

DESIGN AND ANALYSIS OF TOMATO SUPPLY CHAIN IN TANZANIA: THE CASE OF SELECTED REGIONS

Submitted in partial fulfilment of the requirements for the degree of

Doctor of Philosophy

by

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October, 2019

DECLARATION

I hereby declare that the thesis entitled “DESIGN AND ANALYSIS OF TOMATO SUPPLY CHAIN IN TANZANIA: THE CASE OF SELECTED REGIONS” submitted by me, for the award of the degree of *Doctor of Philosophy* to GU University is a record of bonafide work carried out by me under the supervision of Dr Sadananda Prusty.

I further declare that the work reported in this thesis has not been submitted and will not be submitted, either in part or in full, for the award of any other degree or diploma in this institute or any other institute or university.

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CERTIFICATE

This is to certify that the thesis entitled “DESIGN AND ANALYSIS OF TOMATO SUPPLY CHAIN IN TANZANIA: THE CASE OF SELECTED REGIONS” submitted by MARTIN MATHIAS DOME (School of Business) GU University, for the award of the degree of *Doctor of Philosophy*, is a record of bonafide work carried out by him/her under my supervision, as per the GU code of academic and research ethics.

The contents of this report have not been submitted and will not be submitted either in part or in full, for the award of any other degree or diploma in this institute or any other institute or university. The thesis fulfils the requirements and regulations of the University and in my opinion, meets the necessary standards for submission.

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ABSTRACT

Production and consumption of “tomato” in many cuisines has continued to be popular worldwide. This calls for serious studies for continuous improvements of the subsector to benefit all the actors including the small-scale farmers. Previous studies have identified both business opportunities and constraints. From a supply chain’s perspective, the constraints cover the complete chain from input supply to markets. Thus, there is the poor/low rate of the use of supply chain management practices and small-scale farmers are mostly disadvantaged actors. The main objective of this study was to contribute to development of tomato supply chain in Tanzania with respect to small-scale farmers. This is the first empirical study to research on three regions, hence, larger scope than before. The researcher used questionnaires, documentary sources and direct observation to collect both qualitative and quantitative data. Parametric and non-parametric statistical models were used. Data were analysed using the SPSS package. The results show that: there are numerous actors. Short, medium and long routes are used to deliver goods and services to customers. Few strategic arrangements to achieve actors’ common objective(s) exist. Often, goods and services move through fragmented actors. Farmers and traders normally recover their business costs though, comparatively, traders earn more profit. Actors’ relationships depend on placement along the chain; the close the actor is, the more the relationship and vice-versa. Thus, the supply chain relationship between actors determines the structure of the chain. The would-be the focal firm (small-scale farmers) have failed to assume full responsibility for holistic strategy formulation and implementation due to: small size; less education; less market information; lack of capital; unable to sell directly; weak relationships, trust and resource sharing (limited to fellow farmers and tier one suppliers and customers); remotely located; inadequate government support; and dependency of rainfed agriculture. Consequently, opportunistic traders join and assume the chain leadership causing mistrusts amongst actors. A remedying model has been suggested to transform the subsector from traditional, production-driven dominated with spot markets to value-based consumer-cantered focus for a win-win situation for all the actors. The researcher recommends that future researchers should explore more scope whereas future practitioners and the government should address the constraints identified herewith to make the subsector more rewarding and appealing to all the actors.

DEDICATION

“To my beloved parents”.

ACKNOWLEDGEMENTS

The accomplishment of this work was not an easy job. It was made possible through assistance and prayers by many people.

First, I would like to thank the Almighty God for the good health He blessed me throughout my life and in specific during my PhD studies.

Secondly, I thank my supervisor, Professor Sadananda Prusty (PhD) for his tireless guidance throughout my studies. He was fully committed to guiding and assisting me whenever I wanted his assistance. He also encouraged me whenever I encountered a broken heart towards the accomplishment of my studies. Frankly speaking, he acted not only as a supervisor but as a real parent.

Thirdly, I thank my Professor in Research Methodology and Elementary Econometrics modules, Professor-Madam Shalini Sharma. It's she who built my foundation for the research that enabled the accomplishment of this work.

Fourthly, I Thank my mom Mrs. Theresia Hemela for all the good things she has extended to me to make me look the way I am today.

Fifth, I thank my wife Mrs Tekla Mathias, my daughters: Anjela and Rose, and my son Dome for their patience and support they extended to me during my studies. They always missed me at home when I had to be at school and at research sites; however, they remained patient, supportive and loving.

Last but not least, I thank my employer, the Government of the United Republic of Tanzania via the Institute of Accountancy Arusha for a full sponsorship to my studies. Sincerely speaking, I lacked nothing that you couldn't offer throughout my studies.

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Table of Contents

Contents

DECLARATION	II
CERTIFICATE	III
ABSTRACT	IV
DEDICATION	V
ACKNOWLEDGEMENTS	VI
TABLE OF CONTENTS	VII
LIST OF TABLES	XI
LIST OF FIGURES	XIII
SYMBOLS & NOTATIONS	XV
LIST OF PUBLICATIONS FROM THE THESIS	XIX
CHAPTER ONE: INTRODUCTION	1
1.1 RESEARCH BACKGROUND	1
1.2 STATEMENT OF THE PROBLEM	3
1.3 OBJECTIVES OF THE STUDY	6
1.4 SIGNIFICANCE OF THE STUDY	6
1.5 SCOPE OF THE STUDY	7
1.6 PURPOSE OF THE STUDY	8
1.7 CHAPTER SUMMARY	10
1.8 THESIS STRUCTURE	10
CHAPTER TWO: LITERATURE REVIEW	11
2.0 INTRODUCTION	11
2.1 MEANING AND OBJECTIVES OF THE LITERATURE REVIEW	11
2.2 REASONS FOR LITERATURE REVIEW	11
2.3 LITERATURE TREE DIAGRAM	12
2.4 EVOLUTION OF SUPPLY CHAIN MANAGEMENT	12
2.5 SUPPLY CHAIN, SUPPLY CHAIN MANAGEMENT AND VALUE CHAIN	13
2.5.1 <i>Supply chain</i>	13
2.5.2 <i>Advantages of SC to individual members</i>	14
2.5.3 <i>Supply Chain Management</i>	14
2.5.4 <i>Value Chain</i>	17
2.6 SUPPLY CHAIN MANAGEMENT IN FRESH AGRI-FOOD SUBSECTOR	18
2.6.1 <i>Specific characteristics of food SC networks</i>	19
2.6.2 <i>Value-based SC model</i>	20
2.6.3 <i>Challenges faced by primary product producers when constructing values-based food SCs</i>	22
2.6.4 <i>Agri-food SC framework</i>	23
2.6.5 <i>Rising interests in SCM in the food and agribusiness sector</i>	24
2.6.6 <i>Benefits and challenges in managing food/agribusiness SCs</i>	25
2.7 DESIGN AND ANALYSIS OF FRESH AGRI-FOOD SCs	26

2.7.1	<i>SC analysis</i>	26
2.7.2	<i>SC design issues and techniques</i>	27
2.7.3	<i>Comparison amongst the existing design and analysis techniques/models</i>	28
2.8	EMPIRICAL LITERATURE – CRITICAL FINDINGS AND GAPS	34
2.9	CHAPTER SUMMARY.....	54
CHAPTER THREE: TOMATO SUPPLY CHAIN		55
3.1	INTRODUCTION	55
3.2	TOMATO IN THE WORLD	55
3.3	REGIONAL TRADE FLOWS	57
3.3.1	<i>Tomato in Kenya</i>	58
3.3.2	<i>Tomato in Uganda</i>	59
3.3.3	<i>Tomato in Rwanda</i>	60
3.4	ANALYSIS OF TOMATO PRODUCTION, PROCESSING AND MARKETING IN TANZANIA	61
3.4.1	<i>Tomato producing Regions in Tanzania</i>	63
3.4.2	<i>Actors and structure of tomato sub-sector in Tanzania: an SCM perspective</i>	64
3.4.3	<i>Business relationships in tomato SC</i>	66
3.4.4	<i>Situational analysis of the tomato sub-sector in Tanzania</i>	67
3.5	AGRICULTURAL POLICIES IN TANZANIA.....	70
3.6	CHAPTER SUMMARY	73
CHAPTER FOUR: FORMULATION OF HYPOTHESES, CONCEPTUAL FRAMEWORK AND MODEL SPECIFICATION		74
4.1	INTRODUCTION	74
4.2	HYPOTHESES FORMULATION.....	74
4.2.1	<i>SC structure/configuration</i>	75
4.2.2	<i>The integration (relationship) issues of TSC in Tanzania</i>	78
4.3	CONCEPTUAL FRAMEWORK	83
4.4	MODEL SPECIFICATION AND VARIABLE DESCRIPTION	84
4.4.1	<i>Definitions of research variables</i>	86
4.5	CHAPTER SUMMARY	89
CHAPTER FIVE: METHODOLOGY AND RESEARCH PLAN		90
5.1	INTRODUCTION	90
5.2	SELECTION AND JUSTIFICATION OF THE RESEARCH DESIGN.....	90
5.3	STUDY AREA AND TARGETED POPULATION	93
5.4	SAMPLING PROCEDURE/TECHNIQUES AND SAMPLE SIZE.....	95
5.4.1	<i>Sampling of geographical areas to conduct the study</i>	95
5.4.2	<i>Sampling of units of study</i>	96
5.4.3	<i>Sample size</i>	96
5.5	DATA COLLECTION INSTRUMENTS	97
5.5.1	<i>Designing and piloting of the study questionnaire</i>	98
5.5.2	<i>Designing of other data collection instruments</i>	99
5.5.3	<i>Reliability and validity of measurement</i>	101
5.6	METHODS OF DATA ANALYSIS	102
5.6.1	<i>Wilcoxon signed-rank test model</i>	102

5.6.2	<i>Student's t-test technique</i>	103
5.6.3	<i>Logistic regression</i>	104
5.6.4	<i>Descriptive statistics</i>	105
5.7	CHAPTER SUMMARY	106
CHAPTER SIX: RESULTS AND DISCUSSION		107
6.1	INTRODUCTION	107
6.2	RESPONDENTS PROFILE RESULTS	108
6.2.1	<i>Farmers' bio-data</i>	109
6.2.2	<i>Wholesalers' biodata</i>	112
6.2.3	<i>Agents/Brokers' biodata</i>	114
6.2.4	<i>Retailers' biodata</i>	116
6.2.5	<i>Input Retailers' biodata</i>	118
6.2.6	<i>Transporters' biodata</i>	120
6.2.7	<i>Processors' and government officials' biodata</i>	122
6.3	STRUCTURE OF THE QUESTIONNAIRE AND INHERENT VARIABLES	122
6.3.1	<i>Respondents' personal bio-data</i>	122
6.3.2	<i>TSC Status Quo</i>	122
6.3.3	<i>TSC relationship dynamics</i>	123
6.3.4	<i>Nature of TSC relationships and TSC configuration/structural interactions</i>	125
6.4	RELIABILITY MEASUREMENT RESULTS	126
6.5	GENERAL ANALYSIS OF THE PRIMARY ACTORS.....	130
6.5.1	<i>TSC Status Quo</i>	130
6.5.2	<i>TSC Relationship Dynamics</i>	147
6.5.3	<i>Nature of TSC Relationships and TSC Configuration/Structural Interactions</i>	177
6.6	GENERAL ANALYSIS OF THE SECONDARY ACTORS.....	185
6.6.1	<i>General Analysis of transporters</i>	185
6.6.2	<i>General Analysis of processors</i>	187
6.6.3	<i>General Analysis of government officials</i>	194
6.7	OPERATIONALIZATION OF THE RESEARCH MODEL	197
6.8	HYPOTHESES TESTING	213
6.9	SUGGESTION FOR AN SC PERFORMANCE MODEL.....	229
6.9.1	<i>Wished TSC Map (Design) by Small-Scale Tomato Farmers</i>	229
6.9.2	<i>A suggest SC performance model for small-scale tomato farmers using well-established performance indicators</i>	231
6.10	CHAPTER SUMMARY	233
CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS		234
7.1	INTRODUCTION	234
7.2	CONCLUSIONS.....	234
7.2.1	<i>Achievement of the first research objective</i>	234
7.2.2	<i>Achievement of the second research objective</i>	237
7.2.3	<i>Achievement of the third research objective</i>	239
7.3	RECOMMENDATIONS.....	240
7.3.1	<i>Recommendations for future research</i>	240
7.3.2	<i>Recommendations for future practice</i>	241

7.3.3 <i>Recommendations to policymakers, stakeholders and government leaders</i>	242
7.4 LIMITATIONS OF THE STUDY	243
7.6 CHAPTER SUMMARY	244
BIBLIOGRAPHY	245
APPENDICES	265

List of Tables

TABLE 2. 1: OVERVIEW OF THE MAIN CHARACTERISTICS OF FOOD SC NETWORKS AND THEIR IMPACT ON LOGISTICS AND INFORMATION AND COMMUNICATION TECHNOLOGY	20
TABLE 2. 2: DIFFERENCES BETWEEN VALUES-BASED FOOD SCs AND TRADITIONAL FOOD SCs	22
TABLE 2. 3: SUMMARY OF LITERATURE FINDINGS AND GAPS IDENTIFIED.....	36
TABLE 2. 4: SUMMARIZED RESEARCH FINDINGS IN AGRI-FOOD SC	41
TABLE 3. 1: CROSS-BORDER TOMATO EXPORT	56
TABLE 3. 2: THE TOP 15 TOMATO PRODUCING COUNTRIES IN AFRICA	56
TABLE 3. 3: 2010 TOMATO PRODUCTION AND TRADE VOLUMES DATA (MT)	58
TABLE 3. 4: SUMMARY OF TOMATO PRODUCTION IN TANZANIA.....	62
TABLE 3. 5: PLANTED AREA AND YIELD OF TOMATO (T/HA) PER REGION, INCLUDING ZANZIBAR	64
TABLE 3. 6: SUMMARY OF BUSINESS RELATIONSHIPS IN TOMATO VALUE CHAIN.....	67
TABLE 4. 1: VARIABLE EXPLANATION	86
TABLE 4. 2: DEFINITION OF RESEARCH VARIABLES	87
TABLE 5. 1: SUMMARY OF RESEARCH DESIGNS USED AND THEIR TACTICS BY DIFFERENT AUTHORS	93
TABLE 5. 2: SAMPLE CATEGORY, LOCATION, SAMPLING TECHNIQUES AND REASONS FOR SAMPLING	97
TABLE 5. 3: MAIN TASKS ASSOCIATED WITH GENERIC VALUE CHAIN ANALYSIS	100
TABLE 6. 1: SUMMARY OF DATA COLLECTION	109
TABLE 6. 2: VARIABLES UNDER SECTION-2A FOR SELECTING IMMEDIATE CUSTOMERS AND SUPPLIERS AND BUYING FACTORS.....	123
TABLE 6. 3: VARIABLES WITH THEIR CODED NAMES	123
TABLE 6. 4: RELIABILITY STATISTIC.....	126
TABLE 6. 5: ITEM-TOTAL STATISTICS FOR BUYING METHODS	127
TABLE 6. 6: ITEM-TOTAL STATISTICS FOR CONTRIBUTION OF GOOD TSC RELATIONSHIP TO SUPPLY/VALUE CHAIN COMPETITIVENESS	127
TABLE 6. 7: ITEM-TOTAL STATISTICS FOR ACTORS’ ACCESS TO FORMALIZED MARKETS	128
TABLE 6. 8: ITEM-TOTAL STATISTICS FOR SATISFACTION RATING WITH PARTNERS OTHER THAN PRIMARY CUSTOMERS AND SUPPLIERS.....	128
TABLE 6. 9: ITEM-TOTAL STATISTICS FOR DEGREE OF COLLABORATION	129
TABLE 6. 10: ITEM-TOTAL STATISTICS FOR RELATIONSHIP PARAMETERS.....	129
TABLE 6. 11: IMMEDIATE SUPPLIERS AND CUSTOMERS FOR PRIMARY ACTORS IN TSC.....	135
TABLE 6. 12: SUMMARY OF THE DEGREE OF COLLABORATION FOR EACH RESPONDENT CATEGORY	181
TABLE 6. 13: IMMEDIATE CUSTOMER: FARMER TO WHOLESALE	199
TABLE 6. 14: IMMEDIATE CUSTOMER: FARMER TO SEED COMPANY	200
TABLE 6. 15: IMMEDIATE CUSTOMER: FARMER TO RETAILER	201
TABLE 6. 16: IMMEDIATE CUSTOMER: FARMER TO CONSUMER	202
TABLE 6. 17: IMMEDIATE CUSTOMER: FARMER TO BROKER	202
TABLE 6. 18: IMMEDIATE CUSTOMER: WHOLESALER BROKER	203

TABLE 6. 19: IMMEDIATE CUSTOMER: WHOLESALER TO CONSUMER	204
TABLE 6. 20: IMMEDIATE CUSTOMER: BROKER TO RETAILER.....	204
TABLE 6. 21: IMMEDIATE CUSTOMER: BROKER TO WHOLESALER	205
TABLE 6. 22: IMMEDIATE CUSTOMER: RETAILER TO BROKER.....	206
TABLE 6. 23: IMMEDIATE CUSTOMER: RETAILER TO RETAILER.....	206
TABLE 6. 24: SUMMARISED RESULTS OF DISCRETE-LOGISTIC MODEL	208
TABLE 6. 25: IMMEDIATE CUSTOMER: FARMER TO PROCESSOR.....	209
TABLE 6. 26: IMMEDIATE CUSTOMER: WHOLESALER TO PROCESSOR	210
TABLE 6. 27: IMMEDIATE CUSTOMER: WHOLESALER TO RETAILER	210
TABLE 6. 28: IMMEDIATE CUSTOMER: WHOLESALER TO WHOLESALER.....	211
TABLE 6. 29: IMMEDIATE CUSTOMER: BROKER TO BROKER	211
TABLE 6. 30: IMMEDIATE CUSTOMER: BROKER TO CONSUMER.....	211
TABLE 6. 31: IMMEDIATE CUSTOMER: BROKER TO PROCESSOR.....	212
TABLE 6. 32: IMMEDIATE CUSTOMER: RETAILER TO CONSUMER.....	212
TABLE 6. 33: IMMEDIATE CUSTOMER: RETAILER TO PROCESSOR	212
TABLE 6. 34: IMMEDIATE CUSTOMER: RETAILER TO WHOLESALER	213
TABLE 6. 35: FARMERS UNDERSTAND THE REQUIREMENTS AND EXPECTATIONS OF THEIR CUSTOMERS	214
TABLE 6. 36: WHOLESALERS UNDERSTAND THE REQUIREMENTS AND EXPECTATIONS OF THEIR CUSTOMERS.....	215
TABLE 6. 37: BROKERS UNDERSTAND THE REQUIREMENTS AND EXPECTATIONS OF THEIR CUSTOMERS	216
TABLE 6. 38: RETAILERS UNDERSTAND THE REQUIREMENTS AND EXPECTATIONS OF THEIR CUSTOMERS	217
TABLE 6. 39: SUMMARY OF HYPOTHESES TESTING FOR H_01A-D	218
TABLE 6. 40: PAIRED SAMPLES STATISTICS	221
TABLE 6. 41: PAIRED SAMPLES CORRELATIONS.....	222
TABLE 6. 42: PAIRED SAMPLES TEST	223
TABLE 6. 43: RELATIONSHIP BETWEEN FARMER AND VARIOUS ACTORS IN TSC	225
TABLE 6. 44: RELATIONSHIP BETWEEN BROKER AND VARIOUS ACTORS IN TSC	225
TABLE 6. 45: RELATIONSHIP BETWEEN RETAILER AND VARIOUS ACTORS IN TSC.....	226
TABLE 6. 46: RELATIONSHIP BETWEEN WHOLESALER AND VARIOUS ACTORS IN TSC	226
TABLE 6. 47: HYPOTHESES TESTING SUMMARY RESULTS.....	228

List of Figures

FIGURE 2. 1: LITERATURE TREE.....	12
FIGURE 2. 2: A TYPICAL AGRI-FOOD SC STRUCTURE.....	24
FIGURE 3. 1: TOMATO PEAK HARVEST PERIODS FOR KENYA, TANZANIA AND UGANDA.....	61
FIGURE 3. 2: TOMATOES, PRODUCTION QUANTITY TANZANIA.....	62
FIGURE 4. 1: CONCEPTUAL FRAMEWORK.....	83
FIGURE 5. 1: GEOGRAPHICAL ZONES OF TANZANIA.....	94
FIGURE 5. 2: ADMINISTRATIVE REGIONS OF TANZANIA.....	95
FIGURE 6. 1: GENDER OF FARMERS.....	110
FIGURE 6. 2: AGE OF FARMERS.....	111
FIGURE 6. 3: EDUCATION OF FARMERS.....	111
FIGURE 6. 4: EXPERIENCE OF FARMERS.....	112
FIGURE 6. 5: GENDER OF WHOLESALERS.....	113
FIGURE 6. 6: AGE OF WHOLESALERS.....	113
FIGURE 6. 7: EDUCATION OF WHOLESALERS.....	114
FIGURE 6. 8: EXPERIENCE OF WHOLESALERS.....	114
FIGURE 6. 9: GENDER OF AGENTS/BROKERS.....	115
FIGURE 6. 10: AGE OF AGENTS/BROKERS.....	115
FIGURE 6. 11: EDUCATION OF AGENTS/BROKERS.....	116
FIGURE 6. 12: EXPERIENCE OF AGENTS/BROKERS.....	116
FIGURE 6. 13: GENDER OF RETAILERS.....	117
FIGURE 6. 14: AGE OF RETAILERS.....	117
FIGURE 6. 15: EDUCATION OF RETAILERS.....	118
FIGURE 6. 16: EXPERIENCE OF RETAILERS.....	118
FIGURE 6. 17: GENDER OF INPUT RETAILERS.....	119
FIGURE 6. 18: AGE OF INPUT RETAILERS.....	119
FIGURE 6. 19: EDUCATION OF INPUT RETAILERS.....	120
FIGURE 6. 20: EXPERIENCE OF INPUT RETAILERS.....	120
FIGURE 6. 21: GENDER OF TRANSPORTERS.....	120
FIGURE 6. 22: AGE OF TRANSPORTERS.....	121
FIGURE 6. 23: EDUCATION OF TRANSPORTERS.....	121
FIGURE 6. 24: EXPERIENCE OF TRANSPORTERS.....	122
FIGURE 6. 25: THE EXISTING TOMATO SC MAP (CONFIGURATION).....	136
FIGURE 6. 26A-B: QUALITY AND PRICE (& DISCOUNTS).....	140
FIGURE 6. 27A-B: CUSTOMER CARE AND DELIVERY RELIABILITY.....	140
FIGURE 6. 28: FAST DELIVERY-ORDER WINNERS.....	141
FIGURE 6. 29: QUALITY.....	143
FIGURE 6. 30: PRICE (& DISCOUNTS).....	144
FIGURE 6. 31: DELIVERY RELIABILITY.....	145

FIGURE 6. 32: FAST DELIVERY	145
FIGURE 6. 33: CUSTOMER CARE	146
FIGURE 6. 34: LOCATION	146
FIGURE 6. 35: PIE CHART: THERE ARE BENEFITS TO ALL PARTNERS	158
FIGURE 6. 36: BAR CHART: THERE ARE BENEFITS TO ALL PARTNERS	158
FIGURE 6. 37: PIE CHART: GOOD TSC RELATIONSHIP RESULTS IN A HIGH-PROFIT MARGIN.....	159
FIGURE 6. 38: BAR CHART: GOOD TSC RELATIONSHIP RESULTS IN HIGH-PROFIT-MARGIN	160
FIGURE 6. 39: PIE CHART: GOOD TSC RELATIONSHIP RESULTS IN INCREASED SALES.....	161
FIGURE 6. 40: BAR CHART: GOOD TSC RELATIONSHIP RESULTS IN INCREASED SALES	161
FIGURE 6. 41: PIE CHART: GOOD TSC RELATIONSHIP GENERATE HIGH-VALUE-ADDED PRODUCTS	162
FIGURE 6. 42: BAR CHART: GOOD TSC RELATIONSHIP GENERATE HIGH-VALUE-ADDED PRODUCTS....	162
FIGURE 6. 43: PIE CHART: I DO ACCESS TOMATO FORMALIZED MARKET SEGMENTS.....	163
FIGURE 6. 44: BAR CHART: I DO NOT ACCESS TOMATO FORMALIZED MARKET SEGMENTS	164
FIGURE 6. 45: QUALITY CONSTRAINTS	165
FIGURE 6. 46: QUALITY IS NOT A MAJOR LIMITING FACTOR	165
FIGURE 6. 47: QUANTITY CONSTRAINTS	166
FIGURE 6. 48: QUANTITY IS NOT A MAJOR LIMITING FACTOR.....	167
FIGURE 6. 49: SEASONALITY/RELIABILITY CONSTRAINTS	168
FIGURE 6. 50: SEASONALITY IS NOT A LIMITING MAJOR FACTOR	168
FIGURE 6. 51: LOCATION CONSTRAINTS AS PERCEIVED BY ACTORS	169
FIGURE 6. 52: LOCATION IS NOT A MAJOR LIMITING FACTOR.....	169
FIGURE 6. 53: WE SHARE RISKS AS A RESULT OF UNFORESEEN EVENTS	170
FIGURE 6. 54: WE DON'T SHARE RISKS.....	170
FIGURE 6. 55: PIE CHART: WE SHARE RESOURCES IN OUR OPERATIONS	171
FIGURE 6. 56: BAR CHART: WE SHARE RESOURCES IN OUR OPERATIONS	171
FIGURE 6. 57: PIE CHART: WE ASSIST OUR FELLOW TO BUY/SELL	172
FIGURE 6. 58: PIE CHART: WE ASSIST OUR FELLOW TO BUY/SELL	173
FIGURE 6. 59: PIE CHART: MY SUPPLIERS ARE HONEST AND TRUSTWORTHY.....	174
FIGURE 6. 60: BAR CHART: MY SUPPLIERS ARE HONEST AND TRUSTWORTHY	174
FIGURE 6. 61: PIE CHART: MY CUSTOMERS ARE HONEST AND TRUSTWORTHY	175
FIGURE 6. 62: BAR CHART: MY CUSTOMERS ARE HONEST AND TRUSTWORTHY.....	175
FIGURE 6. 63: FARMERS' DEGREE OF COLLABORATION WITH OTHER ACTORS.....	178
FIGURE 6. 64: WHOLESALERS' DEGREE OF COLLABORATION WITH OTHER ACTORS.....	179
FIGURE 6. 65: BROKERS' DEGREE OF COLLABORATION WITH OTHER ACTORS	179
FIGURE 6. 66: RETAILERS' DEGREE OF COLLABORATION WITH OTHER ACTORS	180
FIGURE 6. 67: INPUT RETAILERS' DEGREE OF COLLABORATION WITH OTHER ACTORS	180
FIGURE 6. 68: OVERALL DEGREE OF COLLABORATION IN TSC	181
FIGURE 6. 69: FARMERS' RELATIONSHIP PARAMETERS.....	182
FIGURE 6. 70: WHOLESALERS' RELATIONSHIP PARAMETERS	183
FIGURE 6. 71: BROKERS' RELATIONSHIP PARAMETERS.....	183
FIGURE 6. 72: RETAILERS' RELATIONSHIP PARAMETERS.....	184
FIGURE 6. 73: INPUT SUPPLIERS (RETAILERS) RELATIONSHIP PARAMETERS.....	185
FIGURE 6. 74: THE EXISTING AND THE 'WISHED' TSC MAP (DESIGN) FOR SMALL-SCALE FARMERS	230
FIGURE 6. 75: THE SUGGESTED TSC MAP (DESIGN).....	231

Symbols & Notations

AFSC	-	Agri-Food Supply Chain
AFSCQ	-	Agri-Food Supply Chain Quality
AVRDC	-	The World Vegetable Centre
CF	-	Contract Farming
DAS	-	District Administrative secretary
DED	-	District Executive Director
DP	-	Dynamic Programming
DRC	-	Democratic Republic of Congo
DSS	-	Decision Support System
EAC	-	East African Community
Ed	-	Education
Exp	-	Experience
F&V	-	Fruits and Vegetables
FAO	-	Food and Agriculture Organization
FDI	-	Foreign Direct Investment
FFV	-	Fresh Fruits and Vegetables
FOA	-	Fortune of Africa
GAP	-	Good Agricultural Practices
GNP	-	Gross National Product
GP	-	Goal Programming
HODECT	-	Horticultural Development Council of Tanzania

IFAD	-	International Fund for Agricultural Development
IT	-	Information technology
IVORI	-	Iringa Vegetable Oils and Related Industries
JIT	-	Just-In-Time
LGA	-	Local Government Authority
LP	-	Linear Programming
MIP	-	Mixed Integer Programming
MT	-	Metric Ton
N/A	-	Not Applicable
NBS	-	National Bureau of Statistics
NGO	-	Non-Governmental Organization
NIAEM	-	National Institute of Agricultural Extension Management
NMB	-	National Microfinance Bank
OEM	-	Original Equipment Manufacturer
OSHA	-	Occupational Safety and Health Administration
PBRA	-	Plant Breeders Rights Act
PFSCQ	-	Perishable Food Supply Chain Quality
PhD	-	Philosophiae Doctor
PHLs	-	Post-harvest losses
PPA	-	Plant Protection Act
PRIDE	-	Promotion of Rural Initiative and Development Enterprises

RAS	-	Regional Administrative Secretary
RBQ	-	Rank Based Quotient
Rev	-	Revenue
RUDI	-	Rural Urban Development Initiative
SACCOS	-	Savings and Credit Cooperatives
SADC	-	Southern African Development Community
SCC	-	Supply Chain Collaboration
SCM	-	Supply Chain Management
SCN	-	Supply Chain Network
SCOR	-	Supply Chain Operations Reference
SCRQ	-	Supply Chain Relationship Quality
SCRs	-	Supply Chain Relationships
SC	-	Supply Chain
SDP	-	Stochastic Dynamic Programming
SIDO	-	Small Industries Development Organization
SMEs	-	Small and Medium Enterprises
SP	-	Stochastic Programming
SPSS	-	Statistical Package for Social Sciences
SUA	-	Sokoine University of Agriculture
SWOT	-	Strength, Weakness, Opportunities and Threats
TAHA	-	Tanzania Horticultural Association

TBS	-	Tanzania Bureau of Standards
TFDA	-	Tanzania Food and Drags Authority
TOSCII	-	Tanzania Official Seed Certification Institute
TPA	-	Tanzania Ports Authority
TPB	-	Tanzania Postal Bank
TPRI	-	Tropical Pesticides Research Institute
TRA	-	Tanzania Revenue Authority
TSC	-	Tomato Supply Chain
TZS.	-	Tanzania Shillings
UAE	-	United Arab Emirates
UGC	-	University Grants Commission
URT	-	United Republic of Tanzania
USAID	-	United States Agency for International Development
VEO	-	Village Executive Officer
VICOBA	-	Village Cooperative Bank
VSC	-	Vegetable Supply Chain
WEO	-	Ward Executive Officer

List of Publications from the Thesis

1. Dome, M.M. (2015), Supplier Development-the Catalyst for Empowering Smallholders in Supplying High-value Products-a Case of Fruits and Vegetable in Northern Tanzania. Zenith International Journal of Multidisciplinary Research Vol.5 (2), 39-62.

(UGC Approved)

2. Dome, M. M. and Prusty, S. (2016). An Analysis of Vegetable SC in Arusha Region, Tanzania. Zenith International Journal of Multidisciplinary Research Vol.6 (1), 139-167.

(UGC Approved)

3. Dome, M. M. and Prusty, S. (2017). Determination of vegetable postharvest loss in the last-mile SC in Tanzania: a lean perspective. Int. J. Logistics Systems and Management, Vol. 27(2), 133-150.

(Scopus Indexed Journal)

4. Dome, M. M. and Prusty, S. (in press). Critical Analysis of factors impacting Trust and Opportunism in Agri-food Supply Chains: The case of Tomatoes in the Northern Tanzania. International Journal of Business Process Integration and Management.

(Scopus Indexed Journal)

5. Dome, M. M. and Prusty, S. (in press). Simulation Modelling and Analysis of Fresh Agri-Food Supply Chain Configuration: The case of Arusha City in Tanzania. International Journal of Business Process Integration and Management. **(Scopus Indexed Journal)**

CHAPTER ONE: INTRODUCTION

1.1 Research background

Tanzania is East Africa's largest democracy, with more than 52.6 million inhabitants (NBS, 2017). Tanzania shares borders with eight countries namely, DRC, Uganda, Kenya, Rwanda, Burundi, Malawi, Zambia, and Mozambique. Historically Tanzania has been dominated by agriculture where rural areas are home to approximately 75 percent of the population, who depend mainly on farming activities for their livelihood (Export.gov, 2016). In Tanzania, agriculture is an important economic sector in terms of food production, employment generation, production of raw material for industries, and generation of foreign exchange earnings. The country has plenty of arable farmland and water resources across diverse agro-climatic zones, (Bernstein at al., 2010). Arable land in Tanzania is estimated at 44 million hectares of which only 24.5 percent is utilized. (Export.gov, 2016). Further, it is estimated that 29.4 million hectares are suitable for irrigation. (TIC, 2018). The planted area has been stable for several years so land expansion could be a major source of agricultural growth. According to URT (2008) and NBS (2013), Tanzania has favourable climatic condition for growing at least all industrial export crops like coffee, tea, sugar, cocoa, cotton, cashew nuts, tobacco, sisal and some non-traditional export crops, such as crops which are not part of the customary diet of the local population and grown primarily for their high cash values and export potentials for example wide range of high value fruits and vegetables (HVFV) amongst others. Tanzania's HVFV cluster consists of fruits and vegetables (F&V) that are grown for export using global best practices to meet international standards for traceability, safety and quality.

Other agricultural strengths in Tanzania include: Potential market within and outside the country; Tanzania's membership in regional trade groupings for example Southern African Development Community (SADC) and East African Community (EAC) and as a subsidiary to international trade protocols; unexploited natural resource stock that permits almost unlimited expansion and diversification in crop and livestock production, (URT 2001). Within SADC and EAC trading blocks, Tanzania enjoys an opportunity to trade with more than 10 countries including, Rwanda, DRC, Kenya, Zambia, Malawi, Uganda, Mozambique, Republic of South Africa, Comoros Islands, Swaziland and Angola. The

regional market accounts for (40%) of the markets for vegetables and fruits produced in Tanzania. Onions, tomatoes, oranges and banana are the main products for the regional market. Tanzania dominates in the production of onions, tomatoes and oranges.

Horticulture industry in Tanzania has been performing well in a number of years. Horticulture registered growth of eight (8) to ten (10) per cent in four consecutive years before the 2008/2009/2010 global economic crunch. Compared to other subsectors in the agriculture sector, the horticulture industry is the fastest growing subsector growing at a rate of 9 to 12 percent per annum. (MMA, 2017). Nevertheless, given the country's potential this amount is still far below the existing potentials. Most priorities of F&V produced are consumed domestically whereas most of the flowers are for export.

Despite the above potentials, government efforts and plans to revive the sub-sector and tap the market opportunities both local and export, little progress has been made to distinguish Tanzania within its neighbourhood or the world at large. Researchers' findings have identified several constraints in F&V supply, value and market chain in Tanzania from on-farm productivity, through transport and freight to markets. These include the following: policy and institutional framework weaknesses that hinder tapping of export opportunities; good policies are not matched with existing institutions on one hand and practice on the other hand; there are limited business models to be used in marketing activities; impediment to food market access; there is lack of knowledge of demand and supply opportunities; storage and logistics are disorganized; large number of food processors don't have strong relationship with their downstream partners from sell-buy relationship; each participant in the SC seeks to optimize individual profit rather than the entire SC network, as the result local processors are less competitive; lack of technical, professionalism, capital investment, managerial skills and physical infrastructure in the country; low productivity; poor coordination and limited capacity; inadequate support services; low quality of agricultural produce; limited practical and systematically quality controls and quality judgments are still based on visual appearance; inadequate participation of the country's private sector in agriculture; crop pest and diseases; weak producer organizations; depressed prices for primary commodities in global market; increased level of post-harvest losses (PHLs) due to inadequate agro-processing facilities and other

reasons; entertaining longer SC; lack of active participation amongst participants in the SC on Tanzanian side; low farm gate prices; high marketing margins; lack of reliable market information; inadequate electrical energy in the country; presence of many players/actors in the SC; data and information collection and analysis is poorly done (Muendo et al., 2004, URT, 2001, ESRF, 2009, Ruteri and Qi Xu, 2009, Saravanan, 2012, Sinha and Kotzab, 2012, Dai Washington, 2007, Hewett, 2003, Bernstein et al., 2010, USAID, 2013, Maertens et al, 2012, Morisset, 2013, WBG, 2013, Wood, 2013). Moreover, there are unbearable PHLs where about one-third of the food in the SC is either lost or wasted at the farm, during storage and distribution or in households, (Vodafone Group, 2011); Tanzanian farmers (Morisset, 2013) don't sell what they produce because they produce what is not needed, however, even if it is needed they don't produce in excess of their consumption, and even if they do, production is done in remote areas not connected by good roads to urban areas where there is demand. Eaton (2007) adds to the list that there is the dominance of spot markets and limited involvement of farmers into contract farming (CF). On the other hand, Maertens et al., (2012) put forward that developing countries have a challenge of supplying high-quality and safe fresh food, challenging legislation, failure to demonstrate a capacity for producing high standard food through labelling and certification and failure to attract foreign direct investment (FDI).

Despite the constraints in the horticulture industry, Tanzania is wishing to follow the lead or even become more superb than other countries like Kenya that is currently ahead. This can be realized through producing high-value vegetable exports within tightly integrated supply chains (SCs) (to avoid spoilage and ensure traceability and safety) that meet stringent supermarket requirements. It will also need to find a way to compete and secure relationships with European supermarkets, the United States of America and the highest growth markets in Russia, India, UAE and Turkey that are highly coveted by many global suppliers (Bernstein et al., 2010).

1.2 Statement of the problem

Tanzania is very potential in the production of horticultural products including tropical fruits; temperate fruits; exotic, indigenous/tropical vegetables and other wild varieties; spice and herb crops; flowers and other ornamental plants. (URT, 2008b).

Picking tomato from vegetables as our case, several business prospects (opportunities) have been identified as well as inhibiting factors (constraints) to the development of the sub-sector. Specifically, the following are the problems that affect the tomato supply chain (TSC) in Tanzania that hinder the country and the individual actors from achieving efficiency and effectiveness: Poor relationship among actors in the TSC both upstream and downstream with suppliers and customers respectively; Lack of information sharing among participants along the TSC; Lack of reliability of the shared information amongst actors in the tomato value chain; Lack of important facilities (postponement possibility) to preserve the quality of tomatoes at one stage when the other stage is currently not ready to accept consignment from the preceding stage; and Lack of incentive alignment amongst actors in the TSC, for example local optimization within functions or stages of a SC – referring to such incentives that focus only on the local impact of an action result in decisions that do not maximize total SC profits.

Efforts have been made to resolve the constraints or problems that inhibit the growth of tomato sub-sector in Tanzania. However, the sector to date is still not performing well. This researcher after going through the literature such as that of Katunzi and Zheng (2010) and Dome and Prusty (2016), hypothesised generally that there is lack of application of the supply chain management (SCM) practices especially in the TSC in Tanzania. This argument can further be supported by the findings that many Small and Medium Enterprises (SMEs) in Tanzania are not ready to adopt SCM practices (Katunzi and Zheng, 2010), and many TSC participants in Tanzania are in SMEs. From SCM point of view, the identified problems in the tomato sub-sector in Tanzania covers the complete chain from input supply through on-farm productivity, processing, to transport and freight to market. This follows that there is the poor or low rate of the use of SCM practices in Tanzania.

By definition, SCM practices are a set of activities undertaken in an organization to promote effective management of its SC (Li et al., 2006). SCM practices involve suppliers in strategic, tactical and operational decision-making. It encourages information sharing and searches for new ways to integrate upstream activities. Moreover, customer contacts are developed by using customer feedback aimed at integrating the downstream activities

and deliver orders directly to customers when needed. Achievement of these goals depends on many factors including: locating closer to the markets, helping suppliers in developing just in time (JIT) capability, creating a compatible platform and SCM teams (Bratić, 2011). Due to the low rate of the use of these practices in managing the TSC in Tanzania, the chain is not managed effectively and as a result, some of the actors are motivated whereas others are not due to being poorly rewarded. In other words, without having well-motivated companies across the SC to work with, other motivated companies will never achieve true competitive advantage since the SC is only as strong as its weakest link (de Souza et al, 2013). One of these weak links in the TSC in Tanzania is opportunism amongst actors. The weaknesses by the actors in Tanzania's TSC can be linked to failure to implement the five distinct dimensions of the SCM practices, namely: strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing and postponement, (Li et al., 2006).

As a result of the above status quo, Tanzania's vegetable sector, tomato sub-sector without exception, is dominated by smallholder growers (Temu and Temu, 2005). These small growers have, until recently, remained less attractive to importers and large retailers such as supermarkets (Ibid.). In response to the above problems, this study sought to suggest an SC performance model and assess its impact on overall TSC performance, however, with attention to small-scale farmers/growers.

Moreover, the study also investigated using 'soft' methods, the relationship between a firm's SCM practices in the tomato sub-sector in Tanzanian. The holistic SC system design and analysis suggested by Soto-Silva et al. (2015) for fresh food SCs in operational research modelling was adopted. The best value SC performance criteria fairly discussed by Ketchen et al., (2008) and many others such as Harrison et al., (2014) and Lembito et al., (2004) were used to build the model. It is clearly observed that the nature of the problems developed for an investigation called for both qualitative and quantitative approaches to research.

1.3 Objectives of the study

The research objectives are the goals which the researcher sets out to fulfil in the act of conducting the study. These consist of the main objective and specific objectives.

Main Objective

The main objective of this study was to contribute to development of tomato SC in Tanzania with respect to small-scale farmers.

Specific Objectives

The above main objective was broken down into the following specific objectives;

- 1) To analyse the structure of the current tomato SC in selected regions of Tanzania with respect to small-scale farmers
- 2) To examine tomato SC relationships and their impact to payoff system amongst tomato SC actors
- 3) To suggest for an SC performance model for small-scale tomato farmers using well-established performance indicators

1.4 Significance of the study

This work would be of no value if its significances were not mentioned because SCM is important to all companies in both public and private sectors as well as individuals.

It was the researcher's expectations that this research would be a big contribution to the world of knowledge. In particular, the following were the researcher's expected outcomes to policymakers, practitioners and researchers in both public and private sectors as well as to this researcher:

To Policymakers: The findings of this study would be of huge importance to policymakers in both public and private institutions. Problems affecting and constraining the TSC and the involved actors –especially small-scale tomato farmers would be identified and counteractive measures in the form of policy recommendations would be suggested for implementation.

To SCM practitioners in agri-food sub-sector: It was the researcher's expectation that findings of this research would provide useful reference materials to the SCM practitioners in agri-food SC in general particularly in the fresh agri-food SC. Moreover, the SC model suggested in this study would certainly improve TSC and hence benefit all the practitioners including small-scale tomato farmers.

For future researchers: Successful completion of this study would create another room for more and more future researchers. In fact, all the identified limitations of this study are potential areas for future researches.

To the current researcher: The knowledge and experience gained in this study would act as a working tool towards enabling the researcher to impart knowledge to the general public as well as conducting future objective researches and consultancy activities of impact to the general society. Moreover, successful completion of this study would produce a report that would enable the researcher to be awarded a PhD qualification in Management.

1.5 Scope of the study

This study was carried out in Tanzania, with a focus on analysing the TSC model in selected regions of Tanzania with respect to small-scale farmers. Although tomato is technically the fruit of the tomato plant, The Concise Oxford Dictionary of Botany (1992), however, it's used as a vegetable in cooking, hence, considered vegetables by nutritionists as well as in this study. To make it manageable, the study was conducted in three out of seven zones of Tanzania. In one hand, from the Northern and Southern highlands zones, Arusha and Iringa regions were purposively selected regions among the tomato producing regions in Tanzania. Other prominent tomatoes producing regions such as Morogoro, Mwanza, Mbeya, Kilimanjaro, and Tanga regions were not studied. (MMA, 2017). Arusha and Iringa were also chosen due to the presence of tomato processing industries (for example Dabaga, IVORI and DARSH). Moreover, Arusha and Iringa were selected due to their distinct specific qualities. While Arusha region is centre /headquarters of most of the potential institutions for tomato farming such as AVRDC - The World Vegetable Centre, for Eastern and Southern Africa, Tropical Pesticides Research Institute (TPRI), Research institutions (Tengeru Horticultural Research Training Institute) and home of most of the

seed companies (for example Kibo Seed, Alpha Seed, E. A. Seed, East-West Seed); Iringa region leads in Planted area, area harvested (ha), quantity harvested (tons) and quantity sold (Tons) (United Republic of Tanzania (URT) 2016).

On the other hand, the Eastern Zone was comprehensively included and Dar es Salaam region was used specifically for being one of the main urban tomato markets in Tanzania. Dar es Salaam market is mostly preferred for tomatoes from Northern Zone (Arusha, Kilimanjaro and Tanga) and Southern Highlands (Iringa and Njombe). Both Arusha and Iringa regions are connected to Dar es Salaam by good roads.

In order for the researcher to get relevant data for this study, the researcher traced out the TSC with a purpose of designing and analysing based on the buy (inputs/raw materials), harvest and deliver (finished products) to the consumers including processors. From SCM point of view, the identified problems cover the complete SC from input supply through on-farm productivity, processing, to transport and freight to market. This is to say, input suppliers, small-scale farmers, wholesalers, brokers, retailer, transporters, processors and government officials from the studied three regions were the potential respondents for this research.

1.6 Purpose of the study

In conducting this study, the author had the purpose of addressing the following pressing issues:

a) Tanzania 2025 vision, Tanzania horticultural development strategy 2012-2021 and government's commitment to reviving agriculture in the country

Tanzania has a goal to flourish economically, socially, politically and culturally by the year 2025. It was expected that by 2025, Tanzania would have graduated from a least developed country to a middle-income country with a high level of human development. One of the dependable sectors for these achievements is agriculture including horticulture. Development of agriculture is believed to have an immense multiplier effect on the economy and contributed to about (50%) to the inflation basket in Tanzania (NBS, 2015).

b) The need to contribute to the current few empirical studies in designing agri-food SCs

It is well argued that despite food sector significance, food SCM has received little attention in the literature (Ronget al., 2011). Yet, modelling of agri-food SCs has predominantly dealt with non-perishable produce due to the claim that perishable crops are considered less important than their non-perishables counterparts such as grains (Ahumada and Villalobos, 2009). It follows therefore that this study, especially in the developing countries such as Tanzania, was timely in this regard. Also, due to the recent more stringent regulations and closer monitoring particularly for products meant for human consumption, the traditional food SC need to be redesigned in response to such requirements (Ibid.). Therefore, this study was timely and of the essence.

c) Need to enhance production and distribution of high-value fresh fruits and vegetables for better returns by small-scale farmers and other actors

Following the fall in demand and price of traditional cash crops from Africa and Tanzania in particular, the researcher thought there was a need to sensitize small-scale farmers to produce high-value crops which had recently recorded high demand and attractive price as a substitute to traditional cash crops such as coffee, cotton and sisal, to mention a few. Lessons from this study would also help relevant authorities and other actors in contributing to tomato subsector performance.

d) A need to respond to the current business challenges following ever-changing business environments with a focus on agriculture sector

The 21st century is a globalized world and its business environment is characterized by free movement of goods and services, fast technological developments, shorter shelf life, too demanding and/or knowledgeable customers and more intense global competition. During the time of conducting this study, the competitive position of Tanzania in producing tomato for export purposes was at infancy stage despite its potentiality. Therefore, this large-scale study was expected to heighten Tanzania's competitive position regionally and globally through a series of recommendations to be generated. The study would also make producers and traders of tomato become

more responsive to the needs of the customer through a combination of capabilities such as speed, delivery and quality. Since agribusiness is also being affected by the above business challenges, findings of this study would create a sense of awareness and preparedness and proposed remedies to overcome the challenges to make Tanzania tomato sub-sector productive, competitive and profitable.

e) Extension of the researcher's previous studies in the form of published articles

Prior to this study, the researcher had conducted several studies in vegetable SCs that suggested areas for further research. One of the published works on vegetable SC suggested the need to improve trading practices by formalising the dominant traditional SC in Tanzania. Therefore, the accomplishment of this study by specifically using tomato as a focal crop would generate lessons through which responsible authorities can use in the market formalisation process.

1.7 Chapter Summary

Chapter one has presented an opening introduction not only for this chapter but also for the whole report. It is in this chapter where the background of the study was given. The chapter has also presented the objectives of the study, significance, scope and purpose of the study. The chapter ends by giving this chapter's summary and the general thesis structure in section 1.8 below.

1.8 Thesis Structure

This thesis is organized into seven chapters including this chapter. The remainder of this thesis is organized into six more chapters whose contents are as follows. Chapter two is for a literature review in which meanings, theoretical and empirical literature related to this study are critically analysed. Chapter three is an extension of the literature chapter in which tomato SCM as the main theme of this study is analysed. Chapter four contains a conceptual framework and hypotheses formulation for this study. In chapter five, the methodology and research plan are explained in detail. Chapter six gives the results and discussion of the study findings. Last but not least, chapter seven gives the conclusions and recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This part consists of previous related studies carried out by researchers in the area of SCM. Special attention is paid to such literature regarding agri-food SCM with a particular interest in fresh produce such as vegetables. The literature sources include articles in academic and professional journals; books or chapters in edited books; government publications; reports for international organizations such as the World Bank reports, and periodicals; unpublished documents such as research reports and conference papers, company reports, and even meeting minutes; and documents published on the web (Saunders et al., 2003; Adam and Kamuzora, 2008).

2.1 Meaning and objectives of the literature review

In simplistic terms, a literature review can be defined as documentation of a comprehensive review of both published and unpublished works from secondary sources of data in the specific interest to the researcher (Sekaran, 2003). In any research activity, a literature review is one of the important aspects to be explored in relation to the topic under investigation. There are many activities (to-do-list) that entail a literature review. These include: identifying, reading, evaluating, describing, summarizing, discussing, citing, and synthesizing various documents. In the above to-do list of literature review, synthesizing and critiquing are most important activities rather than taking things for granted (Adam and Kamuzora, 2008).

2.2 Reasons for literature review

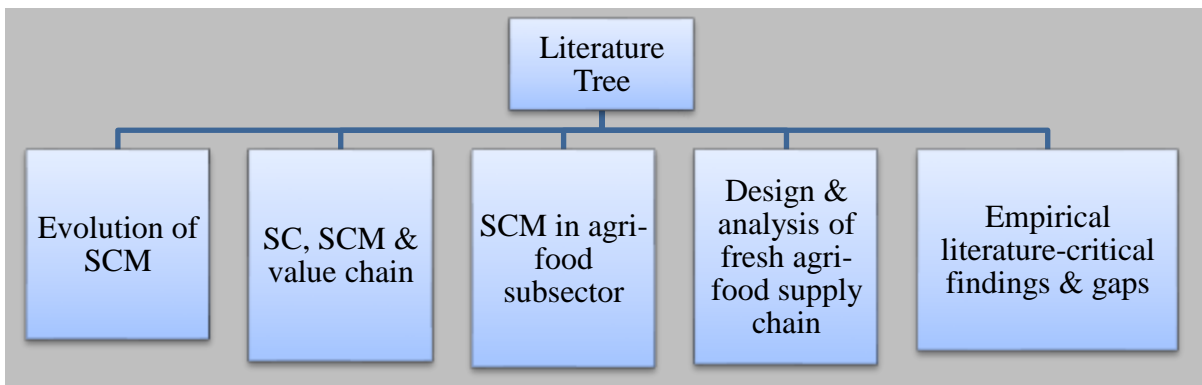
Generally, there are two main reasons for reviewing the literature prior to conducting a research namely, preliminary search-which is meant to help the researcher to generate and refine research ideas and the critical review which is the main part of the researcher's project (Saunders et al., 2003). According to Adam and Kamuzora (2008) the reasons for the literature review include: to avoid unnecessary repetition of topics already researched before; to determine recommendations made for further investigation by previous researchers; to identify appropriate theories to employ in one's research; to refine your research questions, objectives, as well as research problems; to enable the researcher to

develop conceptual framework to guide research; to discover controversy in the published documents; to avoid plagiarism; to help the researcher in selecting an appropriate research design and methodological strategies; to help the research in selecting adequate samples and to help the researcher in revealing some data of which was not aware of before.

2.3 Literature tree diagram

The basis for literature reviewed here comes from the research topic and the research objectives put forth in chapter one. The literature review was conducted using multi-sources. The following are the areas of interest in literature review which thereafter are presented in a tree diagram, Figure 2.1 below: Evolution of SCM; SC, SCM and value chain; SCM in agri-food subsector; Design and analysis of fresh agri-food SCs; and Empirical literature - critical findings and gaps.

Figure 2. 1: Literature Tree



Source: Researcher's construct

In the subsequent sections, the main sub-topics as depicted in Figure 2.1 of literature tree above are reviewed in details together with their subsections.

2.4 Evolution of supply chain management

Academic and commercial interest in SCM goes back to 1990s in Europe and the USA. The driving forces included the trend towards consolidation of organizations (at farm input, farms, processor and supermarket levels), along with government deregulation of agribusiness markets. During the same time, there was a rising interest in quality management systems and food safety, and competition in markets was increasing,

associated with global trade in agribusiness products. Lembito et al., (2004) add to the list of the driving forces to the changes of the global business environments. These are globalization, strategic alliances, merger and acquisition, business process and re-engineering. The rapid advancement of information technology (IT) is also having its effect on businesses and their management. These changes, in turn, affect the management of SCs of all businesses including agribusiness. Timmer (2010) identifies three revolutions that have stimulated the rapid integration of commodity markets, these are: revolution in agricultural technologies that permit highly productive but specialized farming techniques; the revolution in communications and transportation that permits buyers and sellers to connect quickly and at low cost across vast distances and the revolution in global living standards that has brought billions of new consumers into a world of discretionary purchase. According to Brennan (2004), the agri-food sector has moved from a production driven to a customer-driven focus and this has resulted in a restructuring of vertical arrangements in the industry. In this case, CF has emerged as a means of managing supply-chain interdependencies in both developed and developing countries. CF has cost advantages in overcoming quality control and investment issues associated with spot markets while avoiding the large investment and difficult management costs associated with vertical integration (ibid).

2.5 Supply chain, supply chain management and value chain

2.5.1 Supply chain

Many people and institutions have defined SC. Sinha and Kotzab (2012) define SC as that chain of all processes and organizations that are involved in making a product available to customers. Examples of the referred processes include but not limited to, new product development, marketing, operations, distribution, finance and customer service; whereas for the case of organizations they include, suppliers, manufacturers, distributors, wholesalers, retailers and consumers. Sturim (1999) defines SC as the set of business processes and resources that transforms a product from raw materials into finished goods and delivers those goods into the hands of the customer. Ayers (2001) in Sharma (2010) defines SC as life cycle processes comprising physical, information, financial, and knowledge flows where the purpose is to satisfy end-user (customer and customers’

customer) requirements with products and services from multiple linked suppliers (supplier and suppliers' supplier). Therefore, to sum up, SC is comprised with all stages and processes involved, directly or indirectly, in fulfilling a customer request and for an SC to operate; there should be some flows along it including physical material/product and services, information, financial, and knowledge flows.

Advantages of SC to individual members

There are advantages for SC actors who are connected to a common SC. According to NIAEM (n.d.) SCs create synergies and more benefits than if each of the actors has to work independently. Thus, SCs create synergies in the following three ways: First, expanding traditional markets beyond their original boundaries leading to increased sales for all the actors; second, reducing the delivered cost of products lower than the cost of competing chains leading to increased gross margin for the working capital injected by chain actors; and third, targeting specific market segments with specific products, and differentiating the service, product quality, or brand reputation of the products delivered to the market segments as the result, consumer perception of delivered value is increased. Consequently, the chain actors can charge higher prices (ibid).

2.5.2 Supply Chain Management

SCM to Sinha and Kotzab (2012) means the management of such chains, its design, process execution and control. Other definitions for SCM with authors in brackets are as follows: The design and management of seamless, 'value-added' processes across organizations boundaries to meet the real needs of the end customer (Institute for Supply Management); Managing supply and demand, sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, and delivery to the customer (The SC Council); The planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities ... also includes coordination with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers (Council of SCM Professionals); Integrated planning, implementation, coordination and control of all business processes and activities necessary to produce and deliver, as efficiently as possible, products that satisfy market requirements. (Vorst, van

der et al., 2007). From the above definitions for SCM, one important phrase has been introduced that is value-added processes or activities that deserve to be defined. By Articlesbase (2008) Value-adding activities mean, any activity that improves the product appearance, functionality, durability, satisfaction and brand loyalty. This can be in any step: in raw materials manipulation, production, or adjustments and packing of the product. Sinha and Kotzab (2012) explain on the value-adding processes from a different angle where they refer to such business practices which integrate or coordinate the important business areas within a company and among the SC partners. These processes have a special relevance for an SC and its actors (not only customer but also suppliers, distributors, wholesalers and retailers) and despite creating value for customers, these processes also generate flows of goods and related information. The processes include the following: customer relationship management including development and maintenance of relationships with right customers; customer service management referring to the provision of the agreed service levels with customers; demand management for identification of customer requirements and matching them with the company's capabilities; manufacturing flow management including the activities that are necessary to create the required portfolio of products and services in time at the lowest cost; order fulfilment management for providing an information network that is able to execute orders in a timely manner while minimizing the total cost; product development and commercialization including identification and design of future customer solutions in collaboration with customers and suppliers; supplier relationship management including development and maintenance of relationships with right suppliers and, return management associated with reverse flows of goods and management of reusable assets (ibid).

Activities involved in SCM

The following are the activities under SCM, TNAU (2013): Purchasing-the major SC activity since it is the central focus; Quality Control-almost all organizations nowadays recognize how important is quality and the need to prevent rather than simply trying to detect quality problems on finished products; Demand planning-identifies forecasts of anticipated demand, inventory adjustments, order taken but not filled and spare parts, and after-market requirements; Supply planning-the process of taking demand data and

developing a supply, production and logistics network possible of satisfying demand requirements; Materials/inventory control-responsible for determining the inventory level of finished goods required to support the customer requirements and emphasizes physical distribution; Order processing-helps ensure that customer receive material when and where they require, representing the link between the producers and the external customer; Production planning scheduling and control-involves determining a time-phased schedule or production, developing short-term production schedule, and controlling work-in-progress production; Warehouse/distribution-particularly important for companies that produce according to forecast in anticipation of future sales; and Customer service-include a wide set of activities that attempt to keep a customer satisfied with a product or service (ibid).

Key performance indicators of SCM

One of the popularly known and approved model or tools for measuring and managing SC performance is the supply chain operations reference (SCOR) model. Sinha and Kotzab, (2012) proposes five measures or metrics to measure for the SC performance. These are delivery reliability, responsiveness, flexibility, costs, and assets. Reliability, responsiveness and flexibility represent the customer side and deal with the effectiveness of the SC whereas cost and assets, refer to efficiency and represent the internal business perspective. Thus, for a well-performing SC, it is important to find out how well products or services are being delivered to customers and how good is the overall operation of the SC.

Potential benefits of SCM

Sinha and Kotzab (2012) proclaim that implementation of SCM leads to first, cost reduction resulting from reduction of internal inefficiencies and synchronization of activities between companies as a result; redundant processes are taken out of the chain, second, customer satisfaction, this is made possible when companies become more responsive to customer requirements and flexible to the changes in the marketplace.

The SCM benefits apply across businesses including agribusiness. Van Roekel et al. (2001) enumerate the advantages of successful SC development projects in the agricultural sector

as follows: reduces the transaction cost; reduces the institutional barriers that decouple individual links in traditional distribution channels; allows participants to achieve higher levels of service; and allows participants to capture substantial added value thereby serving as leverage points both for economic growth and for poverty alleviation. Moreover, SCM leads to enhanced customer loyalty and improved market share and profitability (Hewett, 2003).

Supply chain management approach

SCM approach is highly needed nowadays in the 21st century where among other things is characterized by turbulent markets. TNAU (2013) supports this argument and provides three factors that emphasize the use of SCM approach. These factors include the following; first, cost and availability of information resources between entities in the SC, as it allows easy linkages that eliminate time delays in the network; second, the level of competition in both domestic and international markets requires organizations to be fast, agile, and flexible; and third, customer expectations and requirements are becoming much more stringent. SCM as a business approach has been more popular in the industrial sector than in the agricultural sector. However, given the current business environment, there is an increased use of SCM in the food and agribusiness sector.

2.5.3 Value Chain

The value chain is closely related term to SC. Value chain is defined as the full range of activities that are required to bring the product or service from the conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services); delivery to final customers; and final disposal after use (Sanogo, 2010; Bockel and Tallec, 2005). It is also argued that both SC and value chain describes the same network of companies that interact to deliver goods and services (Webber and Labaste, 2007). However, the value chain is essentially about value as it is added at every stage of the chain (Ibid.). Other arguments try to differentiate the value chain from a generic SC through the following lines (FAO, 2009): Participants in the value chain have a long-term strategic vision; Participants recognise their dependence on each other and a willingness to work together, define common objectives, share risks and

benefits and make the relationships work; In the value chain, participants have a shared commitment to control produce quality and consistency; and Participants have a high level of confidence among them that allows greater security in business; this, in turn, facilitates the development of common goals and objectives. From a general perspective, industry chains are classified as either 'supply' or 'value' chains. (Bryceson, 2008).

2.6 Supply chain Management in Fresh Agri-Food Subsector

The food sector is one of the main sectors in any country and plays a significant role in the economy. Food sector contributes significantly to the Gross National Product (GNP) of many countries, especially in the developing world. (Gebresenbet and Bosona, 2012). Food value chain is undergoing reforms due to the volatile nature of the world's economy. Currently, the food value chain is characterized by three overriding features as follows. First, greater concentration of farms, food industries, and wholesalers into small number with large sizes; secondly, the evolution of integrated SCs linking producers and other stakeholders; and third, there is ever increasing consumers demand for food quality and safety (food that is fresh, palatable, nutritious, and safe) and animal welfare. (Ibid). The food SC is large and multifaceted involving many stakeholders/firms such as farmers/producers, vendors/agents, wholesalers, rural retailers and suppliers and transporters. These firms are positioned in a network level and each belongs to at least one SC. At any time, each firm or actor buys and sells from and to one or more suppliers and customers respectively. In this case, the performance of one firm is influenced by the performance of other firms directly and/or indirectly (Vorst, van der et al., 2007). Thus, what happens in transactions between two firms does not exclusively depend on the two business partners, but also on the outcomes of other relationships within the chains and networks. (Ibid). In other words, strategic collaboration among actors in the particular SC is unavoidable in one or more areas while each preserving its own identity and autonomy. However, one should be extra careful as to the choice of the business partners as firms may play different roles in different chain settings and therefore you may end up collaborating with competitors. (Ibid).

2.6.1 Specific characteristics of food SC networks

An agri-food system is comprised of all the organizations that are responsible for the production of agricultural produce through distribution until when the produce is in the hands of the end user or consumer. There are mainly two types of these systems namely, agri-food chains for fresh agricultural products and agri-food chains for processed food products. The agri-food chain for fresh products is comprised of different actors such as growers, auctions, wholesalers, importers and exporters, retailers and speciality shops and their input and service suppliers. The products grown by the farmers are exchanged amongst other actors as they move the product downstream to the customers or consumers through such processes like handling, conditioned storing, packing, transportation and actual trading of these products. Essentially, these processes by the SC actors in this system leave the intrinsic characteristics of the grown product as raw as it was produced by the farmers or untouched. In contrast, agri-food chains for processed food products make use of the raw products grown and exchanged among different actors as raw materials for producing consumer value-added finished products. (Vorst, van der et al., 2007). Vorst, van der et al., (2007) have set forth an overview of the main characteristics of food SC networks. Their overview is subdivided into three columns including SC stage, product and process characteristics, and impact on logistics and information and communication technology (ICT). Table 2.1 below gives an overview of the main characteristics of Food SC Networks and their impact on logistics and information and communication technology. The items in the three columns in the table can be illustrated by the following example. Taking seasonality for instance as one of the products and process characteristic of tomato; seasonality has a great impact to growers/producers from responding to the customers' requirements. The growers/producers can only be responsive during harvest tomato season whereas during low season, the farmers can hardly be responsive unless they also use irrigation.

Table 2. 1: Overview of the main characteristics of Food SC Networks and their impact on Logistics and Information and Communication Technology

Supply Chain Stage	Product and Process Characteristics	Impact on Logistics and ICT
Overall	<ul style="list-style-type: none"> • Shelf-life constraints for raw materials, intermediates and finished products and changes in product quality level while progressing the SC (decay) • Recycling of materials required. 	<ul style="list-style-type: none"> • Timing constraints • Information requirement • Return flows
Growers / Producers	<ul style="list-style-type: none"> • Long production times (producing new or additional products takes a lot of time) • Seasonality in production • Variability of quality and quantity of supply 	<ul style="list-style-type: none"> • Responsiveness • Flexibility in process and planning
Food Processing industry	<ul style="list-style-type: none"> • High volume, low variety (although the variety is increasing) production systems • Highly sophisticated capital-intensive machinery leading to the need to maintain capacity utilization • Variable process yields in quantity and quality due to biological variations, seasonality, random factors connected with weather, pests, other biological hazards • A possible necessity to wait for the results of quality tests • Alternative installations, alternative recipes, product-dependent cleaning and processing times, carryover of raw materials between successive product lots. • Storage buffer capacity is restricted when material, intermediates or finished products can only be kept in special tanks or containers • Necessity to value all parts because of the complementary nature of agricultural inputs (for example, beef cannot be produced without the co-product hides) • Necessity for lot traceability of work in process due to quality and environmental requirements and product responsibility 	<ul style="list-style-type: none"> • Importance of production planning and scheduling focusing on high capacity utilization • Flexibility of recipes • Timing constraints, ICT-possibility to confine products • Flexible production planning that can handle this complexity • Need for configurations that facilitate tracking and tracing
Auctions/ Wholesalers / Retailers	<ul style="list-style-type: none"> • Variability of quality and quantity of supply of farm-based inputs • Seasonal supply of products requires global (year-round) sourcing • Requirements for conditioned transportation and storage means 	<ul style="list-style-type: none"> • Pricing issues • Timing constraints • Need for conditioning • Pre-information on quality status of products

Source Von der Vorst et al., 2005

2.6.2 Value-based SC model

Value-based SC is one of the SC models. (Stevenson and Pirog, 2013). Others include competitive bidding (arm's-length) relationships with suppliers on one hand and internal ownership of business activities (vertical integration) on the other hand. However, value-based SCs usually outperform other complex business models in rapidly changing markets.

Characteristics of Values-Based SCs

The following are the general characteristics of values-based SCs (Ibid): Have the capacity to combine scale with product differentiation and cooperation with competition, to achieve collaborative advantages in the market scale; Emphasize on high levels of performance and inter-organizational trust; Emphasize shared values and vision, shared information (transparency) and shared decision-making among the strategic partners; and Make commitments to the welfare of all strategic partners in the chain, including appropriate profit margins, fair wages and long-term business agreements.

In agriculture and food business, contrary to values-based SCs, traditionally businesses were focusing strongly on price and were not equipped to respond to a widening range of consumer demand. This is to say, there were no means for effective consumer response, each actor represented only part of the processes involved in the production of an agribusiness product and its subsequent transport, processing, and retailing to the customer (Woods, 2003). Stevenson and Pirog (2013) distinguish values-based food SCs and traditional food SCs. See Table 2.2 below:

Table 2. 2: Differences between values-based food SCs and traditional food SCs

S/N.	Characterizing factor	Traditional food SCs	Values-based food SCs
1	Relationship type.	Relationships within the SC are often in win-lose terms with resulting levels of inter-organizational mistrust.	Business relationships among strategic partners within these SCs are framed in win-win terms and constructed on collaborative principles that feature high levels of inter-dependence and inter-organizational trust. All values-based food SC partners have a strategic interest in the performance and well-being of other partners.
2	Treatment of primary producers (for example farmers, ranchers and fishers).	Primary producers are treated as interchangeable and exploitable input suppliers, often operating in restricted markets or under short-term contracts where they usually bear risks.	Producers of differentiated food products such as farmers, ranchers, and fishers are treated as strategic partners with rights and responsibilities related to SC information, risk-taking, governance and decision making.
3	Distribution of benefits and profits.	Distribution of the benefits and profits from the selling of finished food products are unevenly distributed across the SC, with food processors and marketers usually receiving a disproportionately higher share.	Commitments are made to the welfare of all strategic partners in a values-based SC, including appropriate profit margins, living wages and business arrangements of appropriate duration.
4	Operations, Location and coordination.	Operations are increasingly located and coordinated on the national and international scale, with food production, processing and marketing sited according to short-term economic gains for those parties who dominate the chain.	Operations can be effectively located and coordinated at local, regional and international scales.

Source: Adapted from Stevenson and Pirog (2013)

2.6.3 Challenges faced by primary product producers when constructing values-based food SCs

Stevenson and Pirog (2013) outline the following as the possible challenges faced by primary product producers (such as farmers, ranchers and fishers) while building values-based SCs: Difficulty in: getting appropriate SC partners and developing mechanisms for building trust, transparency and decision-making; determining effective strategies for product differentiation, branding and regional identity; developing food quality control systems that address weather, seasonality, multiple production sites and quality-preserving distribution mechanisms; determining appropriate strategies for product pricing that are based on understanding true cost structures. Two contrasting strategies are cost-based pricing and paying premium above commodity market prices; building sufficient trust among competing producer groups to form networks of farmers, ranchers or fishers large enough to supply significant and consistent volumes of high-quality, differentiated food

products; acquiring adequate technical, research and development support; creating meaningful standards and consistent certification mechanisms across the SC; and developing equal economic power for SC negotiations. (Ibid).

2.6.4 Agri-food SC framework

There are four main direct SC activities performed by direct supply actors ranging from input supply, through farm production, processing to domestic and international logistics. (Jaffee et al., 2010).

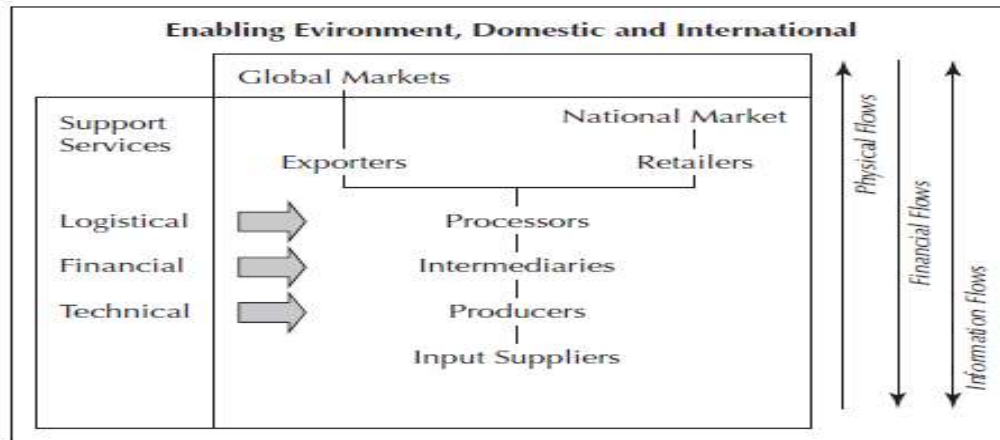
Input supply involves production and distribution of material inputs for example fertilizers, seeds, chemicals (herbicides, fungicides and pesticides), and packaging which are utilized in the primary production, processing and/or trade of the focal commodity. (Ibid).

The farm production stage deals with all the primary production farm activities until when the produced farm raw commodity is passed on to a subsequent SC actor be at the farm gate or any other place. (ibid).

The processing phase deals with the transformation of agricultural raw materials into finished goods. In particular, processing stage involves such activities as drying, canning, freezing, or any other methods. However, depending on the nature of the product, this phase sometimes is skipped when products are traded, distributed and consumed as raw commodities. (Ibid).

The logistics stage deals with the movement of the commodities as they move from one actor to the other until when such commodities are in the hands of the end user. (Ibid). A typical Agri-food SC structure is depicted in Figure 2.2 below.

Figure 2. 2: A typical Agri-food SC structure



Source: (Jaffee et al, 2010).

2.6.5 Rising interests in SCM in the food and agribusiness sector

Food/agribusiness SCM refers to the management of the relationships between the business responsible for the efficient production (including pre-production activities) and supply of products from the farm level to the consumers (and post-consumption activities) to meet consumers' requirements reliably in terms of quantity, quality, and price. (Vorst, van der et al., 2007). Wood (2003) discusses the underlying reasons on the rising interest in SCM in the food and agribusiness sector at the business level and at the consumer level as follows:

At the business level, reasons include: growing interest in the competition for consumer expenditure; greater differentiating of food products; improvement in product quality; the ability to support products in cost-effective ways has provided the consumer with a greatly increased array of products from which to choose (ibid).

At the consumer level, the driving forces include increasing consumer sensitivity to quality, safety, health and nutritional aspects of food products; consumer interest in place of origin and means of production-including non-food values such as environmental sustainability and animal welfare. This is to say current customers do exercise their ability to choose and as the result, they have regained the power that used to be with the suppliers in the past. As the result, hence, impacted the food production and marketing systems (ibid).

2.6.6 Benefits and challenges in managing food/agribusiness SCs

Below are the benefits and challenges in managing food/agribusiness SCs, fruits and vegetable (horticulture) SCs in particular:

a) Benefits: SCM practices are required in horticulture for achieving such benefits as improved fruit or vegetable quality, better service and possibly lower relative costs for the consumer; large sales volumes, faster throughput, sustained prices, and possibly greater profits for the retailers; better control of inventory, higher fruit or vegetable quality and increased returns for the fruit or vegetable trader; and, more importantly, better prices for the grower, (Hewett, 2003). Hewett, further puts it forward that, wastage and poor-quality fruit or vegetable should be eliminated by use of tried and proven postharvest technologies and highly efficient integrated SC. When this is done, prices to the consumer could be lower and those to the growers higher than is traditionally anticipated with those within the chain benefiting from enhanced commissions or margins. In other words, it will be a 'win-win situation' for all parties. (Ibid).

b) Challenge: According to Hewett (2003), the fruits and vegetable SC is complex and challenging with numerous parties involved often not having knowledge of best practices to optimize the quality of their perishable cargo. In fact, relationships within the industry are not favourable, being segmented and full of suspicion among participants. Lack of coordination is predominantly practised among SC participants, growers, for instance, know that they produce perfect produce and consequently expect to receive optimum prices and when they don't, they blame factors beyond the orchard gate like poor retailing, inadequate cooling, or rough transportation. (Ibid). That is, somewhere or someone downstream is responsible for cheating them out of their due rewards, by poor handling, inadequate promotion, or marketing or untimely sales or anything else! Similarly, those who purchase the product for example supermarket chains have to buy products at a low price for them to be able to make profit and they also tend to be suspicious of growers who do not show consistent loyalty, who do not provide consistent quality within and between seasons, who are considered to be wealthy because they own huge land but who always blame about low prices received. This lack of coordination (blaming culture) continues until when the two parties meet and talk openly then they begin understanding the realities

of their respective business. Based on the above scenario, Hewett (2003) confidently concluded that the horticulture industry is heavily affected by disintegration between parties involved in the growing and handling of fresh F&V. This challenge among others was also revealed by Negi and Anand (2015) as well as Dome and Prusty (2016). This calls for the application of true SCM to incorporate all players and let them work collaboratively.

2.7 Design and Analysis of Fresh Agri-Food SCs

2.7.1 SC analysis

SC analysis (SCA) like in many other sectors, maps out the flow from input supply through to the end users while detailing at each stage gains, costs and challenges. SCA is the study of quantitative models that characterize various economic trade-offs in the SC (Simchi-Levi et al., 2008). Theoretically, SCA calls for the unprecedented amalgamation of both prescriptive and descriptive characteristics while practically, it offers the basis for strategic positioning, policy setting, and decision making (Ibid.). The first step in designing agri-SC is the analysis of the existing system and its environment (van Roekel et al., 2002). This step encompasses the following; 1) Determination of product flows, exchange levels, facilities, the forces affecting the SC system; 2) Identification of actual and potential SC players, their functions, roles and relationship; 3) Identification of the focal firm or the chain leader and assessment of its acceptance; 4) Assessment of the performance of the existing SC based on criteria such as efficiency, flexibility, innovation and responsiveness set at national or international benchmarking; and 5) Tools such as SWOT analyses can be used to assess opportunities, threats, strengths and weaknesses of the chain.

In analysing the SC system, this study adopts the SCM theme classification provided by Bellamy and Basole (2013) by identifying structure, dynamics (behaviour) and policy and control (strategy). Bellamy and Basole (2013) adopted the approach they referred to as the network analysis in their work. Network analysis draws on theories from the social, organizational, and complexity theory and leverages graph theoretic methods to model, analyse, and visualize the structure, dynamics, and strategies that shape SC systems (Ibid.). Components of the SC structure include: components, connectivity, firm-level (node-level) structural properties, the degree and pattern of inter-firm cohesion, flow type, nature of complexity and strength of ties (Ibid.). SC dynamics, on the other hand, is comprised of

the formation, change and evolution of SCs and its relationship to robustness, responsiveness and resilience. SC policy and control (strategy) encompasses strategies that firms employ and leverage to improve their performance. Strategies are differentiated by levels of scope (dyadic-, triadic-, or network-level), intent and nature of governance (Ibid.). Although the authors refer to these three SCM themes as distinct and interdependent, in fact, there seems to be a lot of overlaps among them, and given the multidisciplinary nature and scope of SCM, the three themes seem to be highly abstracted.

Similar to the Bellamy and Basole (2013) theme nomenclature, Guinepero et al., (2008) performed a content analysis using thirteen SC themes, namely; SCM strategy; SCM frameworks, trends and challenges; alliances/ relationships; e-commerce/world wide web; time-based strategies; IT; quality; supplier development/selection and management; environmental/social responsibility; outsourcing; human resource management; buyer behaviour and international/global SC concepts. The second step is a determination of the SC strategy and organisation as part of the strategic planning process (Van Roekel, et al., 2002). When an SC strategy and organisation are defined by the participants, then the design part of the chain can be dealt with.

2.7.2 SC design issues and techniques

Determining the right SC design involves a lot of quantitative data as well as some non-quantitative considerations (Watson et al., 2014). An SC is not designed or developed on its own but requires a lot of efforts and competencies of actors involved (Van Roekel, et al., 2002). SC design which is variably called network design refers to the determination of the physical configuration and infrastructure of the SC (Simchi-Levi et al., 2008). It involves decisions relating to facilities location as well as distribution and sourcing decisions. Also, SC design is sometimes referred to as strategic SC planning and has a long-lasting effect on the firm, hence difficult to reverse. The objective of SC design is to reconfigure the network so as to realise a number of benefits (ibid.). Such goals may include minimising annual system-wise cost, including production and purchasing cost, inventory holding cost, facilities cost (storage, handling and fixed costs), and transportation costs depending on service level required by customers (ibid.). SC design as part of the

strategic planning process is normally guided by the overall SC strategy and is carried out using predetermined tools (Chopra et al., 2013). Oral and Kettani (2015) argue that in designing and implementing the SCM system, the world of SCM is supposed to be thoroughly understood and perceived from four 'global' perspectives. These are firm-level perspective, immediate business context, the society and the natural environment protection. SC analysis like in many other sectors maps out the flow from input supply through to the end users while detailing at each stage gains, costs and challenges. SC players in this regard are varied and may have different objectives that would certainly impact the society and the environment in different fashions. Supply design parameters are decision variables used in configuring the supply network. Some authors have considered the following as the most important SC parameters, namely; the number of SC levels or echelons; the number of players at each level/echelon; the number of sources for each node and the distance between nodes (Pero et al., 2010). In designing the SC using simulation, Bottani and Montanari (2010b) adopted the first two SC design parameters of Pero et al. (2010) and added the type of reorder policy adopted by each echelon as their three parameters. More on the analysis and comparisons of models/techniques used for SC design is discussed in section 2.7.3 below. However, Table 2.3 below summarizes the literature findings and their respective gaps especially as it relates to the topic of this study.

2.7.3 Comparison amongst the existing design and analysis techniques/models

SC consists of all parties involved, directly or indirectly, in fulfilling the customer request (Chopra et al., 2013). The management of the SC entails the strategy or design, planning and operational aspects in view of maximizing profitability through the delivery of superior customer value (Ibid.). In other words, SCM refers to the successful design and operation of the interactions between organisations (Rangaraj, et al. 2012). Traditionally, SCM has been a melting pot of various disciplines, with influences from logistics and distribution, operations management and materials management, marketing, as well as procurement, purchasing and IT (Giunipero et al. 2008). SC design involves strategic decisions and plans regarding where to locate facilities (for production, storage, distribution and retail), how to allocate capacities or assign production tasks to the various facilities, how to choose and develop supplier and distribution channels, and how to organize the interfaces among the

various parties in the SC (Kouvelis et al., 2006). Alternatively, SC design involves choosing what capabilities along the value chain to invest in and develop internally and which to allocate for development by suppliers (ibid.). Additionally, SC design or planning spans the strategic, tactical as well as the operational scopes on a varying degree of intensity (Ahumada and Villalobos, 2009). SC design is a dynamic phenomenon and for it to be effective it has to be integrated with the design of products or services as well as the production systems design for the respective goods.

Various SC design and analysis tools have been widely discussed and used in popular international journals and publications (Beamon, 1998; Ahumada and Villalobos, 2009; Min and Zhou, 2002; Chang and Makatsoris, 2008; Bottani and Montanari, 2010a; Bottani and Montanari, 2010b; Bottani et al., 2013; Chopra et al., 2013; Lambiase et al., 2013), and modelling has been at the centre of this subject. Based on the process of research problem definition, building a theory to explain the defined research problem, modelling has been a popular method of SC design (Oral and Kettani, 2015). Models link the theory with the real world through the simplification process because we start with a problem in a rather complex world and end up with a solution obtained from a relatively much simpler model (ibid.). Implementing the solution back in the real world, on the other hand, is a complicating process because we start with a simplified solution to deal with a more complex problem and even a more complex real world (ibid.). According to Rogers et al. (2012), any modelling techniques have been developed to maximize the effectiveness and efficiency of forwarding logistics and SCM. The main weakness of models as representatives for reality is that the former are perforce approximations of the latter (Ibid.). Thus, a key matter is model fidelity (goodness-of-fit), that is how well the model captures the salient features of interest of the system under study (Ibid.). The process of assessing model fidelity is called model validation and is relative to the aspect under consideration (ibid.). The modelling calls for building a model that resolves two compromises: the first is between model complexity and model tractability, and the second between model fidelity and model cost (Ibid.). Compromises are required because high-model fidelity generally calls for more complex models, which in turn are less tractable and more costly to devise and manipulate. The authors (Rogers et al., 2012) further categorise models into three

groups, namely; physical, conceptual and mathematical models. Mathematical models share a number of characteristics, the first of which is having a precise model formulation (consisting of system components, attributes, rules of operation, both formulas and algorithms and performance metrics), with random phenomena formulated using probabilities. The second feature is that models require the computation of their output metrics, using so-called evaluators. Evaluators are used for two purposes, namely; ‘‘What-if’’ Predictions (invariably called sensitivity analysis) and performance optimization (ibid.). Rogers et al. (2012) concludes their study by further grouping mathematical models into analytical and simulation types, and point that most real-life systems of interest are too complex for capture by analytical or numerical models at acceptable fidelity, and hence simulation becomes the next best alternative.

The most popular and frequently used SC design and analysis models are categorised as deterministic analytical, stochastic analytical, economic and simulation-based models (Beamon, 1998). Furthermore, Min and Zhou (2002) classify SC models into deterministic, stochastic, hybrid (inventory theoretic or simulation) and IT-driven models. Ahumada and Villalobos (2009) further refine the latter classification by specifically identifying mathematical models used to design and/or analyse agri-food SCs ranging from linear programming (LP), dynamic programming (DP), mixed integer programming (MIP) and goal programming (GP) for deterministic parameters. For stochastic situations, on the other hand, stochastic programming (SP), stochastic dynamic programming (SDP), simulation (SIM) and risk programming (RP) are used (ibid.). Ahumada and Villalobos (2009) further categorise models based on scope (strategic, tactical or operational), intended user (advisor, planner and farmer) or function (production or production and distribution). In concluding their paper, Ahumada and Villalobos (2009) found that models dealing with perishable products fail to incorporate realistic stochastic and shelf life features present in different echelons of the SC. They also found that operational models were few and most of them dealt with non-perishable agricultural produce (ibid.). Some of the gaps identified by Ahumada and Villalobos (2009) include challenges of coordination in agriculture SC so as to benefit the whole SC actors, where contracting has been the classical entry tool. Models that can include uncertain information, risk modelling that incorporate contracts, financial

or real options, regulatory environment and security of products can also be subjected to further research (Ibid.).

Another interesting classification is the one advanced by Griffis et al. (2012) who categorised SC models into four, namely; optimisation, simulation, heuristics and very recently meta-heuristics. Problem complexity is a major issue when selecting an analytic method to evaluate SC alternatives (Griffis et al., 2012). Optimization tries to find the best problem solution by minimizing or maximizing a specific objective function. However, many SC problems are too large or complex for traditional optimization methods to warrant an optimal solution (Griffis et al., 2012). Heuristics, also named “rule-of-thumb” algorithms, are sets of steps, taken sequentially to determine a combinatorial optimization problem (Shapiro, 2001). Metaheuristics are defined as an iterative generation process which guides a subordinate heuristic by combining different concepts for exploring the search space; learning strategies are used to structure information in order to find efficiently near-optimal solutions (Said et al., 2014). Metaheuristics have the ability to find a “near-optimal” solution to the problem in reasonable amounts of time (Griffis et al., 2012). It is sometimes argued that metaheuristic solutions are inferior because they cannot be proven to be mathematically optimal (ibid.). Also, metaheuristic techniques can provide solutions within scant percentages of optimal, and offer insight into complicated problems that simulation or linear programming cannot fully analyse (ibid.). In addition, as metaheuristics conduct a search of all feasible solutions to a problem, they have the ability to find an alternate, optimal solutions and provide the user with alternatives (Griffis et al., 2012). The design and analysis of TSC is certainly a large and complex problem that calls for the careful selection of analytic tool given the perishability nature of the produce.

Soto-Silva et al. (2015) reviewed the current state of the art in the use of operational research models applied to fresh fruits SC, and provide the basis for future research in this area. In reviewing the papers, the authors (Soto-Silva et al., 2015), identified decision level, analytical modelling approach, the purpose of the model, practical application, novelty and research segmentation by the journal as the six classification criteria. The following decision variables were also identified namely; planting/sowing, production, harvesting,

distribution (transport) and inventory (Ibid.). However, the number of papers for inventory and planting/sowing were noted to register fewer than other variables (Soto-Silva et al., 2015). Soto-Silva et al. (2015) provided nomenclature of models used for the papers reviewed falls into the following eight, namely; mixed integer/integer LP, non-linear programming (NLP), multi-objective LP (MOLP), simulation models, dynamic programming (DP), stochastic optimisation (SP), heuristics algorithms and metaheuristics and hybrid models (HYB). It should be noted that the author is aware that every model has its pros and cons and that there is no model that fits all purposes, contexts and products. Rogers et al. (2012) suggested a high-level procedure for selecting the simplest model with the best compromise between adequate fidelity and acceptable computational cost (ibid.): If the system appears “simple”, try first to find or derive a tractable analytical model with an analytical evaluator. This may include simple queuing systems and basic inventory systems; If an analytical model with an analytical evaluator proves inadequate, try to similarly develop a more complex analytical model with a numerical evaluator. This may include Markov chains which require moderate vector-matrix arithmetic and If all else fails, select the simulation approach as a last resort. Examples include multi-echelon SCs. Be sure to use sufficient computing resources to achieve adequate statistical reliability of your estimates.

One of the gaps highlighted by Soto-Silva et al. (2015) was the lack of a holistic approach to the design and management of fresh food SCs. Other findings of the study were that most papers focused on tactical and operational decisions rather than strategic decisions with transport, routing and planning and allocation problems involving production and distribution attracting more attention (ibid.). Likewise, LP models (both integer and mixed integer) were the most dominant with other scantily used as a result of proposals or the availability of the solver (ibid.). In the review under reference, the common objective was found to be the maximisation of benefit with cost function described in detail and income was determined using sale prices averaged under uncertain conditions (ibid.). The authors finally suggested areas for further research such as challenges of organic fresh food production, sustainable fresh ASCs, food security and seasonality issues in ASCs (ibid.). At the methodological level, Soto-Silva et al. (2015) suggested further research using complementary methods such as optimisation and simulation or using multiple criteria

rather than a single criterion. Pero et al. (2010) investigate the relationships between some SC design parameters and the resulting performance of the SC. Design parameters considered by the authors are (Ibid.): (i) a number of SC levels; (ii) the number of players at each level; (iii) the number of sources for each node; and (iv) distance between nodes.

SC integration is defined as the scope and strength of SC processes amongst firms (Leuschner et al., 2013). Information, operational and relational integration facilitate the linkages in SC processes between firms (Ibid.). Furthermore, SC integration is said to be achieved when SC actors are perfectly collaborated and coordinated (Ibid.). Trust, effective communication/information reliability and asset/resource sharing have resulted in being of paramount significance in SC integration (Giunipero et al., 2008). It is sometimes argued that the terms like integration, collaboration, cooperation and coordination are complementary to each other (Usuga et al., 2012). It is further argued that coordination is perceived as a prerequisite to integrate operations of SC entities to achieve common goals (Ibid.). Leuschner et al. (2013) contend that the terms collaboration and coordination are used to describe elements of integration. Another related contention is that the term integration is often used interchangeably with other related but distinct concepts such as cooperation and collaboration (Chen et al., 2009). For the purpose of this research report, all these interrelated, interdependent and complementary terms are labelled using one umbrella term “relationships”. That is, the sort of supply chain relationships (SCRs) can take the form of being coordinated, integrative, collaborative, cooperative or adversarial and the closest term to relationships shall be partnerships.

The potential lack of or weak integration amongst SC actors will likely signify poor reliability of the chain as a whole. Poor reliability of the SC system may result into one or more of the following; supply risk, production risk, financial risk, macro risk (such as political unrest/terrorism) and information risk (Yildiz et al., 2015). On the other hand, mitigating risks and lowering costs are goals that often conflict (ibid.). The author has taken note of a well-argued contention that managerial issues in SC problems are not suitable to resolve using mathematical modelling (Min and Zhou, 2002). This study thus tackled the strategic SCM issues particularly integration based on the fact that alternative to modelling

and simulation has been the use of organizational, economic and sociological theories (Mena et al. 2013). However, in many instances, the latter approaches remain in a dyadic context (bilateral) and do not use a multi-party unit of analysis (ibid.). Nevertheless, this study also employed qualitative techniques in studying strategic SC issues such as collaborations, in which soft as opposed to hard methods are more appropriate.

This study builds on the work of Soto-Silva et al. (2015) to specify the research problem and the subsequent development of the conceptual framework/research model based on the cited review. The study also intends to incorporate the concept of best value SCs advanced by Ketchen et al. (2008) by only speed, quality, reliability and cost as the overall SC performance indicators at a more strategic perspective.

2.8 Empirical Literature – Critical Findings and Gaps

Table 2.3 below gives a summary of the findings and critical gaps identified from the literature. Twenty-three authors from 2001 to 2017 who wrote around the study area were randomly selected and summarized to give an insight to this researcher. The summary gives explanations on four main columns namely, previous work area (title), author and year of publication, study outcome and the identified gaps. After a critical analysis of the literature for some recently published articles for researches done in Tanzania, this researcher summarizes some gaps that are to be filled in this research. Researching three (3) regions (Arusha, Iringa and Dar es Salaam) and nine (9) districts in Tanzania addresses a large scope that was hardly reached by previous studies. The previous researcher studied hardly one to three districts in one region. (Katunzi & Zheng, 2010, Rasheli, 2014, Mwangike and Mdoe, 2015, Mwangike, 2015b, Rashel, 2014, Khasa & Msuya, 2016, Dome & Prusty, 2016, Mutayoba & Ngaruko, 2017). The current study analyses tomato sub-sector from SC point of view, as such, many primary actors (input suppliers, farmers, wholesalers, brokers, retailers, transporters & processors are studied at a time (ibid). Previous studies were performed with different purposes –mostly downstream on distribution and marketing only and were limited to analyse fewer actors –one or two.

This study has used more data analyses techniques to include descriptive statistics, both parametric and non-parametric statistics models like Paired t-test, Wilcoxon signed-ranks

test and Binary Logistic Regression whereas previous studies used mostly descriptive statistics. This study improved on the sample size (432) compared to previous studies whereas previous studies sample size ranged from 47 to 242 (ibid). Moreover, this study used a variety of data collection methods for triangulation purposes whereas previous studies used one or two data collection methods-mostly questionnaires.

Table 2. 3: Summary of Literature Findings and Gaps identified

S/ N.	AUTHOR YEAR AND TITLE	STUDY OUTCOME	GAP
1	Van Roekel et al., 2001 “Building agricultural SCs- Issues and guidelines agriculture in Sub-Saharan Africa”	Integrated SCs are the most powerful competitive tools in today’s business economy. New market segments, products and services, can best be developed through partnerships among SC actors.	Single companies lack the capacity for dealing with most of the agricultural SC challenges rather than when co-operating as an SC.
2	Wheatley et al., 2003 “The benefits of SC practice in developing countries- conclusions from an international workshop”	SCM is becoming increasingly important in developing countries because of the following: supermarkets sector is already well established (in major urban centres) and shows a high level of capital investment and market share of growth; traditional food products in domestic markets will face increasing competition from imports; consumers across the region and international retailers share a desire to ensure that all products in both traditional and more managed SCs move towards global standards of food safety and health. Moreover, the growth of managed high-value SCs has deep implications for smallholder producers in the developing world in such aspects as, sharing of benefits that arise from enhanced SCM.	Governments are not informed of implications of the current changes for the smallholder farmers of their economies that is why most new strategies do not incorporate these major agriculture-food sector developments; retail chains are not more informed of the wider social and environmental consequences of an SCM approach that tends to place more emphasis on economic efficiency; actors and other stakeholders involved in producing, processing and marketing food products lack knowledge of taking more market- oriented approach; future research should be action- oriented and involve various SC actors to ensure that efficient competitive SCs can make a significant and positive contribution to the development of prosperous and sustainable rural communities in developing countries
3	Wheatley and Peters, 2004 “Who Benefits from Enhanced Management of Agri-Food SCs?”	Improved management of agricultural SCs affects different actors, and especially the primary actors (producers, traders and processors). It also affects those actors who provide services to the chain (input suppliers, equipment makers, credit providers, and research and R&D institutions (extension, information and facilitation services). Benefits of these effects include: improved and/or more secure income, reduced use of pesticides and better food quality. However, if some actors are excluded from the improved chains, or if increased market power for some actors results in reduced income for others.	Despite the wide use of the term SC, a clear understanding of SCs is needed, including who participates and is affected by them, how the economic and other benefits and costs of participation are apportioned among these actors, and how chain development affects other livelihood activities and the wider environment.
4	Eaton et al., 2007 “Analysing the role of institutional arrangements: Vegetable value chain in East Africa (EA)”	Marketing of vegetables in EA is still dominated by spot markets. The movement towards farmers’ engaging collectively in CF through producers’ organizations is limited. It is proclaimed that institutional arrangements lower transaction costs. However, another school of thought believes that transaction costs of other institutional arrangements are apparently higher than those of the spot market.	There is little information on how farmers in CF have overcome transaction costs related to the contract. How were the relations with the exporters established? What role did social capital and trust play in this? Are poorer farmers likely to be excluded from participation in such

			schemes? What is the potential to stimulate the development of these new institutional arrangements?
5	Stanton and Burkink, 2008 “Improving small farmer participation in export marketing channels: perceptions of US fresh produce importers”	Results of the study reveal that US fresh produce importers are not uniformly pessimistic about the ability of small farmers to meet their demands.	Data were collected from only the importer side of the grower/importer dyad. Clearly, future studies should include the perspectives of the growers and other SC players
6	Hingley et al., 2008 “Differentiation strategies in vertical channels: A case study from the market for fresh produce”	Findings indicate that in the fresh produce industry there are good opportunities for successful differentiation strategies. Nevertheless, actors at the different vertical stages of the marketing channel take very different advantage from it, depending on their “power” to lead the channel.	This study was based on a single case study; therefore, the findings are of limited generalisation.
7	Clements et al. (2008) “Relationship connectors in NZ fresh produce SCs”	Relationships in the chains were characterised by very strong information exchange, relatively strong cooperative norms, strong operational linkages and specific buyer-seller adaptations. As the result, SC functions of procurement, quality, logistics and information were facilitated. Hence, the challenges facing SC functions, the market requirements of fresh produce and product characteristics, could be managed	A theoretical framework that is developed for the study and tested using two case studies of fresh produce SCs in the South Island of New Zealand cannot guarantee generalisation.
8	Aramyan and Kuiper, (2009) “Analysing price transmission in agri-food SCs: an overview”	Three key challenges are identified in analysing price transmission in agri-food SCs: structure of the SC; factors affecting price transmission; and supply response.	The authors dealt with one aspect of the agri-food SC, such as price transmission in the retail sector in Europe, USA and Canada, leaving other important parameters such as relationships unstudied.
9	Mgeni and Temu, (2010) “Economic analysis of fresh fruit and vegetable export marketing channels by small-scale farmers in Tanzania: the case of Meru District”	There exist four export marketing channels for fresh fruit and vegetable used by small-scale farmers in the study area. First is where the farmers sell their produce directly to the export company. Traders provide the other three export market channels; all these channels are vertically integrated. However, export trading is found to be significantly more profitable than domestic trade. Lack of knowledge about Global Good Agricultural Practices (GAP), recording keeping, possession of storage facilities and contracts were found to be the major challenges facing Fresh Fruit and Vegetable export market enterprises.	From the findings, there are farmers who use the shortest channel while others use the longer channels or sell to the domestic market as opposed to the export market. However, there is no any justifiable reason for these choices, hence the need to conduct further research.

10	Vodafone Group, 2011 “Connected Agriculture: The role of mobile in driving efficiency and sustainability in the food and agriculture value chain”	Mobile services enable companies to access and interact directly with different participants in the value chain, helping to build visibility of issues, capacity and quality. Mobile services would improve the efficiency of the agriculture and food sectors as well as helping to raise the incomes of millions of poor farmers in developing countries.	While it is appreciated that building local relationships will be crucial in helping smallholder farmers to access and benefit from mobile services, little is investigated on how such relationships can be implemented to realise the benefits.
11	Saravanan, (2012) “Problems of vegetable producing farmers in Erode, Coimbatore, and Tiruppur Districts of Tamil Nadu”	Despite India being the second largest producer of F&V in the world, still, the country experiences the situation of excess and scarcity in respect of many crops due to: lack of effective marketing infrastructure and proper storage facilities; scarcity of agricultural inputs; lack of proper training and knowledge about new developments in cultivation methods and technological development; the presence of too many middlemen and higher market charges and unsound financial position of the farmers.	The Indian government has not taken appropriate steps to strengthen farmers’ markets including enabling farmers to sell their produce easily to the consumers directly so that they can save the middlemen commission and hence improving farmers’ financial position.
12	Srimanee and Routray, (2012) “The fruit and vegetable marketing chains in Thailand: policy impacts and implications”	The government has made various attempts to improve the fresh fruits and vegetables (FFV) market by promoting both domestic and export markets simultaneously thus improving production efficiency. Supermarkets play important roles in connecting farmers to markets through direct procurement while improving cultivation practices of farmers in order to enhance the quality of produce.	A number of policy gaps still exist to protect the interests of the farmers in maximizing their returns, and in the areas of participation between public and private sectors.
13	Xaba & Masuku, (2013) “An analysis of the vegetable SC in Swaziland”	The study revealed marketing channels in use by producers in obtaining attractive prices and a higher share of the consumer price. The findings show that the largest producer’s share comes from a direct sale to consumers’ channels that include restaurants. Moreover, these channels had high total gross margins and low producer’s share of the consumer price.	Issues on postharvest and marketing have not yet taken an integral part of policy development and research programmes. Public and private sectors have not adequately facilitated contractual arrangements for vegetable farmers. A need to commercialize vegetable production to encourage farmers to be market-oriented. Also, farmers’ failure to work in cooperatives hinders them in the bargaining of prices within the vegetable SC.

14	Tsolakis et al., 2013 “SCM for Agri-food Sector: A Critical Taxonomy”	The paper presents a generic system component along with the unique characteristics of Agri-food SCs (AFSCs) that differentiate them from conventional SC networks. Also, the paper presents the most critical issues for the design and planning of AFSCs and provides a respective classification of the related research efforts. These key issues are further mapped on the underlying natural hierarchy of the decision-making process. It captures both the associated challenges and the complexity of the decision-making process for the design and planning of AFSCs.	Less effort is dedicated to the agri-food SC network configuration starting with tailoring the already developed general SC methodologies to AFSCs. In the field of AFSCs, SC partners’ relationships need more practice-oriented integrated solutions that can emphasize the design of performance measurement systems. SCM in the agri-food sector is a rapidly evolving research field currently tackling rather myopically key issues instead of adopting an integrated systemic approach.
15	Rijkema et al., (2014) “Effective sourcing strategies for perishable product SCs”	The findings reveal that the order policies obtained with standard cost parameters result in poor product quality and large amounts of product waste. Also, including costs for expected shelf life losses in sourcing strategies significantly reduces product waste and improves product quality, although transportation costs rise.	This study confined itself to assess strawberry sourcing strategies imported from Egypt to Italy, therefore, studies on perishable produce such as tomato deserve analysis as well.
16	Kalidas et al., (2014) “SCM in Vegetables”	With a focus of Indian vegetable sector, the authors found huge waste during post-harvest storage and handling due to improper bagging without crating, lack of temperature-controlled vehicles, no cold chain facilities for the preservation of produce, coupled with significant processing of the agricultural produce.	An SCM needs to be improved at all stages to adopt the global best practice in storage, packaging, handling, transportation and value-added services, not only India but the rest of world including Tanzania.
17	Negi and Anand, (2014) “SC Efficiency: An Insight from Fruits and Vegetables Sector in India”	Findings highlight the inefficiency of F&V SC sector as one of the major business problems in the agriculture sector of India.	The concept of efficient SC of F&V sector in India is still in a growing stage. The future areas of focus include: addressing the problem of SC losses and wastage, transportation and storage; identifying the most significant logistics activity leading to SC inefficiency, developing a framework to improve the SC efficiency of F&V sector can be a very interesting area of study.
18	Rasheli, (2014) “Governance mechanisms among traders in vegetable chains in Lushoto District”	Two buying arrangements were identified: spot market (such as buying at the farm gate or using village open markets) and using brokers situated in the villages. A large number of traders dealing with distant dynamic markets contract village transport broker and farm gate buying were more preferred to village open market. Using the prevailing governance system, both product and process upgrading were possible however very low upgrading initiatives were evidenced. In terms of	Identified avenues for further action researches include: enlargement of the study to include vegetable brokers in other producing regions and conduct a detailed analysis of the role of the broker in vegetable marketing chain at the national level; a detailed analysis of the significant factors influencing the choice of spot market or the use of vegetable broker when buying vegetable.

		policy, it is very important for a public-private partnership to improve village road networks so as to increase market access.	
19	Negi, and Anand, (2015) “Issues and challenges in the SC of the fruits & vegetable sector in India: a review”	The below factors constitute serious challenges for the F&V sector and are affecting the overall growth of the agricultural development of India: cold chain facilities; fragmented SC; linkages and integration between the partners; taxation issue; infrastructure facilities; cost of packaging material; technology and techniques; farmer's knowledge and awareness; quality and safety standards; processing and value addition; SC inefficiency; farmers income; SC losses and wastage of fresh produce; transportation facilities; demand and market information.	The study focuses only on F&V sector in general; hence, further researches may also focus at other sectors like food processing unit, cold chain and other individual perishable crops such as tomato, meat, dairy industry, chocolate and beverages.
20	Mwagike, L & Mdoe, N. (2015) “The role of middlemen in fresh TSC in Kilolo district, Tanzania”	The study revealed that majority (58%) of smallholder tomato farmers sold their produce to middlemen due to being geographically separated from the markets, poor local road network and poor access to market information. Consequently, the use of middlemen to sell tomato produce cannot be avoided unless smallholder farmers are linked with urban markets.	Further studies should look at vegetable SC at the national level and investigate how vegetable SC can operate at the global level.
21	Dome and Prusty, (2016) “An analysis of vegetable SC in Arusha region, Tanzania”	The current structure behaviour of vegetable supply chain (VSC) is to the large extent dependent on policies in force, which also have a significant impact on the unfair reward/pay-off system amongst VSC participants. Resultantly, some VSC participants sustained opportunistic power relationships that tried to maintain the status quo of their position in existing VSC structure. Poor logistical support services were also found to exert tremendous impact to the current proportion of PHLs.	Apart from its importance, VSC in Tanzania is faced with many challenges including non-formalization of the sector. To date, fewer studies have been done to investigate the sector for improvement in this aspect. Researchers are called upon to investigate on how to navigate the sector to a more formalized trading practice.
22	Sanga & Mgimba (2016) “An Analysis of Constraints That Affect Smallholder Farmers in The Marketing of Tomatoes in Mbeya Urban and Peri-Urban, Tanzania”	Prominent constraints of marketing tomatoes among the small-scale farmers include: lack of access to credit, lack of access to storage facilities, lack of market information, lack of finance for farming, poorly developed village markets, poor producer prices, high perishability of produce, low patronage, inadequate access roads, small size of transport and high transportation costs.	The performed analysis was limited to the marketing constraints of tomatoes as experienced by smallholder farmers in Mbeya urban and peri-urban, Tanzania.

23	Siddh, M. M. et al. (2017) “Agri-fresh food SC quality (AFSCQ): a literature review”	Unlike in developed countries, relatively lesser publications are available on issues in developing countries, hence, larger opportunities for research in the field of AFSCQ. Empirical research is also growing in the field of AFSCQ. Largely research publications make use of “case study” research approach and “statistical analysis” as a quantitative tool of research. The literature is also categorized under the various issues of SC quality such as sustainability management, information management, logistics management, collaboration and coordination management, strategic management, demand management, inventory management, food safety, performance management, SC integration, supplier management and quality management. It was found that in the majority of articles, information management, sustainability management, and logistics management are very critical in AFSCQ. Performance measurement of agri-fresh food SC is also on a growing stage. It is also an integral part of AFSCQ.	In the upcoming days, empirical research needs to be directed at intra-functional and intra-firm scope at organization and SC level. If feasible, such empirical studies can concentrate on complete “network” as well. Else, they should at least concentrate on the “dyad” level where the interaction of small farms with distributors is investigated. In other words, future researches should embrace the need of promoting integration and sustainability philosophy at all the levels in the agri-fresh SC.
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(Source: Literature review by the author, 2018)

The author further analysed another group of randomly selected relevant articles for this study. However, this time the author’s focus was on different aspects. The analysed aspects were purposely decided by the researcher. He wanted to get acquainted with the nature of objectives, research design, variables, respondents, and data analysis tools as applied in agri-food supply researches. Table 2.4 below refers.

Table 2. 4: Summarized research findings in agri-food SC

S/ N.	AUTHOR, YEAR AND TITLE	OBJECTIVES	VARIABLES AND DESIGN (Quantitative/Qualitative)	RESPONDENTS	DATA ANALYSIS TOOLS	MAJOR FINDINGS
1	Matopoulos et al., (2007) “A conceptual framework for SC collaboration: empirical evidence from the agri-food industry”	To analyse the concept of SC collaboration and to provide an overall framework that can be used as a conceptual landmark for further empirical research	Business activities, the size of the companies and general discussion related to the particularities of the sector, as well as, the changes that had occurred lately. Also, the relationship between the two companies (issues regarding the type of relationship, its evolution over time, the nature of dependence	Purchasing manager and Managing Director each representing one company.	Interview protocol was developed. Moreover, propositions were formulated in the conceptual framework to be proved by	SC collaboration concept is of significant importance for the agri-food industry. However, some constraints arise due to the nature of the industry’s products, and the specific structure of the sector. Subsequently, collaboration in the SC is often limited to operational issues and to logistics-related activities.

S/ N.	AUTHOR, YEAR AND TITLE	OBJECTIVES	VARIABLES AND DESIGN (Quantitative/Qualitative)	RESPONDENTS	DATA ANALYSIS TOOLS	MAJOR FINDINGS
			and the role of other critical elements (power and trust). (Exploratory case study (Qualitative))		the empirical results of the study.	
2	Leat, P. (2008) "Building collaborative agri-food SCs: The challenge of relationship development in the Scottish red meat chain"	To identify the attitudes and experiences of Scottish farmers in marketing their beef and sheep, and the nature of their marketing relationships. Specific objective: to identify the challenges that the recently revised Forward Strategy for Scottish Agriculture may face with respect to the wider establishment of collaborative SCs and the strengthening of links between beef and sheep farmers and other parts of the meat SC.	Main problems faced in marketing beef and sheep; marketing objectives; the influence of a set of such conditional variables including: the main marketing channels used by the producer; whether the producer was a breeder, breeder and finisher, or only a finisher; form type such as specialist sheep producer, specialist cattle producer or a producer of both cattle and sheep; region such as North East, North West, Southeast and South West; farm size measured in terms of SLR. (Quantitative and qualitative.)	Beef and sheep producers, major meat processors and retailers.	Tables and descriptions.	The results: there are low levels of customer awareness amongst farmers in the red meat chain, and low levels of trust of other chain participants, particularly in relation to price.
3	Katunzi, T. M. & Zheng, Q. (2010) "Tanzanian SMEs' Perceptions towards Adoption of SCM Strategy"	To identify: the most important benefits of SCM for maintaining the competitiveness; the most important type of information shared among SC actors; the motives behind the implementation of SC integration strategy and To evaluate the extent of which activities (supporting	SCM issues considered as important by various types of industries; Inventory management and logistics costs (Qualitative and Quantitative)	200 companies (within the agro-processing sector). These included: top-level managers responsible for the SCM strategy in	Tables, t-test	SMEs give less attention to SCM strategies, also reluctant to employ the transparent integrated system to link them with other actors in the chain. Moreover, the absence of compatible organization structures in SMEs is seen as a major obstacle for complete implementation of the integrated strategy.

S/ N.	AUTHOR, YEAR AND TITLE	OBJECTIVES	VARIABLES AND DESIGN (Quantitative/Qualitative)	RESPONDENTS	DATA ANALYSIS TOOLS	MAJOR FINDINGS
		SCM) collaborated with other SC actors To recognize the kind of SCM competitive advantages perceived to be most important by management		their respective companies, including CEOs, logistics and financial directors.		
4	Man, N. & Nawi, N. M. (2010) “The practices of CF among fresh fruit and vegetable suppliers in Malaysia”	To examine CF as the new marketing practice among selected vegetable and fruits suppliers. Specifically, to: Examine the respondents’ perceptions towards CF; identify respondents’ practices towards CF, and suggest a policy to ensure the sustainability of CF.	Buyer-producer relationship particularly the CF processes in terms of performance (for example replenishment lead time, quantity and size, supply quality, transportation pricing terms, information coordination and supplier viability. (Qualitative and Quantitative)	Selected market participants: retailers, wholesalers, processors, packers, input suppliers, assemblers and producers.	SPSS-descriptive statistics	The production and marketing contracts exist in non-formal or mainly verbal agreement. Also, the production contract respondents did not follow the criteria for CF.
5	Mathuramaytha, C. (2011) “SC Collaboration – What’s an outcome? A Theoretical Model”	To examine the consequences of supply chain collaboration (SCC) on organizational performance. The research question was: how SCC affects firm outcomes.	SC collaboration, competitive advantage, organizational performance, environmental uncertainty.	Chain members.	Conceptual model	It was proposed that SCC has a positive effect (such as cost reduction and operational flexibility) on firms and that the effect is a long-term effect. In addition, variable measurement scales were subsequently developed.
6	Gor, CO et al. (2012) “The Interface between Mango Value Chain Analysis and	To analyse the value chain by identifying the various, processes, inputs and major players in the mango value chain system.	Socio-economic determinants of the functional roles of actors in the various mango chain segments included income, education, age, gender, farm size or size of the business operation.	Farmers, input suppliers, traders and Farmers/traders.	SPSS and Microsoft Excel: basic descriptive statistics: frequencies, percentages,	Results showed that important socio-economic determinants of the functional roles of actors in the various mango chain segments included income, education, age, gender, farm size or size of the business operation. These variables influence the agribusiness uptake pathways impended in mango value chain and therefore their importance in

S/ N.	AUTHOR, YEAR AND TITLE	OBJECTIVES	VARIABLES AND DESIGN (Quantitative/Qualitative)	RESPONDENTS	DATA ANALYSIS TOOLS	MAJOR FINDINGS
	the Socioeconomic Determinants”		(Qualitative)		cross tab., z-scores, chi-squares, std deviations and min. and max. levels and the means. Findings in histograms, bar charts, pie charts, matrixes and graphical formats.	policy formulation and technology recommendation domains.
7	Akpinar, M. G. (2012) “Analysing the effects of consumers’ demographic characteristics on the preferences of fresh fruit and vegetables SCs”	To determine the impacts of consumer demographic variables on their preference for fresh fruit and vegetables	Gender, age, education, marital status, income, employment status of women in households. Also: information about the preference of outlets for FFV SCs: super/ hypermarkets, groceries, farmer markets, wet markets, general stores. (Qualitative)	Vegetable consumers	SPSS 15.0 was used: Chi-square test and descriptive statistics were used to analyse the data.	The results indicated that consumer age and marital status had no significant correlation with the preferences. On the other hand, the test results showed that gender, education, income and female employment status did have a significant correlation with the preference for outlets in FFV SCs.
8	Prakash, K.C. & Dhamotharan, P.G. (2013) “An analysis of SC of cole vegetable from farm to retail outlets for Palamuthir	To examine the SC involved in the sourcing of Cole Vegetable (cabbage) from the farmer at the sourcing point to delivery at Palamuthir retail outlets. Specific objectives: of the study are: To analyse the costs and benefits of sourcing selected	Current status of the Value Chain of Cabbage (Qualitative)	Farmers, Wholesalers and Retailers	Conventional analysis, Rank Based Quotient (RBQ), Price spread analysis and Estimation of Marketing Efficiency	

S/ N.	AUTHOR, YEAR AND TITLE	OBJECTIVES	VARIABLES AND DESIGN (Quantitative/Qualitative)	RESPONDENTS	DATA ANALYSIS TOOLS	MAJOR FINDINGS
	Nilaiyam in Coimbatore city”	cole vegetables from farm to Pazhamudir Nilayam retail outlets in Coimbatore city; To evaluate the marketing efficiency of alternative marketing channels for the selected cole vegetables; To provide the suggestions for improving procurement and the sale of selected cole vegetables through Pazhamudir Nilayam retail outlets in Coimbatore city.			used by Shepherd's Formula.	
9	Shonghari, M. A. et al., (2013) “The impact of SC relationship quality on quality performance (Case study: Sugar Factory in Naghadeh city)”	(a) Whether or not it is possible to measure the multi-dimensional nature of SC relationships and (b) if so, what is the effect of SC relationships on quality performance?	Trust, commitment, adaptation, communication and conformance quality (Quantitative)	Suppliers and staff in the Sugar Factory of Naghaden.	Structural equation model	Supply chainrelationship quality(SCRQ) has a positive impact on design quality (H3) but not on conformance quality (H2). This suggests that by developing and engaging in true partnership types of SC relationships, suppliers can become much more proactive in the design and new product development process. Consequently, customers will recognize their competitive edge with respect to design capability. Suppliers with such design capability can thus contribute much more than merely conforming to a manufacturing specification (although support for H4 indicates the positive effect of design quality on conformance quality). The finding that SCRQ does not have an impact on conformance quality may be because conformance quality is a fundamental competitive pre-requisite, irrespective of the nature of SCRQ. Support for the design quality—customer satisfaction (H5) and the conformance quality—customer satisfaction (H6) further substantiate the findings of previous studies (Ahireand Dreyfus, 2000; Fynes and Voss, 2001).

S/ N.	AUTHOR, YEAR AND TITLE	OBJECTIVES	VARIABLES AND DESIGN (Quantitative/Qualitative)	RESPONDENTS	DATA ANALYSIS TOOLS	MAJOR FINDINGS
10	Mehdi, M. et al., (2013) "The effectiveness of a "whole of chain" approach in linking farmers to market: a case of Pakistan mango market"	To demonstrate the benefits of premium quality at high-end markets so as to modify the existing practices on improved market knowledge and skills at each level of the chain.	Based on Kolb's learning cycle: Observation, reflection, planning, and implementation. (Longitudinal qualitative study)	Growers, contractors, wholesalers and retailers.	Conceptual framework	The results indicate that the participants all along the chain would change their practices if they find the compelling reason to change in their existing businesses.
11	Xaba, B.G. & Masuku, M. B. (2013) "An Analysis of the Vegetables SC in Swaziland"	To investigate the vegetable SC in Swaziland. Specifically, to; identify existing channels used by vegetable farmers to market their vegetables (cabbage, carrot, onion, tomato, baby corn, and baby marrow), and determine market margins within the VSC.	The vegetable crops studied included cabbage, carrot, onion, tomato, baby corn and baby marrow. (Descriptive quantitative)	All farmers engaged in vegetable production in Swaziland	Descriptive statistics and multinomial logistic regression. SPSS (Version 17) was used for the analysis.	Farmers growing baby vegetables relied on wholesalers to purchase their produce. Wholesalers were mainly located in the Manzini region and operated at retail and assembling level. Retailers purchased vegetables from local vegetable farmers, local wholesalers and also from foreign retailers. They then sold them to market vendors, restaurants and consumers. The highest producer's share was obtained through the channel-1, which is selling direct to consumers. Channels that included restaurants had high total gross margins and low producer's share of the consumer price and market margins were higher in channels that involved restaurants. Selling direct to consumers is the most channel used for when selling vegetable mainly because they sell at a higher price compared to selling to wholesalers.
12	Almaz, G. et al., (2014) "Determinants of profit shares to vegetable value chain actors in	Looking at the determinant factors of profit share in male and female-headed households in the vegetable value chain in Ethiopia.	Marketing profit; Respondents age (Yrs.); Educational level of household head; family Labour (man equivalent); Distance from the production area in km; Distance from the nearest market; Experience	TSC actors: Producers, wholesalers and retailers	Data analysis was done with the aid of econometric tools employing	The multiple linear regression model results indicate that family labour, quantity produced and selling price determine household's profitability of tomato for MHH positively. Access to price information, achievement motivation, fertilizer cost, selling price and quantity produced determined household's tomato profitability in

S/ N.	AUTHOR, YEAR AND TITLE	OBJECTIVES	VARIABLES AND DESIGN (Quantitative/Qualitative)	RESPONDENTS	DATA ANALYSIS TOOLS	MAJOR FINDINGS
	Ethiopia: a gender perspective”		of household (yrs.); Purchasing price; Quantity holding in quintal; Selling price; Access to price information; participation in social organization; Brokerage fee; Storage loss; Ownership of mobile. (Quantitative)		Stata SE-version and SPSS version 20. Specifically, multiple linear regression econometric models.	FHH. The regression model results also showed that the profitability of wholesaler actors is determined by the distance from the production area, purchasing price, selling price, quantity held per week and brokerage fee. Participation in social organization, storage loss, purchasing price, selling price, and quantity sold per week are also determinants of profitability of retail actors. Female actors had less profit than male actors.
13	Lemma, Y. (2014) “The loss in Perishable Food SC: An Optimization Approach Literature Review”	The main objective of the paper is to review FSC researches which are related to perishable food losses specific to tools/methods used to optimize and sustain the food SC.	The sources of the reviewed papers are from different scientific journals (such as Emerald Insight, Elsevier, IEEE publishers) that are related to the main heading of the paper. (Qualitative)	The review highlights the following points to satisfy the main objective: segmentation of research papers, product type used, optimization approach used in for perishable products and identification of gaps that need further investigation.	Tables and description.	About 55% of the papers in perishable food SC are published in the last 2 years including 2014. This trend indicates that researchers and practitioners are giving attention due to the scarcity of food and related products around the globe. Also, there is a lack of research’s related to modelling and optimization approaches in the perishable food SCM area. Due to the formulation of the new state of the art optimization approaches, researchers practice the tools in their own research interest is the other factor for the increased size of recent publications.
14	Hotegni, V. N. F et al. (2014) “Bottlenecks and Opportunities for Quality	Primary objective: to describe and analyse the fresh pineapple SCs in Benin and identify the main constraints for quality improvement to fulfil the	Chain objectives and performance indicators, the SC network structure, SC business processes, SCM components, and chain resources.	Key informants in the fresh pineapple SCs including primary	Descriptive statistics (percentage), non-parametric Chi-square	The chain diagnosis showed there was no concordance between actor groups in which quality attribute they valued most. Moreover, pineapple quality was found to be highly heterogeneous.

S/ N.	AUTHOR, YEAR AND TITLE	OBJECTIVES	VARIABLES AND DESIGN (Quantitative/Qualitative)	RESPONDENTS	DATA ANALYSIS TOOLS	MAJOR FINDINGS
	Improvement in Fresh Pineapple SCs in Benin”	requirements for different markets. Secondary objective: to identify the pineapple quality preferred in the different outlets and compare the quality preferred to the quality supplied.	(Qualitative)	producers, exporter, wholesalers plus retailers in different markets, processors and pineapple experts.	tests, non-parametric Kendall coefficient of concordance (W) tests, non-parametric Kruskal-Wallis tests, Mann-Whitney U tests, and one-way ANOVA	
15	Handayati Y. et al., (2015) “Agri-food SC coordination: the state-of-the-art and recent development”	To define the state-of-the-art of SC coordination in agri-food chains and identify research gaps in this research area.	Three categories of variables, such as, interdependencies, coordination mechanisms, and methodology were analysed. (Qualitative)	Selected researchers on agri-food SC coordination	Tables and description.	The results of the analysis suggest that a further research on the adoption of value co-creation in the coordination process is required to deliver benefits not only for participating actors but also for end consumers.
16	Negi, and Anand, (2015) “Issues and challenges in the SC of the fruits & vegetable sector in India: a review”	To identify the factors affecting SC of Fruits & vegetable sector in India. • To suggest mitigation strategies for the identified challenges in SC of Fruits & vegetable sector in India	Various themes according to the issues in the SC of Fruits as well as Vegetables like Cold Chain, Transportation of F&V, Infrastructure, SC of F&V, Quality Management and Food SC. Further, an investigation has been attempted to identify various factors affecting the SC. (Descriptive research)	Basic and contemporary literature available focusing on F&V sector.	Description.	Cold Chain Facilities; Fragmented SC; Linkages and Integration between the partners; Taxation Issue; Infrastructure Facilities; Cost of Packaging Material; Technology and Techniques; Farmer's Knowledge and Awareness; Quality and Safety standards; Processing and Value Addition; SC inefficiency; Farmers income; SC losses and wastage of fresh produce; Transportation facilities; Demand and market information are the factors which constitutes serious challenges for F&V sector and are affecting the overall growth of the agricultural development of India.
17	Ugonna, C.U. et al. (2015)	Overall objective: to contribute towards	Issues, challenges and strategies in tomato VC.	Key VC actors	Description.	Although tomato is produced in large quantities in the northern part of Nigeria, a lot of it is lost due to

S/ N.	AUTHOR, YEAR AND TITLE	OBJECTIVES	VARIABLES AND DESIGN (Quantitative/Qualitative)	RESPONDE NTS	DATA ANALYSIS TOOLS	MAJOR FINDINGS
	“Tomato Value Chain in Nigeria: Issues, Challenges and Strategies”	promoting the development of tomato value chain in Nigeria. Specific objectives to: study the VC for tomato namely production, processing and conversion to different products and marketing; identify existing technologies and technology gaps in tomato production, handling and processing; identify the challenges associated with the development of tomato VC and suggest ways to make all components of the chain to be more competitive.	(Semi-structured informal interviews)	including input suppliers, farmers, producers, intermediate traders, wholesalers, retailers, processors and end users.		its perishability and lack of processing companies to process the raw tomatoes into a paste and other products. Furthermore, only a few of the tomato varieties in Nigeria are suitable for industrial processing. The research also revealed that Nigeria is still not a major exporter of either fresh or processed tomato products despite the high production.
18	Siddh, M. M. (2015) “Perishable food SC quality (PFSCQ): A structured review and implications for future research”	To answer 7 research questions: 1. What is the status of research publication in PFSCQ over the years? 2. What is the status of research in PFSCQ across countries? 3. What perishable products are being researched in SCM? 4. What research tools are being used by researchers in this field? 5. What are the product/process quality issues in PFSCQ? 6. What is the status of performance measurement in PFSCQ? 7. What are the research gaps and future scope of research in this field?	The comprehensive scheme for a literature review of PFSCQ was divided into six subsections: time horizon, selection of database, search criteria for article selection, sorting of articles, article classification, and results and analysis of PFSCQ literature. (Structured literature review)	Includes all the literature related to products/process from the farm to folk of perishable food (milk, meat, vegetable, grains and butter).	Tables and description.	Research toward PFSCQ has risen in the last 5 years. Fewer articles are addressing issues of developing countries than developed countries. Majority of the articles involved multiple as an entity of analysis (combination of the supplier, distributor, manufacturer, retailer and consumer), information as an element of exchange and chain as the level of analysis. A large number of articles involved “agri-food,” “dairy” and “pork” as perishable products. Majority of articles used “case study” methodology. Statistical analysis as a tool for problem-solving was used in the majority of articles. Performance measurement aspect is also on growth in PFSCQ literature. Information sharing, logistics management, strategic management, demand forecasting and integration among the various stakeholders of PFSCQ are some of the critical issues.

S/ N.	AUTHOR, YEAR AND TITLE	OBJECTIVES	VARIABLES AND DESIGN (Quantitative/Qualitative)	RESPONDENTS	DATA ANALYSIS TOOLS	MAJOR FINDINGS
19	Anuradha, A. (2015) "Analysis of the behavioural patterns of organized and unorganized vegetable retail shoppers"	To find out the major factors influencing the purchase of vegetables in an organized and unorganized vegetable retail outlet.	-Factors influencing the purchase of vegetables in organized and unorganized retail outlets -the relationship between the consumer's income level and choice of vegetable retail market. (Qualitative and quantitative (cross-sectional surveys & case study))	Shoppers of vegetable retail outlets of Coimbatore.	SPSS-frequency distribution and Chi-square test.	-There is a significant positive relationship between the income level of the consumer and their preferred vegetable marketplace. -overall the freshness of the vegetables and the appearance (well cleaned and sorted vegetables) are found to be the major factors among the consumers in choosing an organized/unorganized retail outlet.
20	Mwagike, L & Mdoe, N. (2015) "The role of middlemen in fresh TSC in Kilolo district, Tanzania"	To analyse the role of middlemen in linking smallholder tomato farmers with Dar-es-salaam markets, Tanzania.	Immediate customer, markets location, order qualifiers, problems of vegetable marketing in the area, vegetable preservation methods (Qualitative and quantitative methods)	Small vegetable farmers and traders.	Descriptive statistics such as frequencies, percentage, chi-square and one-way ANOVA.	The study revealed that majority (58%) of smallholder tomato farmers sold their produce to middlemen due to being geographically separated from the markets, poor local road network and poor access to market information. Consequently, the use of middlemen to sell tomato produce cannot be avoided unless smallholder farmers are linked with urban markets.
21	Mwagike, L. (2015) "The Effect of Social Networks on Performance of Fresh TSC in Kilolo"	To determine the effect of social networks on the performance of the fresh TSC.	Social networks (independent) and performance of the fresh TSC (dependent). (Qualitative and quantitative)	Tomato producing households	Means, percentages, independent samples T-tests and multiple regression analysis.	Membership in socio-economic groups, network size, tie strength, and network density have a significant positive influence on the performance of the fresh TSC in the study area. The study also found out that level of education had a positive influence on the performance.
22	Mwagike, L. (2015b) "Coordination Mechanisms in Fresh TSC in Tanzania"	To examines coordination mechanisms used in the fresh TSC in Kilolo District, Tanzania.	Factors influencing the choice of marketing channels, type of contractual arrangement among actors, SC coordination mechanisms, the source of capital and membership in socio-economic groups. (Qualitative)	Smallholder tomato farmers and tomato traders	Qualitative data were analysed using content analysis. Others: percentages, cross-tabulations	Three main contractual arrangements were found in the fresh tomato namely: spot markets, verbal and written arrangements.

S/ N.	AUTHOR, YEAR AND TITLE	OBJECTIVES	VARIABLES AND DESIGN (Quantitative/Qualitative)	RESPONDE NTS	DATA ANALYSIS TOOLS	MAJOR FINDINGS
					and chi-square test.	
23	Krishnawat, A. & Chaudhary, S. (2016) "Decision support system in SC networks: a critical review"	To help researchers in understanding various questions addressed, models proposed in the area of Decision support system (DSS) and supply chain network (SCN) with major emphasis on agriculture and food processing industry. To create a useful resource article for searching for research topics related to DSS in SCN of agriculture and food processing industry. To create an article to serve as a comprehensive bibliography of the articles published during the period.	The literature is analysed under 4 major themes and nine sub-themes: 1. DSS (models, case study & general) 2. IT intervention in the food industry 3. SCM (in agri-sector, in allied industries & basic outline in the various sector) 4. DSS in SCN (structural design/framework in a particular sector, tools and tactics, & general study) (Qualitative)	Chosen articles/book section/reports published in a peer-review, archival journal. Conference proceedings, book section and reports from well-established publication; articles and publications with 'DSS in Agriculture' and 'DSS in SCN' as a part of their titles; the exceptions are those articles that are explicitly dealing with 'DSS in the food processing industry' or 'DSS in SCN in agriculture' but for some	Tables	The concept of DSS seems to be growing and expanding. Different topics such as the importance of using DSS in SC network, DSS framework in agri-business and food processing industry seem to be becoming of interests to the researchers. Also, the mature status of the field is evident in the rigour and thoroughness of the articles in recent years.

S/ N.	AUTHOR, YEAR AND TITLE	OBJECTIVES	VARIABLES AND DESIGN (Quantitative/Qualitative)	RESPONDENTS	DATA ANALYSIS TOOLS	MAJOR FINDINGS
				reasons the authors decided not to use 'DSS' or 'SCN' in the title.		
24	Dome, M. M. & Prusty, S. (2016) "An Analysis of vegetable SC in Arusha region, Tanzania"	To determine the cause and effect of the structure and behaviour of VSC in Arusha and To explain the pitfalls and challenges facing the VSC in Arusha.	Structure and behaviour, policies and norms, reward systems, amount of reward, power and position, PHL, logistical support services. (Qualitative)	VSC participants including farmers, petty traders, retailers, wholesalers, supermarkets and consumers (both individuals and institutions like hotels).	Customized Ms Access database. The analysis was done using both descriptive statistics and nonparametric statistical models in Stata 14 programme.	The current structure and behaviour of VSC is largely the outcome of policies in force, which also have a significant impact on the unfair reward/pay-off system amongst VSC participants. The consequence of unbalanced reward/pay-off system amongst VSC participants sustained opportunistic power relationships that tried to maintain the status quo of their position in existing VSC structure. Poor logistical support services exert tremendous impact to the current proportion of PHLs.
25	Khasa, P. & Msuya, P. (2016) "Gender Roles in the Tomato Value Chain: A Case Study of Kilolo District and Dodoma Municipality in Tanzania"	To assess gender roles in the tomato value chain in Kilolo District and Dodoma Municipality in Tanzania.	Gender of the value chain actors (Quantitative and qualitative.)	Input suppliers, producers, transporters, coolies, brokers, traders and consumers. Moreover, box/crate/Tenga makers were identified in Kilolo District but not in	SPSS. Descriptive statistics (frequency and percentages. The cross-tabulation-to segregate roles done by different gender categories in the tomato value chain.	The majority of input suppliers in both study areas were middle-aged males reported by 49 (81.7%) and 57 (95%) of the respondents from Ikokoto and Mbabala "A" villages, respectively. Middle-aged females in both study areas were also engaged in input supplying although their number was less than that of their counterpart, middle-aged males. Gender categories like youth and old aged category were not involved in supplying inputs in both study areas.

S/ N.	AUTHOR, YEAR AND TITLE	OBJECTIVES	VARIABLES AND DESIGN (Quantitative/Qualitative)	RESPONDENTS	DATA ANALYSIS TOOLS	MAJOR FINDINGS
				Dodoma Municipality		
26	Terefe, Z. K. et al. (2017) "Assessment of Fruit Consumption and Marketing Chains in Aleta Chuko District of Southern Ethiopia"	To assess ways of utilization and marketing chains of fruits in Aleta Chuko district of Southern Ethiopia	Fruits' production and household consumption; harvesting mechanisms and stages; frequency of consumption at household level; place of marketing; PHLs during marketing; and causes of fruit losses (Qualitative)	Farm households who produce fruit.	SPSS version 20: Descriptive statistics with frequencies and percentages.	Despite high production percentage of pineapple (95%) followed by avocado (76.2%) and papaya (66.3%), the percentage of household consumption level was 28.6, 37.5 and 28.7 respectively. Moreover, the percentage amounts sold to the market for pineapple, avocado and papaya were 71.4, 53.8 and 68.5 respectively. Most of the households (61.4%) sell their fruits to nearby markets whereas 36.7% sell at their own farm gate. It was also found out that, 5 to 10% of PHL fruit losses occurred during transportation due to transport used accounting to 48.6% followed by the type of packaging material (31%) and distance to market (18.6%).
27	Mutayoba, V. & Ngaruko, D. (2017) "Assessing tomato farming and marketing among smallholders in high potential agricultural areas of Tanzania"	To assess production and marketing of tomato small-scale producers focusing on production technologies employed, production and marketing challenges farmers are facing and profitability.	The data collected included common farming practices, production and marketing challenges, costs and revenues of tomato farming for determination of profitability for each identified marketing channel. (Quantitative and qualitative techniques)	Farmers were interviewed.	Descriptive statistics techniques such as frequencies were used.	It was found out that farmers employ various production technologies. In addition, it was found that farmers are facing a number of constraints. It was revealed further that profits differ across marketing channels farmers are using.
28	Prabhu, A. et al. (2018) "Influence of Farmer demographics and SC Issues on Organized	Main objective: to study the impact of SC factors on organized retailer performance. Specific objectives: 1. To analyse the influence of farmer demographics on	-Workplace performance of an employee (Age, gender, marital status, education level, field experience, earnings) -Factors influencing the F&V SC in India are (population and demographic changes,	Farmers	T-Test and Regression Analysis	It was found out that independent variables like demographic characteristics and SC issues had no control over the retailer's performance.

S/ N.	AUTHOR, YEAR AND TITLE	OBJECTIVES	VARIABLES AND DESIGN (Quantitative/Qualitative)	RESPONDE NTS	DATA ANALYSIS TOOLS	MAJOR FINDINGS
	Retailer Performance”	organized retailer performance. 2. To identify the SC issues and its impact on organized retailer performance.	integration in Agri-sector, the emergence of organized retail, the emergence of technologies, globalization, and government role). (Qualitative investigation)			

2.9 Chapter Summary

In this chapter, a comprehensive literature review was made. Various definitions of the key terms related to this study were given. These include SC, SCM and value chain to mention few of them. Evolution of SCM as management approach was traced back. Given the nature of the product whose SCM is investigated in this study, the literature for fresh agri-food subsector was reviewed. The meaning, characteristics, advantages and challenges of fresh agri-food SC were equally reviewed. Moreover, a supply model in fresh agri-food was also examined. The literature review in this chapter was meant to build a basic understanding of the key issues pertaining to the theme of this study. The following chapter, chapter three refers to literature review again, however, this time in a more customized way to refer to the specific product being studied which is a “tomato”.

CHAPTER THREE: TOMATO SUPPLY CHAIN

3.1 Introduction

Chapter three is a continuation of the literature review covered in chapter two above. The only difference between these chapters is the scope or coverage. Whereas the scope of literature in chapter two was general, the scope in this chapter is more specific to review the SC of the studied horticultural vegetable, “tomato”. A review of tomato in the world; regional trade flows; tomato production, processing, and marketing in Tanzania; production regions; the actors involved; the structure of SC and the business relationships were made. A situational analysis review of the TSC in Tanzania was also made. The chapter concludes with a chapter summary that summarizes all the analysed issues in the chapter.

3.2 Tomato in the World

Tomato is one of the most important vegetable crops in the world. There are various common names for tomato including the following: tomate (Spain, France), tomat (Indonesia), faan ke’e (China), tomati (West Africa), tomatl (Nahuatl), jitomate (Mexico), pomodoro (Italy), nyanya (Swahili). (Naika, et al. 2005). In 2017, the total world production of tomato fresh fruit was approximately 170.8 million metric tons (Mt), (Worldatlas.com, 2019). Tomato is rich in nutrients and other health-related benefits to the human body. Tomato consumption is a source of vitamins, minerals, sugar, essential amino acids, iron, dietary fibres and phosphorus. (Ayandiji et al. in Arah et al, 2015). The leading producing country is China which in 2017 produced 52.6 million metric tons. The following leading countries after China with their respective quantities in million metric tons in brackets include India (18.7), the United States (14.5) and Turkey (11.9) (Worldatlas.com, 2019). In terms of yield per hectare, Netherlands reported the highest yield of 560mt, followed by Belgium (547mt), United Kingdom (429mt) and Finland (402) per hectares. (Factfish, 2018). Production of tomatoes in the world has recorded an ever-increasing rate in the past five decades, where it quintupled, (Garming, 2014). During the same period, tomato consumption also tremendously grew from 7.5kg to 20.5kg per year per/capita. This signifies that demand for tomato is still there and it is growing. In terms of favourable climate condition, one can say that tomato is an all-weather crop in the sense

that it can be grown in tropical, sub-tropical and temperate climates. Moreover, tomatoes are produced in open fields, greenhouses or under plastic covers. However, despite these flexibilities in climatic conditions favourable for growing tomatoes, still, there are other countries which do not produce or they produce a quantity not enough for their consumption. In this case, international trade in tomato exists. It has been experienced, however, that key suppliers primarily ship to neighbouring countries due to such reasons as perishable nature of the commodity, transportation costs, market preferences for example tariff advantages, and to foster long-term relations (UNCTAD, 2012). Cross-border tomato business to neighbouring countries is exemplified in Table 3.1 below:

Table 3. 1: Cross-border tomato export

S/N.	Country from	Country to
1	Mexico	United States
2	Turkey	Russia and Eastern Europe
3	Jordan	Iraq and other Middle Eastern countries
4	China	Russia, Kazakhstan, Vietnam and Hong Kong
5	Burkina Faso	Ghana
6	Tanzania	Kenya

Source: UNCTAD, 2012

Tomato is popularly grown in most of the Africa countries. Egypt is the main producing country in Africa with a production quantity of 8,625,219 tons in 2015 and outperformed the other African countries by far. The top 15 tomato producing countries with their respective production in tons in Africa are given in Table 3.2 below.

Table 3. 2: The Top 15 Tomato Producing Countries in Africa

Rank	Country	Production (tons)
1	Egypt	8 625 219
2	Nigeria	1 560 000
3	Morocco	1 219 071
4	Tunisia	1 100 000
5	Cameroon	880 000
6	Algeria	796 963
7	South Africa	564 740
8	Sudan (former)	529 200
9	Kenya	397 000
10	Ghana	321 000
11	Tanzania	255 000
12	Mozambique	250 000
13	Benin	244 742
14	Libya	225 000
15	Niger	188 767

Source: Adapted from Arah, et al. (2015)

Tomato consumption is huge and common in most families and it's used for a variety of recipes; consumed fresh in salads, cooked in other dishes, or processed in other food products. It follows therefore that tomato production in African can improve the livelihood of producers especially smallholders by creating employment, and thus, the source of income for both rural and peri-urban dwellers. (Arah, et al., 2015). However, in most African countries, tomato production is not profitable due to the presence of numerous constraints which need special attention. The tomato producers face problems in at least every stage of the SC in production, post-harvest, marketing, or a combination of them. (Ibid).

For instance, PHLs-probably the main constraint, are experienced at both farm level as well as downstream to consumers. Farm-level losses are attributed by improper harvesting stages, excessive field heat, improper harvesting containers, poor farm sanitation and improper packaging materials. Whereas the downstream losses are due to lack of access roads, inappropriate transportation system, lack of processing factories and lack of reliable market information. (ibid). As a counteractive measure, Arah, et al (2015) propose the use of affordable low-cost intermediate technology. This can significantly reduce some of these PHLs and make the subsector a profitable venture in Africa. Other constraints facing tomato production in Africa are such as over dependency in rain-fed farming due to lack of or presence of ineffective irrigation system, the incidence of pests and diseases, low quality and inadequate quantity of tomato produced among competition from foreign imports. (Ibid).

3.3 Regional Trade Flows

Food markets in Sub-Saharan Africa and East Africa, in particular, are not wholly liberalized. It is a common practice of governments to intervene in the flows of agricultural products in the regions especially during a time of scarcity and rising prices. Trade barriers both tariff and non-tariff barriers like police roadblocks, weighbridges, and natural resources agencies are common in East Africa. However, as a matter of fact, none of the countries within the region can be fully satisfied internally hence, goods and services have to flow from the area of production to the area of consumption. Because of the barriers, informal agri-food trade in East Africa is estimated to be (80%) and the formal trade which

is put into records being (20%) only. Efforts to regionalize trade and agricultural policies in African countries is in progress, however, there are still major deviations in terms of the pace of integration and harmonization thus hampering the smooth flow of agricultural products in the region. (Engel and Jouanjean, 2013; Silla, 2013; Pannhausen and Untied, 2010).

In terms of cross-border tomato regional trade, Tanzania, as compared to neighbouring countries, is second to Kenya in tomato production, but in trade, Tanzania exports in large quantity to Kenya, as depicted in Table 3.3 below.

Table 3. 3: 2010 Tomato Production and Trade Volumes Data (MT)

	Kenya	Tanzania	Uganda	Rwanda	Total
	539,151	235,000	31,000	42,800	847,951

SOURCE	DESTINATION				
	KENYA	TANZANIA	UGANDA	RWANDA	TOTAL
KENYA	-	-	267	-	267
TANZANIA	4,694	-	-	-	4,694
UGANDA	2,586	480	-	3,200	6,266
RWANDA	-	-	-	-	0
TOTAL	7,280	480	267	3,200	11,227
IMPORT/PRODUCTION	1.35%	0.20%	0.86%	7.48%	1.32%

Source: Adapted from Chemonics International Inc., (2013)

In the following sub-sections, a brief overview of tomato in neighbouring countries, namely: Kenya, Uganda and Rwanda are provided.

3.3.1 Tomato in Kenya

Unlike Tanzania where tomato leads in terms of vegetable production, in Kenya tomato is ranked the second vegetable in terms of production and value after potatoes. Tomato production is done in both open airfields as well as in greenhouse technology and accounts for (95%) and (5%) of the total tomato production respectively. Tomato production in Kenya is mostly done in two production seasons: November to February and April to June and the highest peak is in May. (Sigei et al., 2014). According to Table 3.2 above, Kenya is ranked 9th in tomato production in Africa and the leading country is Egypt (Arah et al., 2015). However, compared to other countries, Kenya is the net importer of tomato from the region (Government of Kenya, 2012). Of all the horticultural products in Kenya, tomatoes are the most lucrative business in terms of enterprise value per acre. In Kenya,

tomatoes are mainly marketed in the fresh market to processors and consumers and their market channels comprise Producer-Broker-Wholesaler-Retailer-Consumer; Producer-Agro-processor; and Producer-Middleman-Agro-process or inter alia. (Odame, 2008).

There are several constraints in tomato value chain in Kenya from production to marketing of quality tomatoes. These include the following: production inefficiencies, agronomic constraints like the incidence of pest and diseases and physiological disorders (cracking, sunburn or scald); institutional constraints like poor post-harvest technologies due to perishability and poorly organized rural and urban market infrastructures that permit unpredictable price fluctuation (Sigei, et al., 2014). Consequently, Kenya's production is subsistence and not market oriented. From marketing stance, tomato business is full of constraints like market inaccessibility due to poor road infrastructure (especially rural roads), excessive cost of transportation, high market price fluctuation, poor or lack of storage facilities (despite tomato being perishable in nature, hence prone to low-shelf-life) and existence of market cartels-resulting to poor prices paid to the farmers. Moreover, there is underutilization of processing facilities, and consumer exploitation through exorbitant pricing to mention a few. Sigei et al. (2014).

3.3.2 Tomato in Uganda

Production of tomato in Uganda contributes significantly to the country's economy and serves as a source of food for the people. Tomatoes are grown mostly by smallholder farmers for their own consumption as well as for domestic markets as well as regional markets. Tomatoes are grown under both Greenhouse and in ordinary ways such as open fields as such, tomatoes can be grown all year round. However, those in the greenhouse are of a better quality than ordinary ones because they are grown in a controlled environment (FOA,2013).

Tomato in Uganda is marketed to various consumers including hotels, restaurants, local consumers, schools, institutions and processors for tomato juice. Just like in any other countries, tomato production in Uganda is faced with many constraints. In summary, the small-scale farmers face the following common constraints: raising right varieties by farmers; lack of training sites for farmers on propagation of right planting materials; diseases, pests and high costs to combat them; limited funds to improve farm productivity;

dependency on rainfall which leads to seasonality in production; lack of information on market prices; high perishability of tomatoes and lack of effective transport to distant markets. (FOA, 2013).

It is a fact beyond doubt that tomato is food crop which is used in many cooking recipes as such it has a large domestic market and tomatoes are increasingly being exported to external markets in Kenya, South Sudan, and Europe where they fetch a lot of money. This creates an opportunity for farmers to grow them on a commercial basis. (Daily Monitor, 2014).

The lucrative market in Uganda is usually in March since there is usually a long drought in December, which affects or hinders planting of tomatoes. Because of the long drought, those who can irrigate their crop earn a lot of profits due to a limited supply on the market. The likewise lucrative market in Kenya and Tanzania are in the months of May and October respectively (USAID, 2013). This is depicted in Figure 3.1 below.

3.3.3 Tomato in Rwanda

Rwanda is home of horticultural crops and tomato is the principal crop in terms of production and sales. Other crops include onion, sweet pepper, and passion fruits arranged in descending order of production and sales volumes.

Tomato production in Rwanda is performed in all the five provinces. West and East provinces produce more tomatoes than other crops. Tomato is ranked second, third and fourth of the principal horticultural products in the remaining provinces of Kigali, South and North respectively. Tomatoes in Rwanda are chiefly produced in open field and production is seasonal whereas consumption is throughout the year. Rwanda imports tomatoes from neighbouring countries such as Uganda and Tanzania to complement her deficit.

Tomatoes peak harvest periods for Kenya, Tanzania and Uganda:

Kenya, Tanzania and Uganda differ in terms of peak harvest periods and no single country that has tomatoes throughout the year. In Kenya for instance, peak harvest periods are from

January to February; April to June & November to December. Tanzania’s peak harvest periods are from August to December whereas in Uganda are January; April to September; December. Figure 3.1 below depicts these.

Figure 3. 1: Tomato peak harvest periods for Kenya, Tanzania and Uganda

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Kenya					★							
Tanzania										★		
Uganda						★						

Key:

Kenya	
Tanzania	
Uganda	

Peak period ★

Source: Adapted from USAID, 2013.

3.4 Analysis of tomato production, processing and marketing in Tanzania

Tomato production is an important part of Tanzanian economy as well as a food source for its people. Tomatoes are among the vegetable crops grown by small-scale farmers for both home use and domestic markets and can be grown all year round. In recent past years, Tanzania has recorded a consistent tremendous growth in tomato production amounting to (15%) increase in average from the year 2006 to 2013. Table 3.4 below summarizes Tanzanian tomato production for eight years.

Tanzania is ranked 41st in tomato production in the world, however, in terms of yield, Tanzania has ranked 121 hectograms per hectare, whereas in area harvested, Tanzania is ranked 24, (Factfish, 2013). This follows that Tanzania’s productivity per hectare is low compared to other countries in the world; this is why it is ranked high in production but too low in terms of yield.

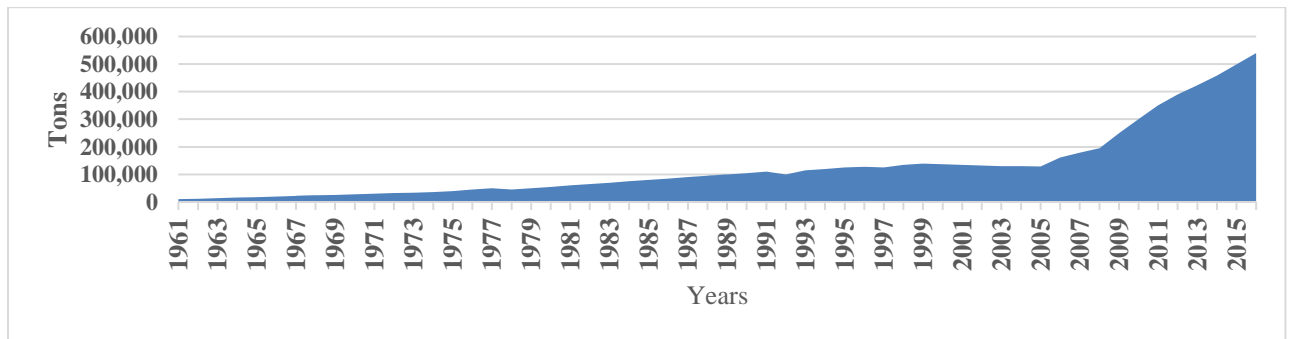
Table 3. 4: Summary of Tomato Production in Tanzania

Year	2006	2007	2008	2009	2010	2011	2012	2013
Qty (mt)	161,344	178,386	195,000	250,000	300,000	350,000	390,000	423,323

Source: Adapted from FAO, 2015

A recent survey by Agricultural Sample Census has produced data that show that Tanzanian tomato production is estimated at 518,312mt per year. These new production records account for (51%) of all horticultural crops produced in Tanzania. It has also been reported that horticulture, in general, has become third in foreign exchange after tourism and mining, (The Guardian, 2015). The most recent data FAOSTAT (2016) shows that Tanzania's production in quantity has continued to rise up to 539,914 tons in 2016. Figure 3.2 below depicts Tanzania's tomato production in quantity tons from independence in 1961 to 2016.

Figure 3. 2: Tomatoes, Production Quantity Tanzania



Source FAOSTAT, 2016

Tomato production is mainly performed by small-scale farmers as such it is said to be labour intensive agriculture. This is because it demands full-time labour attention throughout its lifespan. Tomato production involves several activities from nursery raising through land preparation, planting, field management practices to harvesting. Tomato production inefficiencies are manifested mostly by poor or lack of agronomical practices especially on nutrient management, irrigation, support, weeding, pest and disease management and harvesting. Nutrient management is efficiently done by applying fertilizers. Irrigation is paramount to tomato plants to avoid physiological problems. Support by trellising the tomato on poles and wires is important to allow free air movement and reduce moisture accumulation so as to reduce disease incidences. A tomato plant needs also to be pruned for good yield. Removing of all suckers (de suckering) by hand as soon

as they appear is highly needed. Old leaves should be removed as too many leaves increase the canopy cover hence subjecting the plant to high relative humidity prone for diseases. Tomato plants also call for immediate removal (defoliation) of the leaves below the truss after forming fruit and those leaves around the fruit cluster. Weeds are not allowed to grow big to prevent nutrient competition, thus need to be managed properly. Pest and disease are harmful to tomato development. Common pests include aphids, thrips, whiteflies, cutworms, bollworms, leaf miners, spider mites and nematodes. Pest should be controlled through pest scouting, weed cleaning, use of certified seeds and destroying alternative host to mention a few. Common diseases are such as wilts, blight, leaf spots and mildew. Mildew and blight diseases are controlled by copper-based or fungicides, whereas, viral diseases can be controlled by controlling vectors such as aphids, thrips, whiteflies and nematodes. (Sigei K. et al. 2014).

The phrase ‘agricultural marketing’ refers to the performance or operation of various business activities (assembling, transportation, storing, buying, selling, standardization, grading, processing, sales promotion, inter alia) which direct the goods and services from producers to the ultimate consumers. (Reddy et al.2014). Agricultural marketing starts at the farm which is the basic source of market supply. Tomato marketing encompasses getting the tomatoes from the point of production to the point of consumption. (Sigei et al. 2014).

Processing includes the transformation of fresh tomato produce into the tomato end products like tomato paste, tomato juice, tomato ketchup, tomato sauce, amongst others. (Sigei K. et al. 2014).

In Tanzania, most of the F&V like tomato are still consumed raw or unprocessed. This fact applies also to the exported F&V. This is to say, value addition to agricultural crops especially fresh agri-food is still low in Tanzania.

3.4.1 Tomato producing Regions in Tanzania

Many regions are favourable and potential for the growth of tomatoes in Tanzania. Table 3.5 below outlines these regions, their land size allocated to tomato and yield, ton/ha.

Table 3. 5: Planted Area and Yield of Tomato (t/ha) per Region, including Zanzibar

S/N.	Region	Planted area (ha)	Yield (tons/hectare)
1.	Morogoro	6,159	3.5
2.	Iringa	3,274	5.8
3.	Tanga	2,568	4.2
4.	Zanzibar	2,370	2.3
5.	Ruvuma	1,926	3.8
6.	Mwanza	1,916	5.6
7.	Kagera	1,611	2.8
8.	Arusha	1,503	4.9
9.	Kilimanjaro	1,362	8.2
10.	Mbeya	1,218	5.2
11.	Dodoma	1,142	1.7
12.	Mara	1,081	3.5
13.	Pwani	895	2.2
14.	Dar es Salaam	830	3.3
15.	Tabora	827	3
16.	Kigoma	780	4.1
17.	Rukwa	582	3.7
18.	Shinyanga	524	3.8
19.	Mtwara	521	2.5
20.	Lindi	350	6.2
21.	Singida	323	1.7
22.	Manyara	141	6.3

Source: MMA, (2008)

3.4.2 Actors and structure of tomato sub-sector in Tanzania: an SCM perspective

Two important types of research which were done in tomato sub-sector in Tanzania in 2008 and 2009 by MMA (2008b) and MUVI-SIDO (2009) in the Northern zone and Iringa (Southern zone) respectively paved the way for understanding the TSC in the country. Both MMA (2008b) and MUVI-SIDO (2009) defined actors in the TSC in Tanzania. MMA (2008b) classified these actors into five categories whereas MUVI-SIDO came out with four main categories. A brief description of the actors in TSC by the two researchers ranges from seed production, input supply, production, brokering, bulking, trading, processing, wholesaling, retailing and exporting.

MMA (2008b) main five classifications include the following:

- i) Vegetable basket channel: during the time of research it consisted with one medium scale producer who was producing high-quality vegetables by using high-breed seed under irrigated circumstances and by applying modern farming techniques, including pest control management. The main markets were supermarkets, lodges and hotels in the Northern circuit of Tanzania.

- ii) Fresh tomato trade: trade in fresh tomatoes is very vibrant and many brokers, middlemen and traders are involved.
- iii) Export channel: substantial volumes of tomatoes from Tanzania, especially from the northern zone of the country, are sold to Kenya. The market is monopolized by few traders like Kilombero traders' associations and Ngarenanyuki traders. This channel favours Tanzanian traders as the prices are controlled.
- iv) Processed tomatoes: there are several tomato processing companies in Tanzania and the biggest (in order of capacity) are Dabaga Industry, Red Gold and Natural Choice.
- v) Dried tomato channel: the main but still small player in this chain was the River Cottage industry. The industry produces high-quality tomatoes and part of it is processed in dried tomatoes. The industry is fully integrated operation but a small out-grower scheme is a future and interesting option due to potential high yield due to technical assistance, good seed material and irrigation services and more importantly, high prices.

The MUVI-SIDO (2009) classification is given in four levels as follows:

- i) Input supply level: including importers, stockist, research institutes, seed farmer producers, seed companies, extension services and training, and credit facilities.
- ii) Production level: the key players here are the farmers-mostly small-scale farmers. The main activities at production level include fertilizers and pesticides, cooperation, casual workers, grading and standards, post-harvest handling and transportation.
- iii) Trading level: there are different types of traders who interact in the tomato trading segment, including brokers, buyers (primary and secondary), wholesalers and retailers.
- iv) Transporters: transport is a cross-functional issue in the value chains and affects all actors. However, the most important actors for transport are entrepreneurs who own trucks, tracks drivers as well as porters.

As you can see from above, TSC in Tanzania is complex and challenging with numerous parties involved unless these parties are united, managing such a chain could be very difficult and complicated.

3.4.3 Business relationships in tomato SC

MUVI-SIDO (2009) identified two main types of business relationships in TSC in Iringa region as shown in Table 3.6 below. These are persistent network relationships and spot market relationships. Persistent network relationship seems not to be common with most of the actors and it prevails only between two sets of the actors, namely: Researchers and input suppliers Institutions and exporters and importers. On the other hand, spot marketing relationship is very common with the rest of the actors in the SC. Comparing these two types of relationships, Van Roekel et al. (2001) supports persistent network relationships since single companies lack the capacity for dealing with most of the SC challenges. But with persistent network relationship, experience demonstrates that new market segments, new products and new services, can best be developed through partnerships among suppliers, input providers, marketers, and customers in the chain. Contrary to this, Eaton (2007) introduces another school of thought that believes in transaction costs of other institutional arrangements to be apparently higher than those of the spot market. These two-differing school of thought, call for further researches, in this case, one of them was this one.

Table 3. 6: Summary of Business relationships in tomato value chain

Functions	Services	Participants	Linkages between actors
Research institutions	Research, multiplication of seeds	Researchers	Persistent network realizations exist between researcher and input suppliers
Input supply	Agro-chemicals, equipment supply	Input supplier (stockist)	Spot market relationships (the relationships are created on the spot (including negotiations on price)
Production	Input purchase, ploughing, ridging, planting weeding	Transporters, Farmers, Labourers (casual)	Spot market relationships (the relationships are created on the spot (including negotiations on price)
Harvesting	Labour for harvesting	Labourers	Spot market relationships (the relationships are created on the spot (including negotiations on price) between farmer and labourer
Loading at firm/local collection place	Transport, loading, unloading	Transporters and Labourers	Spot market relationships (the relationships are created on the spot (including negotiations on price) transporter and labourer
Trading (primary)	Move tomatoes to markets, load/unloading, transport	Transporters, urban trader sell tomato to retailers	Spot market relationships (the relationships are created on the spot (including negotiations on price, volume, type) between the local trader and urban trader
Trading (secondary)	Unloading, packing, transport, loading	Wholesaler and retailer	Spot market relationships (the relationships are created on the spot) including negotiations on price, volume, type) between urban trader and retailers
Retailing	Transporting, selling	Shopkeeper/stall	Spot market relationships (the relationships are created on the spot) including negotiations on price, volume) between retailer and consumers
Exporting/importing	Grading and packing, loading	Exporter/Importer	Persistent network relations exist between exporters, prearrangements on volume but prices determined by market forces

Source: Adapted from MUVI-SIDO, 2009

3.4.4 Situational analysis of the tomato sub-sector in Tanzania

Comprehensive situational analyses of the tomato subsector in Tanzania were performed in the past, MMA (2008b) and MUVI-SIDO (2009) in both northern and southern highlands parts of Tanzania respectively. As part of their findings, these studies outlined several opportunities and constraints for tomato production and supply in their respective parts/zonal regions in Tanzania. The identified opportunities and constraints for both studies are presented in the following paragraphs.

Opportunities in the northern part of Tanzania: MMA (2008b) from their study in northern part of Tanzania, they identified the following: increased availability of improved seed like Tanya and Tengeru 97 enable farmers to increase yield; hotels and lodges, particularly in the north have an unsatisfied demand for vegetables, including tomatoes; good quality tomatoes, especially from high seeds could fetch higher prices per kg; all

processors are in the process of expanding their production capacity and hence will need more supply; available and accessible electrical and sun drying technologies and knowledge offer farmers opportunities to preserve tomatoes and add value; and some programmes have developed adequate financing mechanism for farmers, for example through Savings and Credit Cooperatives (SACCOS).

Opportunities in the southern highlands part (including Iringa) of Tanzania: on the other hand, MUVI-SIDO (2009) from their study in Iringa region (southern highlands) identified the following opportunities: progressive small-scale farmers-who are willing to adopt the production of tomatoes in the current farming systems as an important source of income; presence of good road from Iringa to Dar es salaam, the main tomato market in Tanzania motivates the actors to engage into tomato business; land availability: the availability of land for expansion; varied climatic conditions and possibility for irrigation, which provides an opportunity to produce a wide range of good quality vegetables including tomato throughout the year; and Technology: the existence of agricultural and other research institutes such as ARI Tengeru (in northern Tanzania), ARI Uyole (in southern highlands), Sokoine University of Agriculture (SUA) that are developing appropriate technologies including improved varieties to support development of the horticultural sub-sector in Tanzania; and institutional support: presence of horticultural promotion and marketing section within the Ministry of Agriculture and Ministry of Industry, Trade and Marketing (Ministry of Industry, Trade and Marketing) through SIDO and IFAD.

Constraints in the northern part of Tanzania: MMA (2008b) identified the following constraints: lack of storage and preservation facilities, forcing farmers to sell immediately; most (small scale) farmers still depend on rain-fed farming and therefore are not able produce the whole year round; high costs of certain inputs, for example hybrid seeds, fertilizer and pesticides, makes it hard for small-scale farmers to shift to high management practices; strong fluctuating prices that make it hard for farmers to decide when and to whom to sell; nearly total absence of contractual arrangement and hence small-scale farmers do not benefit from embedded services; some processors lack consistent supply and hence decide to import tomato paste, mostly from China; poor packaging and

transportation results in high losses on the way, whereby these additional costs are transferred to the farmers.

Constraints in the southern highlands part (including Iringa) of Tanzania: constraints by MUVI-SIDO (2009) are classified into four main categories as follows:

- i) **Production constraints:** These include the following: high incidence of pests and diseases especially during wet season resulting in low productivity and supply; poor and unspecialized crop extension services at producer level with subject matter specialists (SMS) sometimes available only at the district level. This results into production of substandard product qualities which do not meet the export market quality standards; and high level of losses (about 30-40%) of tomatoes due to poor postharvest handling that spans all the way through from harvesting, loading/unloading, transportation and transportation facilities to storage facilities).
- ii) **Marketing constraints:** these include the following: high market price fluctuations due to the high seasonality of supply; the presence of stiff competition on the Dar es Salaam urban market that receives tomatoes from most of the producing regions of Morogoro, Tanga, Arusha, and Kilimanjaro. All these regions rely on the same market resulting in increased transport costs and hence low producer prices to farmers; lack of adequate and reliable tomatoes production and trade statistics necessary for analysis and planning and lack of relevant market and price information, especially to farmers.; lack of effective marketing farmers organizations, resulting in the traders dictating the price; lack of export market information particularly the quality specifications; and lack of expertise in product packaging and shipping (clearing and forwarding).
- iii) **Transport and product handling constraints:** these include: poor rural roads particularly the feeder roads leading to high costs, deterioration of product quality and physical losses, which when combined with other above mentioned constraints for example lack of market and poor packaging materials lead to

losses of up to (40%) in some cases; corruption along highways by traffic police, accidents of trucks due to poor conditions of the trucks; and lack of insurance from such losses as accidents.

- iv) **Processing constraints:** these include: underutilization of the existing tomato processing capacities in Iringa region including Dabaga and IVORI factories; underdeveloped small-scale tomato processors. It is difficult for SMEs to access the tomato processed markets due to poor product quality particularly packaging and labelling, no quality and safety marks (critical traceability information) due to bureaucratic and costly government business licensing and Tanzania Bureau of Standards (TBS) product standards certification procedures; lack of computerized and accessible production database; lack of transparency in export trading; and difficult access to affordable processing technologies.

Summary from opportunities and constraints in tomato value chain in Tanzania

The above two studies conducted at two different parts of the country signifies that opportunities and constraints differ from one place to another and findings from one part cannot be simply generalized for application in another part where the study was not conducted. With this in mind, this current researcher studied two growing case regions (such as Arusha and Iringa) and one major national market – Dar es Salaam City and its three constituting municipal councils of Ilala, Kinondoni and Temeke.

3.5 Agricultural policies in Tanzania

Agriculture is the backbone of the economy of Tanzania. As such, the government of the United Republic of Tanzania has been carefully ensuring availability of workable relevant agricultural policy at all times. Since independence in 1961, the country has been persistently attempting to implement a good range of agricultural policies. (URT, 2008b). New policies have been put into application following perceived weaknesses in the previous set of policies. The building blocks for an agricultural policy include inter alia such aspects like the organization of agricultural production, land tenure, land use planning, agricultural research and extension, agricultural technology, agricultural marketing and

prices, agricultural inputs and the problems of prospects of individual crops. (ibid). It follows therefore that on one hand, the available policy should motivate farmers to produce, whereas, on the other hand, the government has to look for markets, and should be concerned with input supply and provision of extension services. (ibid). From independence to 1990s, Tanzania was biased to the production of food crops and business traditional crops such as coffee, tea, sugar, cocoa, cotton, cashew nuts, tobacco, sisal and many more for the world market. This was due to the fact that the country needed food mainly grains for its peoples' survival and at the same time the country wanted income from the traditionally high-income export products. In the 1970s these traditional export crops were contributing up to (60%) of the total export of the country. But, in the 1980s these crops experienced huge problems at export markets. Until the 1990s, the traditional export crops had dropped to (50%) in terms of export volume and continued to drop to about (23%) in the year 2002. This poor performance was a real shock to the government which had to immediately think about recovery strategy. As a recovery economic measure, the government decided to diversify from too much reliance on traditional export products to recognition of non-traditional exports such as horticultural products such as flowers, fruits, vegetables, spices, and medicinal plants. This decision was reached after seen other African counties being successful in exporting non-traditional export products. In order to officialise the diversification, the Agriculture and Livestock Policy of 1997 included horticulture.

Horticulture in Tanzania

The Agriculture and Livestock Policy of 1997 identified the potential areas for horticultural development in the country. These are found mainly on the highlands and coastal belts of the country to include: Northern Highlands (for example Arusha and Kilimanjaro); Southern Highlands (for example Mbeya and Iringa); Coastal-belts regions and (Morogoro, Tanga, Coast, and Dar es Salaam). Dodoma was identified for Central regions and Mwanza, Mara and Kagera for Lake Zone. The main producers of most of the horticultural crops in Tanzania are small-scale farmers with exception of few crops produced by large-scale farmers and companies for export. These exceptional crops include flowers and some

vegetables for export such as green beans, peas, courgettes, baby corns, chillies, baby carrots and baby leeks on the other hand. (URT 2008b).

Despite Tanzania's endowment in the production of varied horticultural crops, the 1997 agricultural policy highlighted the important horticultural crops and categorized them into three categories namely: fruits, vegetables and flowers. For F&V, the policy recognized: pineapples, passion fruits, citrus fruits, mangoes, peaches, pears and desert banana as important fruits whereas tomatoes, spinach, cabbage and okra as important vegetables. Flowers were divided into two groups: tropical varieties and temperate types. The 1997 agricultural and livestock policy stated categorically that the Tanzanian horticultural subsector was faced by several challenges including: Poor production organization in relation to supply and/or availability of seeds, farm inputs, research and extension services; Poor marketing systems resulting in quality deterioration and enormous PHLs; Inadequate storage, packaging, technology, and processing facilities which in turn creates surpluses and critical shortages of horticultural products during offseason; Poor roads, especially feeder roads and lack of appropriate transportation logistics, and A poor-quality control system (URT, 2008b).

The government of the United Republic of Tanzania did not just constitute the 1997 Agriculture and livestock policy for its own sake but to get it implemented to ripe the intended benefits. For seamless implementation, some agricultural legislations were constituted. These among others include Plant Protection Act (PPA) of 1997, the Plant Breeders Rights Act (PBRA) of 2001 and the Seed Act of 2003. These legislations were specifically constituted with a special bearing to promote non-traditional crops - horticultural. The PPA, for instance, was the first comprehensive law that committed Tanzanian imports and exports to exclude or restraint of harmful organisms from such produce. Further, it is through the requirement of the PPA to perform phytosanitary inspection services at all points of entry and exit such as airports, ports and border posts. The Seed Act was constituted to regulate seed issues like importation, exportation, production, processing, distribution, sale or advertisement for sale of seed. That is, nothing can be done in relation to the above unless one seeks permission from the Director. Moreover, the act requires all seed dealers to be registered with the Director. The Seed Act

of 2003 was given the role of ensuring high seed quality in the country to enhance productivity and production. For implementation purposes, the Seed Act of 2003 established the Tanzania Official Seed Certification Institute (TOSCII) and The National Seed Committee. Despite these, the use of improved seed in Tanzania is generally low. Other farm inputs with low usage include fertilizer and chemicals. (URT 2008).

As a way to move out from government-controlled economy to a free market economy, Tanzania formulated The National Trade policy of 2003 meant for moving Tanzania gradually from import restrictions to the liberalization of foreign exchange transactions, simplification of the tariff structure, and the abolition of imports bans for luxury goods and licensing requirements for exports. It also allowed the private sector to compete in the processing and marketing of cash crops (URT, 2008b).

3.6 Chapter Summary

Chapter three has added more insights to the researcher. A review of tomato in the world has enlightened the researcher on the significance of tomato business in the world. It has been learnt that regional trade flows of fresh tomatoes are possible, though limited to neighbouring countries due to the nature of the product – perishable, and bulkiness. Tomato production being a tropical and temperate product is produced in many countries around the world, Tanzania inclusive. There are many regions in Tanzania that produce tomatoes. Tomato processing is highly needed to elongate the product's shelf life. However, processing in Tanzania is done at a very low rate. Tomato being a consumer product need to be transported, stored and marketed to the consumers for the sustainability of the subsector. In so doing several actors in the TSC are involved in moving the product from producers to the final consumers. Different business relationships are being developed among the actors from arm's-length to strategic alliances. The researcher has also learnt that there are several opportunities and threats/constraints facing the TSC in Tanzania. Moreover, the researcher has learnt that there are good national agricultural policies on the place which if properly implemented may bring about huge revolutions in the agricultural sector in Tanzania.

CHAPTER FOUR: FORMULATION OF HYPOTHESES, CONCEPTUAL FRAMEWORK AND MODEL SPECIFICATION

4.1. Introduction

It's in chapter four where the hypotheses of this study and the conceptual framework were formulated. An operational model design for this study was also formulated and research variables are identified and defined. Lastly, the chapter concludes by presenting a chapter summary.

4.2 Hypotheses formulation

Many people have defined the term hypothesis in more or less the same way. Kothari (2004) defines hypothesis from researcher's point of view as, a formal question that the researcher intends to resolve. Alternatively, the hypothesis is a testable proposition about the relationship between two or more events or concepts. (Saunders et al., 2003). The hypothesis is also defined as a tentative generalization whose validity remains to be tested; a predictive statement, capable of being tested by scientific methods, that relates an independent variable to some dependent variables. (ibid). It follows from these definitions that; this particular study was considered viable as the researcher had some propositions to be tested. The hypotheses for this study were formulated based on the three research objectives set forth in section 1.3 of chapter one above. These objectives include the following:

1. To analyse the structure of the current tomato SC in selected regions of Tanzania with respect to small-scale farmers.
2. To examine tomato SC relationships and their impact to payoff system amongst tomato SC actors.
3. To suggest for an SC performance model for small-scale tomato farmers using well-established performance indicators

Each of these objectives is built upon its own foundation focus namely: SC structure or configuration issues, integration (relationship) issues in SCM as well as the need to suggest an operational performance model for small-scale tomato farmers. Having considered all

these facts, the hypotheses of this study were formulated and presented in section 4.2.1 and 4.2.2 below.

4.2.1 SC structure/configuration

The nature and current status of SCM relate to the structure or configuration pertaining to how various actors are positioned in delivering the product to the final consumer. Various studies have described fresh F&V SC configurations (Mgeni, and Temu, 2010; Bongwiwe, et al., 2012; Srimanee and Routray, 2012; Xiao and Chen, 2012; Rijpkema et al., 2014; Dome and Prusty, 2016). SC configurations or structures are determined using SC mapping. An SC map is a representation of the linkages and members of an SC along with some information about the overall nature of the entire map (Gardner and Cooper 2003). A strategic SC map is distinguished by its direct tie-in to corporate strategy (Ibid.). The main focus of the SC mapping is to show how goods, information, and money flow in both the upstream and downstream directions and through a firm (Ibid.). The main emphasis of SC mapping is to capture the high-level measures such as the volume of product, costs involved or lead-time of the chain (Ibid.). The purpose of SC mapping is either to help create an SC that conforms to a given strategy, or as a check to ensure the current chain is set up properly to fulfil that strategy (Ibid.).

Gardner and Cooper (2003) revisit the attributes of an SC map which are grouped into geometric, perspective and implementation issues. Geometric-related attributes include the number of tiers, the width or degree of aggregation and spatial/location while perspective attributes include the focal point (whether firm-centric view or an industry-centric view). Implementation attributes comprise of information density provided, live link to corporate or SC database and delivery mode to users (paper, electronic or web) (Ibid.). One approach used for SC mapping include the modified lean manufacturing model which depicts both directions, two tiers down and one up, has a high level of aggregation, is not spatial, chooses a manufacturing firm focal perspective, is not clear from visual inspection as to the product breadth, may or may not take a SC perspective, low in information density, may or may not be database linked and is delivered by paper (Ibid.). Given the complexity of SCs, SC mapping may exclude non-critical entities to keep the map simpler (Barroso et al., 2006). Lien et al. (2011) identify unidirectional and bidirectional chain configurations

that indicate how entities can buy from and/sell to other entities in the network. In the former case, a firm can trans-ship to one neighbouring firm and receive from another while in the latter case can trans-ship and receive from both neighbouring locations (Ibid.). Until recently, no one best configuration has been documented ranging from the Dell model where intermediaries are bypassed to as far as the elongated SC structures as this depends on other factors.

Short food SCs have been documented in the European context labelling it as an alternative food networks targeting the rural development (Renting et al., 2003). Structural issues of the SC have been noted to impact SC performance of focal firms and the SC as a whole (Autry and Griffis, 2008). In other instances, SC structure has been noted to influence risk diffusion among the SC actors (Basole and Bellamy, 2014). Alternatively stated, the structural make-up of a supply network should have a significant impact on its vulnerability to cascading delays, shortages, and informational failures (Ibid.). This, in turn, impacts the respective SC competitiveness. Although various TSC structures in Tanzania have been documented (MUVI-SIDO, 2009; Mgeni and Temu, 2010; Rasheli, 2014; Mwangike and Mdoe 2015; Dome and Prusty, 2016), but these have not taken a nation-wide perspective and have remained regional in focus. Yet these studies have been undertaken with different purposes ranging from value chain analysis, marketing mechanisms to the brokerage as trading practices. Given these gaps, this study intended to analyse the current TSC configuration from a national perspective and hence provide an entry point to the regional and later to the global markets. The study narrows by examining the configuration aspects using the attributes suggested by Gardner and Cooper (2003) with necessary customisations to suit the purpose. The resultant nature and current TSC were assessed based on the following propositions:

H₀₁: Understanding of customer requirements and expectations strongly impact the structure of TSC.

The following four sub hypotheses to H₀₁ were formulated:

H_{01a}: Farmers don't understand the requirements and expectations of their customers.

H₀1b: Wholesalers don't understand the requirements and expectations of their customers.

H₀1c: Brokers don't understand the requirements and expectations of their customers.

H₀1d: Retailers don't understand the requirements and expectations of their customers.

It is assumed that the better TSC actors understand their customer expectations, the better aligned is the resultant TSC. All customers are included in this perspective and more emphasis is given to large retailers such as supermarkets and exporters, hotels/catering as well as households. It is argued that there is an opportunity for the SC partners, researchers and practitioners to challenge the traditional way of delivering the product to the customers (Rangaraj et al., 2012). This also forces TSC actors to definitely define their product's order qualifiers and order winners. In analysing and designing the TSC, the dominant and expanding informal markets in Tanzania like in many other Sub-Saharan African countries is taken into consideration (Louw, et al., 2009). It was noted that the small-scale traditional marketing system and independent stores have continued to dominate even in urban areas (Ibid.). The definition of informal and formal markets provided by Louw, et al. (2009) is adopted in this study. According to the authors, informal markets consist of producers producing for subsistence and sell surpluses to street vendors, hawkers and those traders selling food products in housing estates (Ibid.). On the other hand, formal markets consist of supermarkets and neighbourhood stores, 'cash-and-carry' and other independent retail stores (Ibid.).

Customer requirements and expectations can be considered in this case to represent order qualifiers (Q_n) and order winners (W_m) pertinent to TSC (collectively). Competitive criteria (C_r) = ($Q_n + W_m$) determine the resultant TSC configuration (S_t). Then S_t can either meet the competitive criteria (C_r) required or it may not be a competitive configuration. It follows that; $S_t = f(C_r) = f(Q_n + W_m)$ (1)

It is obvious that if TSC participants are customer oriented or not, equation (1) can be expressed as a conditional mathematical function with β (arbitrary constant), such that;

$$f(Q_n + W_m) = \begin{cases} (Q_n + W_m + \beta), & \text{if } (Q_n + W_m) \neq 0 \\ \beta, & \text{if } (Q_n + W_m) = 0 \end{cases}$$

..... (2)

The variables or components of S_t shall, in turn, constitute the geometric and perspective attributes suggested by Gardner and Cooper (2003). The TSC behavioural aspects or dynamics as categorised by Bellamy and Basole, (2013) were then analysed using reliability or dependability (delivery time dependability) and quality loss of fresh produce. These two variables were selected due to the nature of the product under study and were analysed quantitatively. Other managerial issues underlying the TSC system dynamics such as customer service levels as reflected by satisfaction ratings were analysed qualitatively in this study. Studies on SC design and analysis with reliability as a focal theme has been recently taking a toll. Notable studies are found to apply hybrid algorithms – genetic algorithm (Yildiz et al., 2015) or borrowing from reliability engineering (Taghizadeh and Hafezi, 2012). Some of these studies registering noticeable limitations such as using library studies including the review of evidence and documents (Taghizadeh and Hafezi, 2012), or use aggregated reliability indices for each entity and activity thereby losing information (Yildiz et al., 2015). The novelty of this study was to suggest a method that can use the powerfulness of both approaches.

4.2.2 The integration (relationship) issues of TSC in Tanzania

The integration issues in SC have widely been discussed firstly, using the transaction cost analysis (Giunipero et al., 2008). More recently, there has been a shift from arm's length relationships (one-off transaction) and contractual-based ones, to more long-term relational forms of collaboration between parties (ibid.). There is a more imperative need for special capabilities in managing agri-food SCs as compared to the traditional SCs due to the following four unique characteristics (Tsolakis, et al., 2013). Firstly, on the sector-wide or overall basis, product quality changes across the SC (short shelf-life and perishability) and stringent requirements for materials recycling requirements. Secondly, at the growers' level, the major constraints are long production times and production seasonality. Thirdly, at the trading level, the main constraints are quality and quantity variability of supply, global sourcing requirements due to seasonal product supply restrictions, and conditioned transportation and storage requirements. Fourthly, based on food industry in general, the features include; quality and quantity variability of supply, high volume and low variety production, specialized and high technology machinery and intensive capacity utilization,

process yield variability (quality, quantity) due to biological, seasonal and weather reasons, quarantine issue (quality tests), to mention a few.

Today's agri-food sector environment has added yet other challenges such as rapid urbanization, growth of domestic food markets, domestic and global factors and markets liberalization, decrease of public sector funding, growing of middle income class, increase in rural and urban population, consumers' demand and preferences, and emergence of global SCs (Louw, et al., 2009; Tsolakis, et al., 2013). Moreover, the increased demand for high-value foods is due to increased awareness, delayed retirement and involvement of women in the workforce (Louw, et al., 2009). The above pressures call for a well organised, robust and resilient SC that will ensure efficient and effective delivery of agri-food related products, in this case, the tomatoes. One way of achieving this is to ensure there exists in agri-food SCs, a form of relationship that has necessary managerial capabilities throughout the chain. However, Matopoulos et al., (2007) noted that collaboration in SC has remained limited to operational issues and to logistics related activities.

Several authors have documented how a well-coordinated and integrated SC can positively impact firm performance and sustain inter-firm competitive advantage (Usuga et al., 2012; Leuschner et al., 2013; Gold et al., 2010). On the other hand, other authors have strongly noted the challenges faced in achieving fully integrated and productive forms of SC relationships (Richey, Jr. et al., 2010; Usuga et al., 2012; Chen et al., 2009). Barriers to integration are difficult to overcome due to the challenges associated with resistance to change and organizational reluctance (Richey, Jr. et al., 2010). If the resistance to change has forces that are the same as, or greater than, the forces facilitating change, organizational inactivity sets in, keeping a company in a stationary state of equilibrium (Fawcett et al., 2008). The most cited forms of obstacles to achieving a fully integrated agri-food SCs include the following (Usuga et al., 2012; Richey, Jr. et al., 2010): Conflicts that may arise due to reasons such as incompatible goals, decision-making domain or differences in perceptions in joint decision making; Lack of willingness to share needed information (unidirectional); Strong organizational boundaries that prevent relational integration reached as a result of developing a policy or strategy without consultation or disregarding the preference of other partnering firms and the actor becomes too internally focused to the

extent of monitoring itself and excludes external constituents such as customer requirements and expectations.

The above obstacles to integration can be summarised using the ordinary English word “opportunism”. Although opportunistic behaviour can be considered by entrepreneurs in a positive way, in SCM, it is totally toxic to healthy relationships building. Opportunism, largely being an attitude issue, is defined as the ability to take advantage of the mistakes of others in order to use opportunities created by such mistakes, weaknesses or interruptions of others to one's own advantage. Opportunism is also weakly defined as self-interest seeking with cleverness. It includes deliberate acts such as delicate forms of deceit or using mostly the incomplete or altered information (information asymmetry). The connotation of opportunism is lack of trust that may result in a deterrence of parties from relying on each other as much as they should. Therefore, transactions prone to opportunistic behaviour will realize the expected results if appropriate mechanisms are put in place to actors from taking advantage of errors. If opportunism is understood as an aspect related to participants’ attitude towards SCM in general, the second hypothesis can be stated as follows:

H₀₂: There is no significant difference between total costs and total revenue in tomato farming or trading.

The following four testable sub hypotheses to H₀₂ were formulated:

H_{02a}: There is no significant difference between total costs and total revenue in farming

H_{02b}: There is no significant difference between total costs and total revenue in tomato wholesale

H_{02c}: There is no significant difference between total costs and total revenue in tomato brokerage

H_{02d}: There is no significant difference between total costs and total revenue in tomato retail

The above hypothesis (*H₀₂*) was tested using quantitative primary data obtained from the field. Variables for data collection came from the measures of attitude towards SCM

adoption, ability and level of commitment to its implementation. Katunzi and Zheng (2010) found that findings clearly show that, SMEs give less attention to SCM strategies, also reluctant to employ the transparent integrated system to link them with other actors in the chain. The absence of compatible organization structures in SMEs in Tanzania is seen as a major obstacle for complete implementation of integration strategy (Ibid.). Richey Jr. et al. (2010) empirically tested whether facilitators to integrated SCRs can have a positive impact on the SC performance. Such facilitators discussed by the author include the actors being aligned (near-common goals and procedures) and being communicative (sharing technical expertise with customers/suppliers). Other facilitators include such aspects as being structured (formalised and contractual), quantified benefits and interdependence among the actors. It was found that facilitators of integration have a direct, positive, and stronger impact on performance (Ibid.). However, since facilitators of integration as discussed by Richey Jr. et al. (2010) are another side of looking at the same coin, it would become redundant to investigate their impacts to SCRs.

It follows from H₀₁ that if the understanding of customer requirements and expectations by chain participants will make them properly aligned, it is likely that even customer service levels will be positively impacted. Customer service is generally regarded as a means by which firms try to differentiate their product, keep customers loyal, increase sales and improve profits (Ballou, 2004). To beat competition, understanding customer requirements and satisfy them better than the competitor, have turned out to be the best competitive weapon. Simon and Gómez (2014) assert that firms that cannot satisfy their customers are likely to lose market share to rivals who offer better products and services at lower prices. Due to heightened competition and increased risk disruptions, firms are increasingly adopting descent and sound business practices. One of these sound business practices is managing inter-organisation business interactions, which in essence, is SCM. It is widely hypothesised that the efforts from a single firm in the context of a network are far from enough to cover it from many risks, especially those passed down from other companies, or those risk reactions from a competitor (*de Souza et al., 2013*). Business community's awareness of this fact will likely impact the attitudes towards adoption and subsequent implementation of SCM.

It can be remarked that SC structure consists of a strategic arrangement of SC participants geared to efficiently and effectively deliver products to customers. Certainly, interactions (relationships) amongst SC participants in due course of delivering products takes place within the given product SC structure. However, for the purpose of this study, the third hypothesis is formulated as below;

- *H₀₃: There is no significant relationship between various actors in the TSC.*

The following eleven testable sub hypotheses to H₀₃ were formulated:

H_{03a}: There is no significant relationship between farmer and wholesaler in TSC.

H_{03b}: There is no significant relationship between farmer and retailer in TSC.

H_{03c}: There is no significant relationship between farmer and broker in TSC.

H_{03d}: There is no significant relationship between farmer and consumer in TSC.

H_{03e}: There is no significant relationship between wholesaler and broker in TSC.

H_{03f}: There is no significant relationship between wholesaler and fellow wholesaler in TSC.

H_{03g}: There is no significant relationship between wholesaler and retailer in TSC.

H_{03h}: There is no significant relationship between wholesaler and consumer in TSC.

H_{03i}: There is no significant relationship between broker and retailer in TSC.

H_{03j}: There is no significant relationship between broker and fellow broker in TSC.

H_{03k}: There is no significant relationship between broker and wholesaler in TSC.

H_{03l}: There is no significant relationship between broker and consumer in TSC.

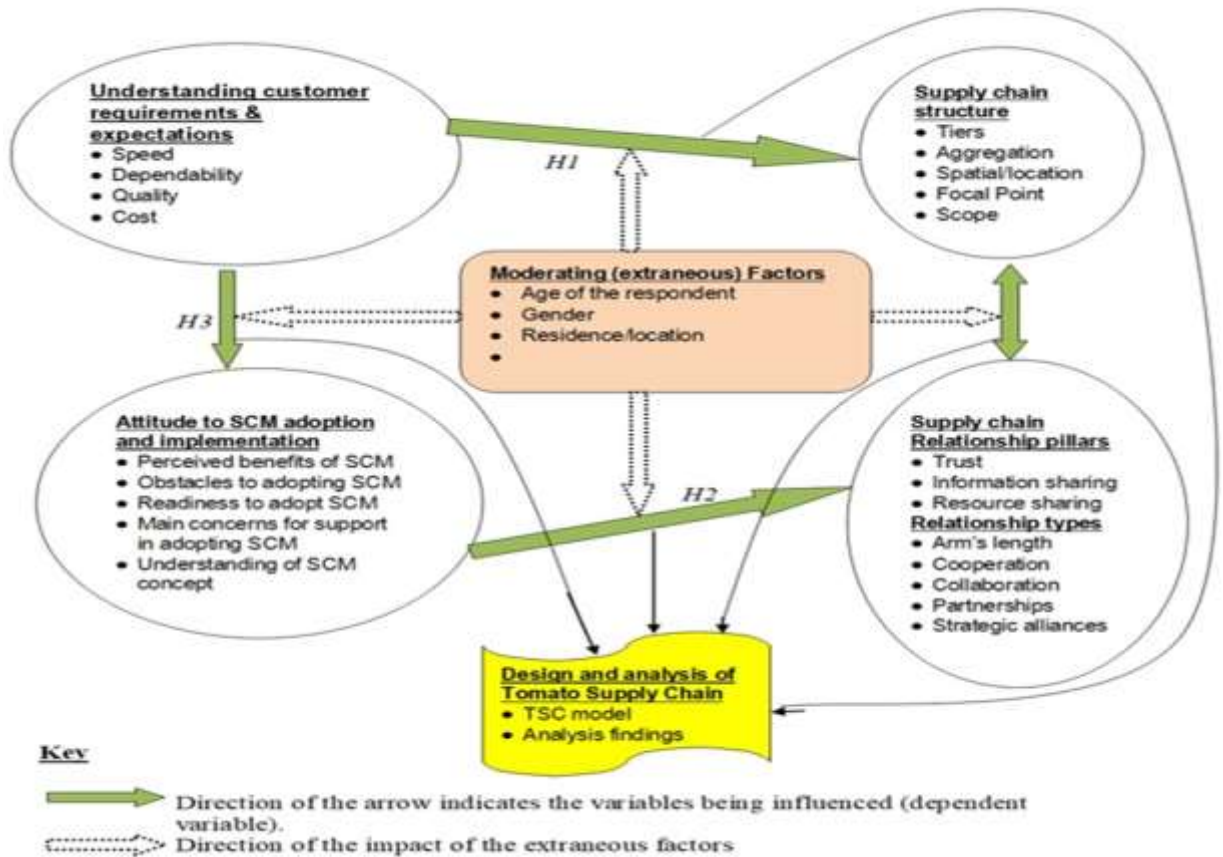
H_{03m}: There is no significant relationship between retailer and consumer in TSC.

H_{03n}: There is no significant relationship between retailer and fellow retailer in TSC.

4.3 Conceptual Framework

The conceptual framework and hence the research model were developed based on the theoretical foundations presented in chapter two as well as the research problem specification in chapter one above. Particularly, research hypotheses H₀₁, H₀₂ and H₀₃ were used to derive research variables and their functional dependence as summarised in Figure 4.1 below. A concept which can take on different quantitative values is called a variable (Kothari, 2004). There are independent and dependent variables such that the latter depends upon or is a consequence of the other variable and the former is antecedent to the dependent variable. Extraneous variables, on the other hand, are independent variables that are not related to the purpose of the study but may affect the dependent variable (Ibid.). A study must always be so designed that the effect upon the dependent variable is attributed entirely to the independent variable and not to some extraneous variable or variables (Ibid.).

Figure 4. 1: Conceptual Framework



Source: Author conceptualization, 2016

4.4 Model specification and variable description

Logistic regression is used in many walks of life including agriculture, biology and environment (Wang and Putterman, 1998). Logistic regression is among the preferred regression methods useful in modelling binary dependent variables (Korkmaz et al., 2012). Logistic regression estimates the effect of independent variables on the result variables as a probability (ibid). Thus, in this study a binary logistic regression model was applied for the analysis. According to Korkmaz et al. (2012), binary variable regression analysis is the simplest regression. The probability of TSC supplier in deciding on a particular immediate customer to sell produce was assumed to be of a binary nature due to the availability of two choices. By considering one possible customer at a time, the possibility is that either a certain SC actor becomes an immediate customer or not. Given the presence of numerous customers/buyers who in most cases are opportunists, this model was particularly thought to be used by the small-scale tomato farmers and traders (middlemen) as they decide to whom they should sell their tomatoes by considering one actor/customer at a time. This is to say, should the small-scale farmer/trader take the product directly to the market or should it let to go through other middlemen before the product reaches the consumer?

The used model was modelled as:

Let 'y' be the binary outcome variable indicating immediate customer/not immediate customer with 0/1 and p be the probability of y, $p = P(y=1)$.

Let X_1, \dots, X_n be a set of predictor variables.

Then, the logistic regression of y on $X_1 \dots X_n$ estimates parameter values for $\beta_0, \beta_1, \dots, \beta_k$ via maximum likelihood method of the following equation:

$$\text{Logit}(p) = \log(p/(1-p)) = \beta_0 + \beta_1 * X_1 + \dots + \beta_k * X_k. \dots\dots\dots(3)$$

In terms of probabilities, the equation (3) above is translated into:

$$P = \exp(\beta_0 + \beta_1 * X_1 + \dots \beta_k * X_k) / (1 + \exp(\beta_0 + \beta_1 * X_1 + \dots + \beta_k * X_k)) \dots\dots(4)$$

Dependent variable measured the choice of a particular immediate customer exclusively one at a time, that is, either a particular customer/buyer becomes an immediate customer

and assigned zero (0) or not assigned (1). On the other hand, a set of independent variables were derived from farmers/traders biodata: age, education, experience, revenue and farm size (for the case of a farmer). To make this study a success, a pre-test analysis of data was done before the main data collection for this main study. Findings by pre-test analysis were found to be viable and commanded the commencement of the main data collection. Sincerely speaking, when this study was planned for the first time, more variables were thought to be used in the model, than those which survived to the end. For instance, a decision to drop gender of farmers was decided after pre-test analysis. This followed domination of male respondents in collecting data for the pre-test. It was found out that male farmers were highly readily available for issuing data than female – given the culture of most tribes in Tanzania where a man is considered the head of the family as well as a spokesperson. Moreover, the gender of traders (wholesalers and brokers for tomato) was also dropped since in average, there are more men than female wholesalers and brokers and in the case of retailers, there are more female than men. More explanation of the biographical data is given on the findings of this research. Consequently, the considered independent variables were as described below. ‘Age’ represented the age of the farmer or trader in years. It was expected that young age to middle age farmers and traders were more aggressive than the elders and could take a risk of taking tomatoes to any booming market. Hence, age was positively correlated with avoidance use of middlemen. Education of the farmer and trader was measured in years spent in schooling and was expected to have a positive impact on avoiding the use of middlemen. Farming experience meant a number of years spent in tomato farming and trading and was expected to have a positive impact into avoiding middlemen. Farmer’s acre size was also expected to have a positive impact and the farmer with large acre size planted with tomatoes was assumed to have economies of scale, hence, power in negotiations and many contacts. Revenue of the farmer represented the total amount earned by the farmer after selling tomatoes in the previous season. It was expected that those farmers who got high revenue they sold their tomatoes direct to consumers rather than middlemen. Further information of the used variables is presented in Table 4.1 below.

Table 4. 1: Variable explanation

Variable code	Variable name	Measurement	Expected sign
Dependent variables			
brok_brok	Broker to fellow broker	'1' fellow broker, '0' not fellow broker	
brok_cons	Broker to consumer	'1' consumer, '0' not consumer	
brok_proc	Broker to processor	'1' processor, '0' not processor	
brok_reta	Broker to retail	'1' retailer, '0' not retailer	
brok_cons	Broker to consumer	'1' consumer, '0' not consumer	
Farm_brok	Farmer to broker	'1' broker, '0' not broker	
farm_cons	Farmer to consumer	'1' consumer, '0' not consumer	
farm_prc	Farmer to processor	'1' processor, '0' processor	
farm_reta	Farmer to retailer	'1' retailer, '0' not retailer	
farm_seed	Farmer to seed company	'1' seed company, '0' not a seed company	
farm_whol	Farmer to wholesaler	'1' wholesaler, '0' not wholesaler	
retai_bro	retailer to blocker	'1' blocker, '0' not broker	
retai_cons	Retailer to consumer	'1' consumer, '0' not consumer	
retai_proc	Retailer to processor	'1' processor, '0' not processor	
retai_retai	Retailer to retailer	'1' retailer, '0' not retailer	
retai_whol	Retailer to wholesaler	'1' wholesaler, '0' not wholesaler	
Whol_brok	Wholesaler to broker	'1' broker, '0' not consumer	
Whol_cons	Wholesaler to consumer	'1' consumer, '0' not consumer	
Whol_proc	Wholesaler to processor	'1' processor, '0' not processor	
Whol_reta	Wholesaler to retailer	'1' retailer, '0' not retailer	
Whol_whol	Wholesaler to fellow wholesaler	'1' fellow wholesaler, '0' not a fellow wholesaler	
Independent variables			
Age	Age of the farmer/trader	Number of years	+
ed	Education of the farmer/trader	Number of years of schooling	+
exp	Experience of the farmer/trader	Number of years of experience	+
FS	Farm size	Size of the farm in Acre	+
rev	Revenue	Revenue of the farmer/trader	+

A total of twenty-one empirical models for analysis were formulated and subsequently regressed.

4.4.1 Definitions of research variables

From the hypotheses and conceptual framework above, some of the variables used and tested in this study are summarized and defined in Table 4.2 below.

Table 4. 2: Definition of research variables

Latent variable	measures	Definition
Understanding customer requirements and expectations	Speed	Speed-Speed means doing things quickly. It is about delivering goods and services to customers as fast as possible. This involves making quick decisions and rapidly moving materials and information inside the operations.
	Dependability	Dependability - means doing things on time and as promised. It is about developing trustworthiness. Dependability can be achieved through the use of reliable equipment, effective communication, efficient scheduling systems, motivated workforce, transparency of processes, inter alia.
	Quality	Quality - is about doing things right. It means consistently producing goods and services that meet expectations. The quality objective can be achieved by the provision of error-free products or services that fulfil customer requirements. This requires a skilled workforce, adequate job specifications, proper technologies, and effective communication. For example, in the context of trade and transport facilitation, 'adequate transport infrastructure' can be a quality performance factor.
	Cost	Cost- performance is about doing things economically. Low cost is a universally attractive aspect. Lower cost of production or service delivery reflects the customer in form of lower price. Cost reduction can be achieved by developing good relationships with suppliers, good negotiation of supplying contracts, getting the right mix of resources and facilities as inputs, inter alia.
SC structure/map/ configuration	<u>Geometric Attributes:</u> *Tiers,	The number of sequential business units performing transactions leading to the final consumer.
	-Direction	The direction is the cover-up down the channel of distribution. Distinguished by: -Supplier oriented/ -Customer oriented/ -Both industry cyclical
	-Length	Length is the number of levels in each direction Distinguished by: ≠ of tiers Up ≠ of tiers Down
	*Aggregation (width)	Aggregation is the degree of specificity within a tier Distinguished by: -High (one box per tier); -Med (types of firms at each level identified); -Low (some firms are named at each level)
	*Spatial/location	A map is geographically representative. Distinguished by: Yes/No
	<u>Perspective Attributes:</u> *Focal point	A map takes a firm-centric view or an industry-centric view Distinguished by: Firm/Industry
	*Scope	This is the scope of the perspective
	-product breadth	This is the breadth of product coverage included in the map Distinguished by: SBU wide Product category Products Components

Latent variable	measures	Definition
	-SC perspective	The SC perspective includes key processes beyond logistics (refer to SCM def.) Distinguished by: Yes/No
	-Process view depth	The depth of the process view is the extent to which the map incorporates a complete set of key business processes Distinguished by: ≠ of key Business Processes Represented
	-cycle view	Includes return channels and other feedback loops Distinguished by Yes/No
SC relationship pillars	Trust	Trust is the extent to which each actor in a particular SC perceives the other party honest or benevolent. (Doney and Cannon, 1997).
	Information sharing	Information sharing as the foundation of SC integration refers to the act of capturing and disseminating timely and relevant information for decision makers to plan and control SC operations. (Simatupang and Sridharan, 2004).
	Resource sharing	Resource sharing is the process of leveraging capabilities and assets and investing in capabilities and assets with SC partners. The referred resources are such as manufacturing equipment, facility, and technology. (Cao and Zhang, 2011).

Source: Researcher compilation

Aggregation is referred to the customers' node along SC where demand originates in a particular geographical location. (Doney and Cannon, 1997).

Spatial refers to units of SC such as manufacturing plant, distribution centre or warehouse when referred to location. (Doney and Cannon, 1997).

Collaboration is a cooperative strategy or process whereby two or more independent SC partners with a common goal of serving customer work closely to plan and execute SC operations through integrated solutions for lowering cost and increasing revenue. (Simatupang et al., 2004 and Cao and Zhang, 2011).

Profit margin measures profit as percentage of revenue. (Chopra et al., 2013).

Food Quality: Food Quality refers to the physical properties of food products as well as the way the product is perceived by the final consumer. It includes such aspects like microbial aspects as well as texture or flavour. (Grunert, 2005). Moreover, quality is

directly related to other food attributes like integrity and safety. Because of its importance, quality should be guaranteed throughout the SC.

4.5 Chapter Summary

In this chapter, three main hypotheses meant for being tested by this study were formulated. These hypotheses include: H₀₁-Understanding of customer requirements and expectations strongly impact the structure of TSC; H₀₂-There is no significant difference between the total costs and total revenue in TSC. H₀₃-There is no significant relationship between various actors in the TSC. These hypotheses were formulated based on the three objectives of the study stated in chapter one above. An operational research model design for TSC in Tanzania was also proposed for being tested in this study. A conceptual framework was also drawn to depict the connectivity and/or relationship of the formulated hypotheses. The identified variables of the study as carefully extracted from the hypotheses were then defined to get their working definitions as applied to this particular study.

CHAPTER FIVE: METHODOLOGY AND RESEARCH PLAN

5.1 Introduction

This chapter contains research methodology and plans that were deliberated prior to practical data collection, analysis and interpretation for this study. There is a clear difference between methodology and methods. Where the former means an approach or philosophy, the latter refers to the technical procedures applied to conduct research. This is to say, both methodology and methods under which this study was conducted are explained in this chapter. The general approach to study methodology is explained together with the selection and justification of the chosen design selected among a general collection of the approaches like survey, case study, action research modelling, and theory building research strategy to mention a few. The choice of the study area and the targeted population form the contents of this chapter. Given the type of this research – a survey with case study as a data collection strategy, and because studying the whole population was not possible, various research aspects were decided before. These include sampling procedures/techniques, data collection instruments (including reliability and validity of data) and methods of data analysis used in the study are explained here. Last but not least, the chapter concludes by giving a summary section.

5.2 Selection and justification of the research design

Research design deals with answers to questions about what, where, when, how much, by what means concerning an inquiry or a research study (Kothari, 2004). The research design is defined as the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in the procedure (Ibid.). Research design or strategy is a logical task (rather than logistical) undertaken to ensure that the evidence collected enables the researcher to answer questions or to test theories as unambiguously as possible. The central role of research design is to minimize the chances of drawing incorrect causal inferences from data. Various authors have differently classified research designs/strategies. The research designs classification by Seuring et al. (2005) is adopted and related empirical studies related to this study are assessed based on the research design that was used in each. Creswell (1998) asserts that when the problem under study is new, dynamic or complex, relevant variables are not

easily identified and extant theories are not available to explain the phenomenon, a qualitative approach is more preferred. This classification is comprised of surveys, case study, action research and modelling SCs. These sampled classifications are defined as hereunder.

Survey: The survey is defined as one of the research strategies involving the structured collection of data from a sizable population. It uses different standardized data collection methods including a questionnaire, structured observation and structured interview; however, the use of the questionnaire is overemphasized. (Saunders et al., 2003). Thus, surveys are very useful in collecting a large amount of data from a large population for effective generalization. A survey study is planned to cover a wider area with limited depth, resulting in questionnaire capturing few variables. (Adam and Kamuzora, 2008). One of the main disadvantages of surveys is lack of economy, as it requires more financial and time resources. Moreover, a survey requires the employment of a huge number of research assistants to be conducted. (Ibid).

Case Study: A case study is also one of the research strategies involving an intensive empirical investigation of a particular contemporary phenomenon within its real-life context using multiple sources of evidence mainly qualitative data. (Saunders et al., 2003; Shaughness, et al., 2000). It is designed to enable the researcher to investigate deeply a particular problem, situation or issue by examining many questions to address. (Adam and Kamuzora, 2008). The case study is potentially used in generating answers to such questions like ‘why’, ‘what’ and ‘how’ - a type of questions. Case study strategy is rich in data collection methods including, questionnaires, interviews, observation and documentary analysis. (Saunders et al., 2003). According to Adam and Kamuzora (2008), from a quantitative point of view, lack of generalizability is considered to be a major weakness of the case study strategy. However, Saunders et al. (2003:93) argue that “case study can be a worthwhile way of exploring existing theory”. Likewise, a simple, well-constructed case study can enable the researcher to challenge an existing theory, let alone providing a source of new hypotheses. (Ibid.).

Action Research: Action research as a research strategy is concerned with the management of a change which is done by the researchers in collaboration with practitioners whose findings should also inform other contexts. (Saunders et al., 2003). The

strong points regarding an action research design include the following: a focus upon change, the recognition that time needs to be dedicated to reconnaissance (fact-finding and analysis), monitoring and evaluation and the involvement of employees (practitioners) throughout the process. (Ibid.). According to Schein (1995) in Saunders et al. (2003), there are two possible focuses on action research. Firstly, that aiming at fulfilling the agenda of those undertaking the research rather than that of the sponsor. Secondly, that starts with the needs of the sponsor and involves those undertaking the research in the sponsor's issues, rather than the sponsor in their issues.

Modelling/theory building research: Modelling/theory building research strategy is that research which aims at developing new models and theories to explain particular phenomena. (Mouton, 2001:176 in Grobbelaar, 2007). Scientific modelling is a scientific activity, whose aim is to make a particular part or feature of the world easier to understand, define, quantify, visualize, or simulate by referencing it to existing and usually commonly accepted knowledge. (Ibid). This can be done in SCM as well as in any other fields of studies. According to Mouton (2001:176) in Grobbelaar (2007), good theories and models are useful in real life. Their applications result into many benefits including providing causal accounts for the world; allowing researchers to make predictive claims under certain conditions; bringing conceptual coherence to a domain of science and simplifying people's understanding of the world.

Table 5.1 below depicts a summary of research designs/strategies and their tactics (data collection methods) compiled by the researcher from literature reviews.

Table 5. 1: Summary of research designs used and their tactics by different authors

S/No.	Author(s)	Approach	Research design/strategy	Tactics
1	Yu and Nagurney, (2012)	Quantitative	Modelling (algorithm) and illustrative case study	Field observation
2	Rong et al., (2011)	Quantitative	Modelling (MILP) and an illustrative case study	Field observation
3	Matopoulos et al., (2007)	Qualitative	Case study	In-depth interviews
4	Mwagike and Mdoe, (2015)	Multi-methods	Case study	Interview (face-to-face) & questionnaire
5	Tsao, (2013)	Quantitative	Modelling (NLP/algorithm) and illustrative case study	Field observation
6	Bottani et al., (2013)	Quantitative	Modelling (Simulation) and an illustrative case study	Interview
7	Aramyan et al., (2007)	Qualitative	Case study	Interview
8	Taylor, (2006)	Qualitative	Case study	Field observation
9	Apte, (2010)	Qualitative	Case study	Interview (face-to-face) and Field observation, Focus group
10	Usuga et al., (2012)	Qualitative	Case study	Field observation
11	Hafiz, et al., (2013)	Quantitative	Case study	Field observation and Experimentation
12	Rasheli, (2014)	Qualitative	Case study	Interview (unstructured)
13	Xaba and Masuku, (2013)	Quantitative	Survey	Questionnaire (structured)
14	Dome and Prusty, (2016)	Multi-method	Survey	Questionnaire (structured)

NLP – Nonlinear Programming, MILP – Mixed Integer Linear Programming

(Source: Literature review by the author, 2016)

It can be noted from Table 5.1 above that quantitative methods dominate in most studies, with the case study as the leading research design/strategy while field tactics remain fairly distributed. This brief summary supports the findings by Soni and Kodali, (2012), Seuring et al., (2005); Boehme et al., (2011) as argued in the preceding paragraphs above.

5.3 Study area and targeted population

This study was conducted in Arusha, Iringa and Dar es Salaam regions. Arusha, Iringa and Dar es Salaam, each represents the Northern, Southern highlands and Eastern zones (see Figure 5.1 below) respectively. While Dar es Salaam is the market centre, the other two regions are regarded as among the tomato producing regions in Tanzania in their respective zones. With these facts in mind, all TSC participants in these regions (see Figure 5.2 below) comprised the population of this study. A research population is generally a large collection of individuals or objects that is the main focus of a scientific enquiry. According

to Sekaran and Bougue (2010), the population has to be defined in terms of elements, and geographical location. To fulfil researcher's objective, data were collected from both direct and indirect actors involved in the TSC. These included input suppliers, small-scale farmers, middlemen (brokers, wholesalers), retailers, fresh-agro processors, transporters and government officials in Arusha, Iringa and Dar es Salaam regions. These are TSC partners throughout Tanzania who comprised the population in this study.

The data collection period for this study began in February to June 2016 (five months). Subsequently, some follow-up visits to the research areas and consultations with various respondents were made whenever need aroused.

Figure 5. 1: Geographical zones of Tanzania



(Source: SPRING, 2010)

5.4.2 Sampling of units of study

Choice of the small-scale farmers' inclusion in the study was randomly done. The extension officers in farmers' localities facilitated identification and availability of the small-scale tomato farmers. Similarly, a random sampling method was done to get specific tomato traders in urban markets. The researcher was introduced to the traders by the respective market officers of every market. In each of the sampled production regions of Arusha and Iringa there are central collection markets namely: Kilombero and Ilula-Tasaf markets respectively. These markets were used as centres for accessing tomato transporters who bring tomatoes to these markets as well as taking tomatoes to Dar es Salaam market and other places. Random sampling was also used to pick drivers for inclusion in this study. For the case of fresh agro-processors, the selection was done purposely. Though, there are many fresh agro-processors, but those who process tomato among other crops are very few. Thus, Dabaga and IVORI in Iringa and DARSH in Arusha were conveniently included in the sample. For the case of government officials, the District Agricultural Officers, Market Masters, Wards' and Villages' Extension Officers were used as sampling units for this study depending on the officer's convenience.

5.4.3 Sample size

Saunders et al., (2003) define the word sample as a subgroup of a large population. Sample size determination is critical in any research since the generalisation about the population from the data collected is based on probability. (ibid). Saunders et al (2003) argue that the choice of the sample size is governed by; the confidence one needs to have on the data, a tolerable margin of error and the total population size. It is worth noting that the larger is the sample size the lower is the likely error in generalising to the population (Ibid.). However, the larger is the sample the more is the resources such as time and money in collecting data (Ibid.). The sample size '*n*' for this study was determined using an infinite population sample size formula (Kothari, 2004: 180), as presented below;

$$n = \frac{z^2 \cdot p \cdot q}{e^2}$$

..... (5)

Where; n = size of sample; Resulting sample-size is 432 (see table 5.2 below)

z = the value of the area under Normal Curve corresponding to the confidence level; equals to 95%

p = sample proportion, set at 30%, $q = 1 - p$; equals to 70%

e = acceptable/tolerable error, equals, 4%.

The sampling techniques employed in each sample category and their reason for selection is as summarized in Table 5.2 below.

Table 5. 2: Sample category, location, sampling techniques and reasons for sampling

Sample category	Arusha	Iringa	Dar es Salaam	Sampling technique	Reason for Sampling technique selection	Total
Agro-Input suppliers	8	10	6	Convenience	Only suppliers of tomato inputs	24
Growers/small scale farmers	50	60	0	Simple random	Avoidance of biasness	110
Agents/Brokers	10	10	12	Simple random	Avoidance of biasness	32
Wholesalers	30	30	20	Simple random	Avoidance of biasness	80
Fresh Agro-Processors	2	2	2	Convenience	Only processors of tomato	6
Retailers	40	40	40	Simple random	Avoidance of biasness	120
Government officials	3	3	4	Convenience	Only those dealing with markets, farmers and agri-food policy makers	10
Transporters	16	14	20	Simple random	Avoidance of biasness	50
Total	159	169	104			432

(Source: Author, 2016)

5.5 Data collection instruments

Given the type of this research – case study, questionnaires were used to collect primary data from respondents, such as data that is collected afresh and for the first time, and thus happen to be original in character. Questionnaires were prepared to elicit data on the predetermined questions from participants in TSC. The questions were prepared after an intensive review of literature from journal articles, books, official publications, thesis reports and internet resources. Questionnaire responses were enriched with more data collected through complementary interview questions in an unstructured manner and captured using multimedia devices such as tape recording. This unobtrusive recording was

intended to improve response rate in collecting data that would be construed as meant for tax purposes.

On the other hand, documentary sources were used in collecting secondary data, such as data that was collected for other uses, for example business reports and market prices. More secondary data were collected from the Ministry of Agriculture, livestock and fisheries, Tanzania Horticultural Association (TAHA) and the National Bureau of Standards (NBS).

Direct observation was also used to give the researcher more information on how TSC participants interact, relate and serve customers. Before data analysis, collected data were verified, validated and properly recorded just to ensure that garbage data were sieved out.

5.5.1 Designing and piloting of the study questionnaire

Different sets of questionnaires were prepared to cover all the intended respondents for this research. In order to improve response rate, questionnaires in this research were self-administered by trained data collectors under the surveillance of the researcher. Both open-ended and closed-ended questions were used in order to reap the inherent advantages from each. Since the English language is hardly spoken by the majority of Tanzanian-mostly applicable to those who went to secondary school and above, efforts were made to translate the English version into the Swahili Language. Each set of questionnaires was accompanied by a covering letter to explain the purpose of the study. The covering letter was also telling the respondents that the data to be collected were meant for academic purposes and that had nothing to do with taxation or any other mandatory payment to relevant authorities. However, it was made clear to the respondents that, the findings of this study would be used to advise the government and other relevant authorities in solving inherent problems including those faced by the individual respondent. Moreover, respondents were assured on maintaining the anonymity of the information they provide and that such information would only be used for the intended purposes. To ensure timely completion of the study, the researcher employed and trained two research assistants to assist him in data collection.

Pilot studies to different categories of respondents were done in order to test the effectiveness and efficiency of the questionnaires. The observed deficiencies for example

ambiguities in some questions and a question bringing answers not expected were rectified accordingly.

5.5.2 Designing of other data collection instruments

Unstructured interviews were deployed simultaneously with the questionnaire so as to complement any data which were not clear or found to be missing during data collection or wrongly provided. Moreover, some of the data were collected by observation method for instance in villages, and at marketplaces. The researchers were able to observe the conditions of the tomato fields, collection centres, and the markets in both villages and city centres. Another means of collecting data used was the documentary source. For instance, when a small-scale farmer would claim to have a farming contract with say seed companies, the researchers would request for a copy of such contract as it was believed that it can provide more and accurate information than other information collected orally. Thus, the triangulation method proved out to be such a powerful technique in facilitating validation of data through cross verification from two or more sources.

The main tasks associated with generic value chain analysis by Bryceson (2003) on Table 5.3 below were used with few modifications.

Table 5. 3: Main tasks associated with generic value chain analysis

Aspect	Definition	Task Description
1. Industry stakeholders and activities	The set of processes or activities that create the attributes or products that will be demanded or used by the end user or consumer.	<ul style="list-style-type: none"> • Identify the main categories of stakeholder/trader groups, stages and activities undertaken in the transformation of a raw input into a delivered product (or service) to the end consumer. • The transformation stages may be linear and sequential but also can bypass or be in parallel with other stages. (such as value nets) • Where different channels exist, their significance can be indicated by volume and value passing through each.
2. Product creation and delivery	The product flow features of the chain.	<ul style="list-style-type: none"> • A summary-level description of the main stakeholders' activities undertaken and material volumes employed at each stage to allow an understanding of operations (and differences in operation) throughout the delivery channels. • A critical issue in managing the product flow in a supply or value chain is managing slack or flexibility and SC interdependencies to accommodate unexpected interruptions or events. • Consumer-based surveys (for example intercept surveys)
3. Financial conditions	The financial or cash flow across the participants and processes.	<ul style="list-style-type: none"> • A simple 'value analysis' to take some sample products and illustrate how value and costs are accumulated (and margin gained) throughout the transformation stages. • Electronic funds transfer technology has improved the efficiency of financial and funds flows compared with earlier systems of billing and cheque writing.
4. Information conditions	The information flow across the chain.	<ul style="list-style-type: none"> • Determine the information flows across the chain. Important elements are the accuracy of messages (whether messages are signals or noise), the strength of these messages, the cost of messaging, the speed of transmitting and receiving messages, and the openness to sharing rather than retaining critical information among participants. <p>An additional element – and often a source of conflict – is the sharing of financial performance information across the stages and chain participants.</p>
5. Incentives, motivators and drivers	The incentive systems that are in place to drive and reward performance and share risk.	<ul style="list-style-type: none"> • Identify the underlying drivers of value and costs between the stages. • Incentives systems might include price premiums, profit sharing, minimum pricing arrangements, window contracts, cash flow or financial assistance contracts, loan guarantees, qualified supplier recognition programs, cost-sharing arrangements, long-term commitments, and knowledge or market access.
6. Governance conditions	The chain governance/ coordination system. This significantly, influences who has power and control in a value chain and how risks and rewards are shared.	<p>Describe the type of governance or coordination systems accommodated within the industry between trading parties.</p> <ul style="list-style-type: none"> • This could include open-access markets, various forms of contracts, strategic alliances, joint ventures, franchising arrangements, networks and cooperatives, and vertical ownership.

Source: Bryceson (2003).

5.5.3 Reliability and validity of measurement

The credibility of research findings depends on the attention paid to a specific emphasis on research design, namely: reliability and validity. (Saunders et al., 2003). To avoid getting the wrong answers to research questions and objectives, reliability and validity aspects were handled with great care as prescribed in the following sections.

5.5.3.1 Reliability

Reliability coefficient is one of ways by which assessment of the consistency of the entire scale is measured. Reliability of a measure indicates the extent to which it is without bias (error free) and hence ensures consistent measurement or findings across time and across the various items in the instrument if similar observations would be made or conclusions reached by other researchers. (Sekaran and Bougie, 2010; Saunders et al., 2003). There are three forms of reliability tests, however, in this research, internal consistency reliability of the questionnaire was carried out using a pilot test. Other forms include test-retest reliability and alternate-form reliability. (Bolarinwa, 2015). Internal consistency refers to the extent to which items on the test or instrument are measuring the same thing. In this study, internal consistency was estimated by Cronbach's alpha –the most commonly used measure of internal consistency reliability (Litwin, 1995). This followed the presence of Likert scale questions with several response options (such as, 1 = strongly disagree to 5 = strongly agree) as well as dichotomous (such as, yes/no; true/false) response scales. It is generally agreed that the lower limit for Cronbach's alpha is 0.70, although it may decrease to 0.60 in exploratory research. (Cooper and Schindler, 2008).

5.5.3.2 Validity

Validity refers to the extent to which a measurement measures what it purports to measure or research findings are really about what they profess to be about. (Bolarinwa, 2015; Saunders et al., 2003). Efforts to establish the validity of the drafted questionnaire for this study were instituted. Specifically, translational or representational validity was deployed. This involved constituting a panel of experts to explore how well the idea of a theoretical construct was presented in the questionnaire. Both face validity and content validity were used. Several experts were consulted to evaluate whether each of the measuring items matches any given conceptual domain of the agri-food SC concept. The experts included: (Katunzi and Zheng, 2010; Mgeni and Temu, 2010; Mwangike, 2015; Rasheli, 2014).

Moreover, the demographic characteristics of the TSC actors used in the logistic model, namely: age, education, experience, farm size and revenue were also used by various researchers in the agri-food SC, hence, considered to be valid. These researchers include the following Prabhu (2018), Almaz et al. (2014), Akpinar (2012) and Gor, Co et al. (2012).

5.6 Methods of Data Analysis

In the world of statistics, there are normally two types of problems faced by data analysts, namely; estimation of population parameters and tests of hypotheses. Before one can proceed to solving any of these problems, prior considerations must be made on the type and nature of data at hand (assuming that data have been collected, coded, cleaned and is at hand for statistical analysis). It is extensively documented in literature that before selecting a statistical model to use for analysis, one should consider whether data are parametric or nonparametric in nature. If no such prior considerations including the nature of data used, there are possibilities of committing statistical errors and sins and shortcomings due to incorrect use of statistical test thereby leading to wrong conclusions thereby demeaning the data collection exercise (Stresak et al. 2007); Egboro 2015). This incorrect usage of statistics and wrong conclusions may have negative effect on the reliability of the results (Egboro 2015). Using parametric analysis for ordinal data as well as inappropriate use of parametric analysis in general have long documented as comprising the one of the sins of statistical analysis (Kuzon et al 1996) which may ultimately lead to wrong research result that can mislead an individual, organization and even a whole nation (Egboro 2015). In this study, data analysis was done with the use of econometric tools employing SPSS version 20 computer programme. Both parametric and non-parametric statistical models in SPSS were used. The subsections below critically review the selected models and their justification for use in empirical studies including the current study. These models include: Wilcoxon signed-rank test, t-test and (multinomial) logistic regression as part of semi-parametric statistical models used in practice.

5.6.1 Wilcoxon signed-rank test model

This test is named for Frank Wilcoxon (1892–1965) who developed it and published in a paper for two independent samples (Wilcoxon, 1945). The test was popularized by Siegel

(1956) in his influential textbook on non-parametric statistics. Siegel used the symbol T for a value related to, but not the same as, W . In consequence, the test is sometimes referred to as the Wilcoxon T test, and the test statistic is reported as a value of T . The Wilcoxon signed-rank test is a non-parametric statistical hypothesis test used to compare two related samples, matched samples, or repeated measurements on a single sample to assess whether their population mean ranks differ such as it is a paired difference test (Shier 2004; Oyeka 2009: 496-533). As is the case with other nonparametric statistical procedures, the Wilcoxon signed-rank test is applicable when certain assumptions or conditions regarding the samples and data are met. These assumptions include data are paired and come from the same population, independence and randomness of observations as well as that the data are measured on at least an interval scale (and ordinal scale for within-pair comparisons).

One of the critical questions that statisticians and data analysts ask in practice is ‘how valid is the inferential procedure under consideration if the assumptions it demands are not fully met?’ In striving to answer this question, various empirical researchers have, since early years of its introduction, tried to slightly ‘modify’ Wilcoxon signed-rank test to some contexts. Some of the studies, for example have proposed an approach that does not require that the populations being studied be continuous nor require the absence of zero differences or tied absolute values of differences (Oyeka and Ebuh 2012). Other studies have proposed a nonparametric Bayesian version of the Wilcoxon signed-rank test using a Dirichlet process (DP) based prior (Benavoli et al. 2014). It can be used as an alternative to the paired Student's t -test, t -test for matched pairs, or the t -test for dependent samples when the population cannot be assumed to be normally distributed (Kamana 2015). The model is an alternative to the use of t -test, which can compare the rank values of variables pair by pair by calculating the quantity of ranks related to the positive and negative differences at the point where the test statistic is the smaller of the two sums of ranks.

5.6.2 Student's t -test technique

It is extensively documented that the Student's t -test is 110 years old, the t statistic that was introduced by William Sealy Gosset (1876-1937) and published under the pseudonym of 'Student' and published in 1908 and frequently referred to student t distribution (Armitage et al., 2002). Gosset worked at the Department of Statistics to monitoring the

quality of beer brews at Guinness brewery in Dublin Ireland (Rono et al. 2014). It can be learned from the reviewed literature in section 5.13 above that Student's-test is only applicable when certain conditions and hard facts are met. The literature identifies three versions of t-test depending on the design of the research (Kim 2005). These are one-sample t-test, independent samples t-test and paired samples t-test. One sample t-test is said to compare a sample mean with a known population mean or some other meaningful, fixed value while an independent (unrelated) samples t-test compares the means of two groups of participants. The dependent (related) samples t-test is used to compare the means of two conditions in which the same (or closely matched) participants were involved, and are also referred to as paired samples t-test. In the third type, the scores might be repeated across different measures or across time, or to compare paired samples, as in a two-treatment randomized block design (Rono et al. 2014). It is reported in literature that Wilcoxon test according to Posten (1982) gives bigger power compared to t-test for smaller samples while according to Bridge and Sawilowsky (1999) the t-test is more powerful than the Wilcoxon test under relatively symmetric distributions. Therefore, it is worthwhile to conclude that the t-test as a parametric statistical model is applicable in designs that among others, involve small samples when considering making statistical or other inferences.

5.6.3 Logistic regression

It is reported in literature that the use of the concept 'logistic regression model' dates back to 1845 (Çokluk 2010), and the first manifestation was linked to the era of population growth which in turn propelled mathematical studies. The term logistic regression analysis comes from logit transformation, which is applied to the dependent variable (Çokluk 2010). Precisely, Logistic regression sometimes called the logistic model or logit model, analyses the relationship between multiple independent variables and a categorical dependent variable, and estimates the probability of occurrence of an event by fitting data to a logistic curve (Park 2013). However, there are certain differences both in estimation and interpretation as a result of interwoven nature of logistic and logit (Hair, et. al. 2006). Logistic regression analysis is occasionally also referred to as binary logistic regression analysis, multinomial logistic regression analysis and ordinal logistic regression analysis, depending on the scale type where the dependent variable is measured and the number of categories of the dependent variable (Çokluk 2010). Logistic regression is divided into two

categories: univariate logistic regression and multivariate logistic regression (Stephenson, 2008), depending on the number of predictor variables at hand. Other studies report similar concepts that there are two models of logistic regression, binary logistic regression and multinomial logistic regression (Park 2013). Furthermore, binary logistic regression is typically used when the dependent variable is dichotomous and the independent variables are either continuous or categorical. On the other hand, when the dependent variable is not dichotomous and is comprised of more than two categories, a multinomial logistic regression can be employed (Park 2013). Logistic regression makes some assumptions for their application. These include absence of multicollinearity, no outliers, independence of errors – assumes a between subject’s design (there are other forms of logistic regression if the design is within subjects) and ratio of cases to variables – using discrete variables requires that there are enough responses in every given category (Park 2013). Therefore, the use of both forms of logistic regression has advanced statistical data management in addition to the most recent developments.

In this study, a binary logistic regression as modelled in section 4.3 above was used.

5.6.4 Descriptive statistics

Descriptive statistics is used to describe the basic features of the data in a study. They provide simple summaries about the sample and other parameters of the population. Together with simple graphics analysis, they form the basis of virtually every quantitative analysis of data. Loeb et al. (2017) argue that Descriptive analysis is data determining what works in education, but descriptive simplification. Good description presents what we know about capacities, needs, methods, practices, policies, populations, and settings in almost every research a manner that is relevant to a specific research or policy question, project and is a necessary. Thus, data alone are not descriptive research, because data are not component of high-quality causal analysis. Purposeful: data dumps, all-purpose data dashboards, and generic tables of summary statistics may be useful for some purposes, but they do not qualify as descriptive analysis. Therefore, for the purposes of advancing to cause-and-effect explanatory studies, the status quo portrayed by the field data, descriptive statistics is inevitable.

5.7 Chapter summary

Chapter five was for research methodology. The chapter started with general issues related to conducting research then, it narrowed down to explaining how this research was done. A number of issues related to how this research was conducted and the issues related to selection and justification of the research design were discussed. The area where the study was conducted and the targeted population have been explained. Further, the sampling procedures, sample size, data collection instruments and the methods of data analysis applied to this study have been thoroughly explained. The chapter concludes by giving this chapter summary.

CHAPTER SIX: RESULTS AND DISCUSSION

6.1 Introduction

This chapter presents the results and discussions of the data collected from the actors in the TSC in the three selected regions of Arusha, Iringa and Dar es Salaam, Tanzania. Data collection period began in February to June 2016 (five months).

The main objective of this study was to contribute to development of tomato SC in Tanzania with respect to small-scale farmers. The following were the specific objectives:

- 1) To analyse the structure of the current tomato SC in selected regions of Tanzania with respect to small-scale farmers.
- 2) To examine tomato SC relationships and their impact to payoff system amongst tomato SC actors.
- 3) To suggest for an SC performance model for small-scale tomato farmers using well-established performance indicators.

Based on the three objectives above, at the end of the study, the researcher required to meet such intended outcomes as follows:

- To have a detailed qualitative and quantitative overview and understanding of the TSC in Tanzania, including the current nature and status as well as the future prospects of the industry.
- To suggest for a TSC performance model using well-established indicators.

For implementation purposes of the above, the researcher collected data. Questionnaires, interview and direct observations were used to collect primary data. Documentary sources were used in collecting secondary data. Both qualitative and quantitative data were collected. Before data analysis, collected data were verified, validated and properly recorded just to ensure that garbage data were sieved out.

Data analysis was done with the use of econometric tools employing SPSS version 20 computer programme. Basically, data analysis was done using descriptive statistics such as frequencies, percentages and cross-tabulation were calculated to determine the distribution of the study variables. Both parametric and non-parametric statistical tests

were used. Wilcoxon signed-rank test, t-test and binary logistic regression as part of semi-parametric statistical models were used. The results are presented in tables, histograms, bar charts and pie charts. Moreover, the results of this study have come out with tangible deliverables in the form of small-scale farmers' TSC maps, with a detailed report on potential success factors and their associated potential failure factors.

Briefly, the following results are featured in this chapter and discussed accordingly: respondents' profiles, reliability measurements of the questionnaire, general analysis of the TSC actors (primary and secondary), results for operationalization of the research model (discrete logistic model), and hypotheses testing. More importantly, a new SC model (design) aimed at empowering small-scale tomato farmers has been suggested. The chapter ends by the chapter's summary section.

6.2 Respondents Profile Results

TSC in Tanzania consists of several actors performing diverse roles. In this study, the researcher considered the eight most important actors namely: the small-scale farmers, wholesalers, brokers/agents, retailers, input suppliers, processors, transporters and government officials. A total of 423 respondents from three selected regions: two production regions and one main market region were surveyed for the study. Table 6.1 below depicts the planned versus actual data collection respondents in the eight groups of respondents.

Table 6. 1: Summary of data collection

	Regions						Planned	Actual		
	Iringa		Arusha		Dar		Total Frequency	Total Frequency	Percent	Cumulative Percent
ACTORS	Plan	Actual	Plan	Actual	Plan	Actual				
Small scale farmers	60	70	50	50	N/A	N/A	110	120	28	28
Wholesalers	30	26	30	30	20	26	80	82	19	48
Agents/brokers	10	8	10	4	12	14	32	26	6	54
Retailers	40	34	40	50	40	56	120	140	33	87
Input suppliers	10	10	8	6	6	-	24	16	4	91
Government Officials	3	2	3	1	4	3	10	6	1	92
Processors	2	2	2	1	2	-	6	3	1	93
Transporters	14	16	16	14	20	-	50	30	7	100
TOTAL	169	168	159	156	101	99	432	423 (98%)	100	

The detailed analysis of the respondents is as described below.

The Table 6.1 above reveals that, out of all the 423 respondents, (28%) were farmers, (19%) were wholesalers, (6%) were agents/brokers, (33%) were retailers, (4%) were Input suppliers, (1%) were government Officials, (1%) were processors and (7%) transporters. Variation in the number of respondents in different categories above was not accidental but rather based on the proportionate number of respondents' population from which the data were collected.

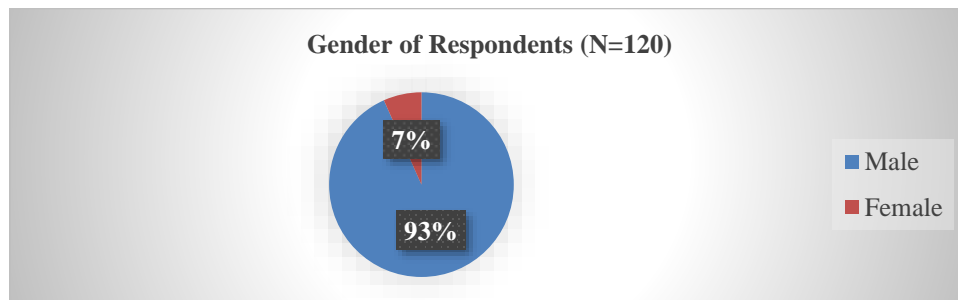
The profile of the tomato supply chain (TSC) actors is briefly summarized into four main variables of gender, age, education and experience. In the subsequent sections, each of these variables is explained in relation to each category of respondents.

6.2.1 Farmers' bio-data

Gender: There were more male farmers 112 (93.3%) than female farmers 8 (6.7%). However, this does not necessarily mean that females are not involved in tomato farming. In fact, agriculture in Tanzania and other African countries is said to be female-intensive meaning that more females are employed in Agriculture than males. (Leavens and Anderson, 2011). Farming in villages is normally practised as a family activity/business and according to most of the African culture (Tanzania in particular), in presence of both

husband and wife, it is the husband who can respond in case of any inquiry on behalf of the family. Further, the family assets/businesses are impliedly referred to the men in terms of ownership. Thus, this high number of males in a farmers' group of respondents is attributed to this reason. Figure 6.1 below displays the way respondents are categorized by gender.

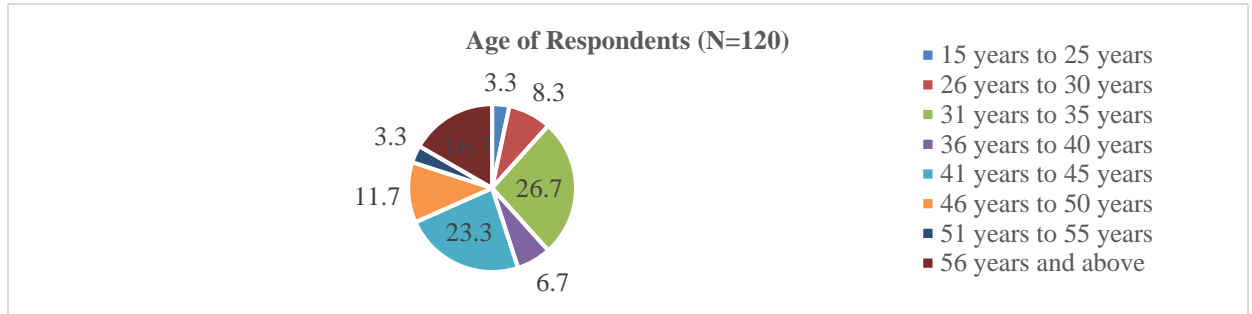
Figure 6. 1: Gender of Farmers



Age: in terms of age of tomato farmers, more farmers are in the middle age group of 31 years to 35 years (26.7%) and 41 years to 45 years (23.3%). Few farmers are in young/early age groups of 15 years to 25 years (3.3%). This finding is attributed by the fact that most of the population under this young age are still attending early education at primary and secondary schools as well as vocational education. However, tomato farmers increased in number in the age group of 26 years to 30 years (8.3%). This increase is due to completion of primary, secondary as well as technical education. Moreover, unlike middle ages (31 years to 45 years), the age group of 46 years to 50 years and 51 years to 55 years recorded a declining number of tomato farmers from (11.7%) to (33.3%) respectively. This fall is attributed to many reasons including engaging in other businesses other than tomato farming, however, possibly using a capital generated from tomato farming. Alternatively, they might have grown tomatoes in early to middle ages and came to learn that it was not paying or profitable. A very surprising good performing age group is that of 56 years and above (16.7%). This is a group of senior citizens living with their children and grandchildren. Some might be tomato farmers in all of their lives, others might be retired from other jobs and decided to settle in villages to perform tomato farming. However, according to most Tanzania's culture in different tribes, if a son or daughter or grandson and granddaughter is still living with parents or grandparents, then whatever he does is

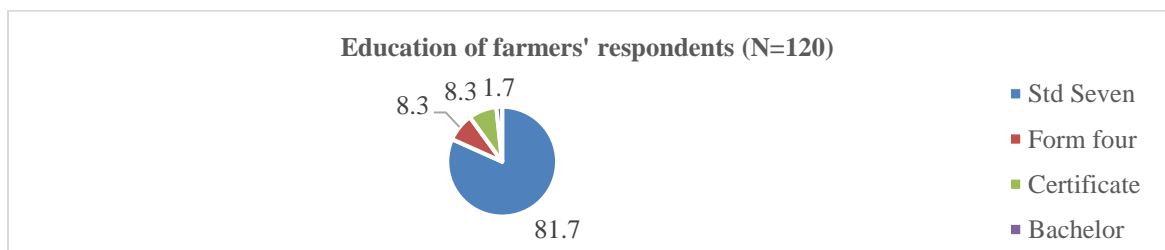
considered to be belong to the parents/grandparents until he is independent especially after marriage. The pie chart below: Figure 6.2 shows how tomato farmers are categorized in accordance with their age groups.

Figure 6. 2: Age of Farmers



Education: many farmers, (81.7%) had finished the compulsory standard seven (primary) level of education in Tanzania. Some few tomato farmers were found to have an education level of secondary school (8.3%) and certificate education level (8.3%). However, as you move upward in the academic ladder, you hardly find tomato farmers there. For instance, at the Bachelor’s level, only two respondents (1.7%) were found to be involved in tomato farming. As a researcher, I was really surprised and became more interested to learn from these graduate tomato farmers. However, I came to learn that, apart from being tomato farmers, they were also extension officers employed by the government. At masters and above educational levels, no any respondent was found there. This is because these people with higher educational levels are employed to work elsewhere in both public and private sectors in their respective areas of speciality or they might have employed themselves in a business industry other than tomato farming. These findings comply with Abdullah and Samah (2013) findings that farmers in Tanzania have low education. The pie chart below in Figure 6.3 depicts farmers’ classification in terms of education.

Figure 6. 3: Education of Farmers

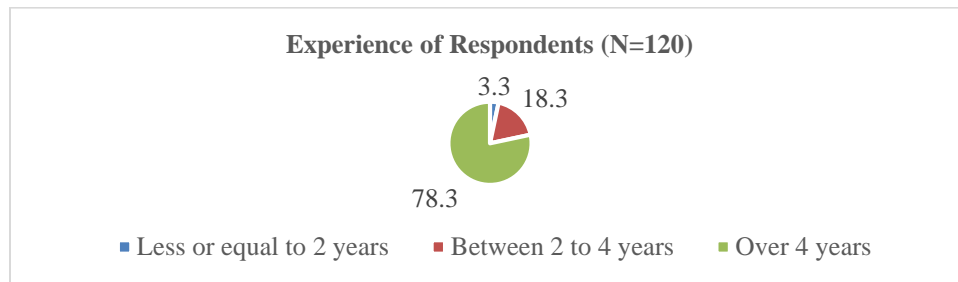


Experience: It was found out that a good number of farmers had long-time experience in tomato farming as 78.3% of them had an experience of 4 years and above. A favourable number of farmers was also found with medium experience of between 2 years to 4 years (18.3%). Lastly, few respondents were found to have experience of less than or equal to 2 years (3.3%). However, these results are not good for continuity of tomato farming in Tanzania, as, few people are joining the tomato farming sub-sector in the country. Many reasons may be associated with this, however, two of the respondents in the senior citizen group in both Arusha and Iringa regions were lamenting to the government that;

“The government has allowed most youngsters to migrate to city centres for petty, roadside hawking businesses without any control leaving behind the elders to do farming”.

Moreover, the government was also blamed by these senior citizens for officiating motorcycle transportation as public transportation where most of the youths are currently employed. In the past, these youths would be employed in farming. The pie chart below, Figure 6.4 depicts how tomato farmers are categorized by experience.

Figure 6. 4: Experience of Farmers

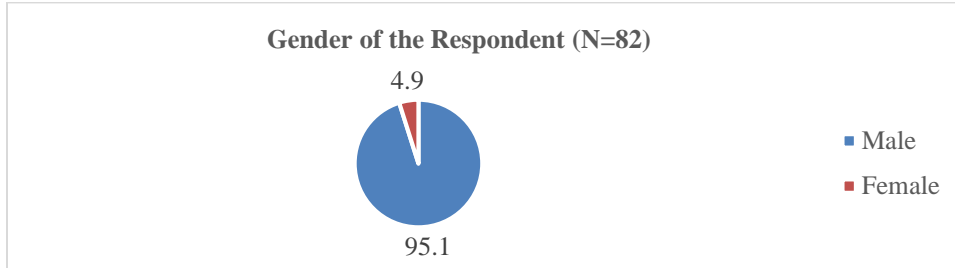


6.2.2 Wholesalers’ biodata

Gender: gender wise, there were more male-wholesalers 78 (95.1%) than female-wholesalers 4 (4.1%). This major difference is thought to be attributed by the nature of the tomato business. Unlike farming, tomato business especially wholesale involves a lot of travelling to and fro villages in fields and a need to work day and night especially in town markets where tomatoes from producing regions are delivered and traded during the night and early in the morning. In this case, it becomes difficult for many women to become

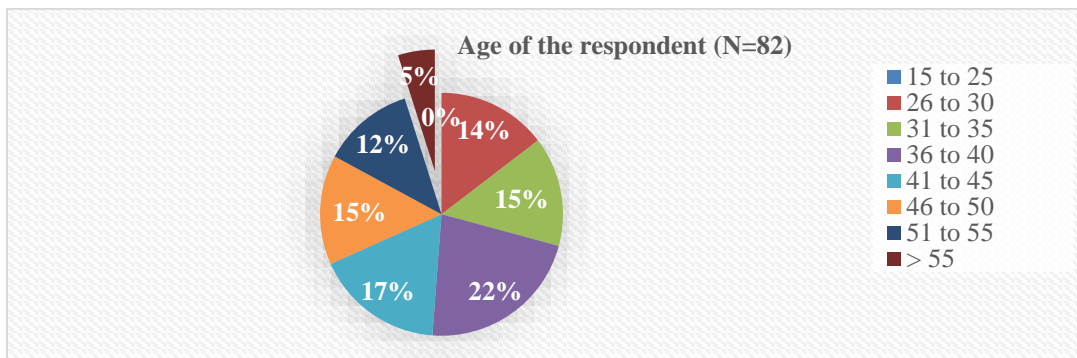
tomato wholesalers as, among other activities, they are expected to take care of the children at home. Figure 6.5 below displays the way wholesalers are categorized by gender.

Figure 6. 5: Gender of Wholesalers



Age: the age of the wholesalers' respondents is fairly distributed in at least all the middle age groups except the lowest age group of 15 years to 26 years (0%) and the highest age group of 56 years and above (5%). More wholesalers were found in the age group of 36 years to 40 years (22%) followed by the age group of 41 years to 45 years (17%). Three age groups of 26 years to 30 years, 31 years to 35 years and 51 years to 55 years recorded the same number of respondents which is 15% followed by the age group of 51 years to 56 years (12%). As we saw under farmers' respondents, lack of respondents in the age of 15 years to 25 years could be attributed to the fact that people of this age are expected to be attending school. Moreover, few respondents in the old age group of 56 years and above may be due to retirement by age. The pie chart below: Figure 6.6 shows how tomato wholesalers are categorized in accordance with their age groups.

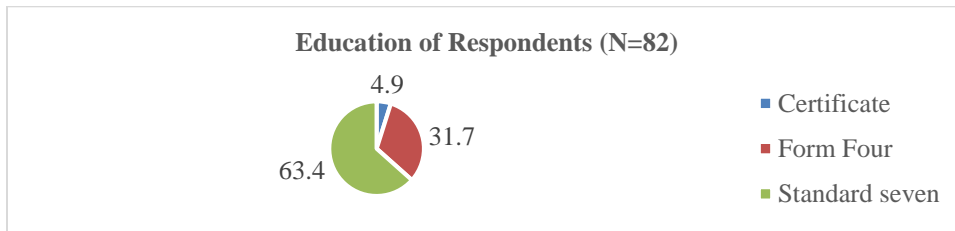
Figure 6. 6: Age of Wholesalers



Education: it was found out that wholesalers are more educated than farmers. Unlike farmers, wholesalers with the level of secondary education-form four and above are (36.6%) whereas for farmers was (18.3%) only. As such, there were few standard seven in

wholesalers' group (63.4%) than those found in farmers (81.7%). This shows that, in order for someone to be involved in wholesale business of tomatoes, he has to be with somehow a higher level of education to be able to manage capital as well as manage business interactions with other traders. The pie chart below: Figure: 6.7 depicts wholesalers' classification in terms of education.

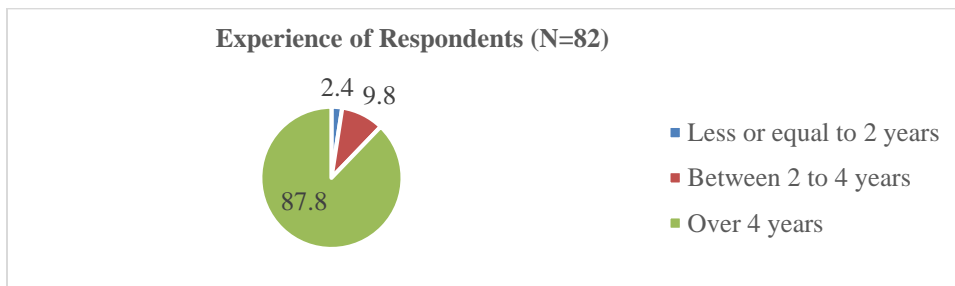
Figure 6. 7: Education of Wholesalers



Experience: It was found out that the business of selling tomatoes in wholesale is done by different people of various experience including those with experience of fewer than 2 years (2.4%), 2 years to 4 years (9.8%) and those with long experience of 4 years and above (87.8%). This means that tomato wholesale business is lucrative as it is being joined by fresh people and those who are in it for a long time, they don't quit instead they remain. Compared to farmers, there are more tomato wholesalers of more than 4 years (87.8%) than farmers of the same experience (78.3%).

The pie chart below, Figure 6.8 depicts how tomato wholesalers are categorized by experience.

Figure 6. 8: Experience of Wholesalers

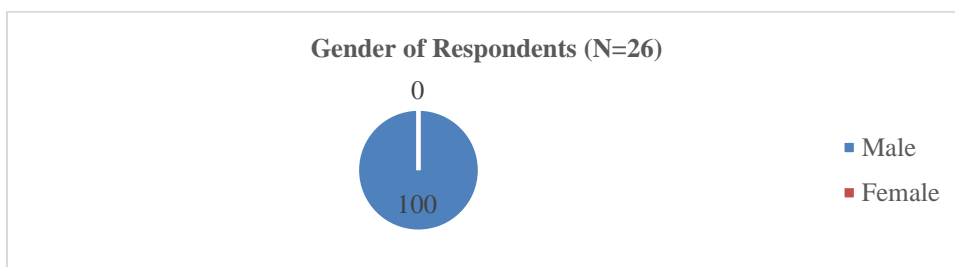


6.2.3 Agents/Brokers' biodata

Gender: All the tomato brokers from whom data were collected were 26 men (100%). These results resemble the results by Nyamba, et al., (2016) who also found no woman

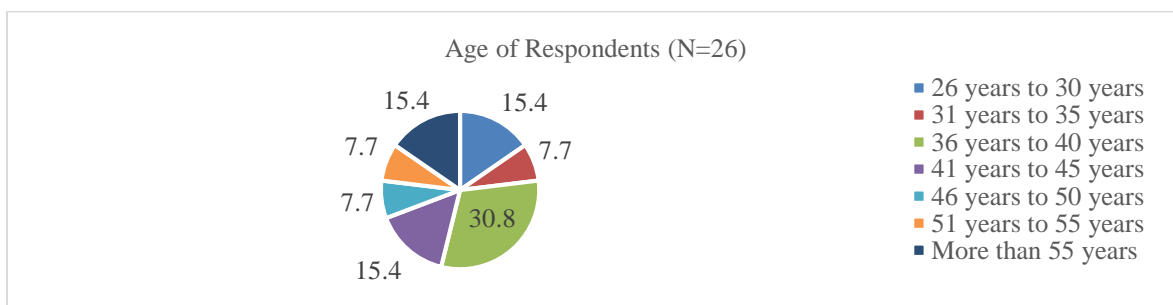
engagement in this activity. This shows that tomato brokerage in the surveyed regions in Tanzania is more or less masculine. The same reasons as given on wholesale tomato business is thought to apply here, that is, the nature of the business itself. Figure 6.9 below displays the way the agents/brokers are categorized by gender.

Figure 6. 9: Gender of Agents/Brokers



Age: age distribution among brokers was fairly distributed in all the age groups with exception of group one: 15 years to 25 years of age with zero respondents. The same reasons given in the previous respondents' categories were thought to apply here, that is most of the respondents of this age were still at school. Of all the age groups, middle age group of 36 years to 40 years recorded the highest frequency (30.8%) followed by the age group of 41 years to 45 years (15.5%). The other age groups: 26 years to 30 years and more than 55 years coincided, each having (15.4%) of the respondents. Lastly, the age groups with minimum score were 31 years to 35 years, 46 years to 50 years and 51 years to 55 years (7.7%) each. The pie chart below: Figure 6.10 shows how tomato wholesalers are categorized in accordance with their age groups.

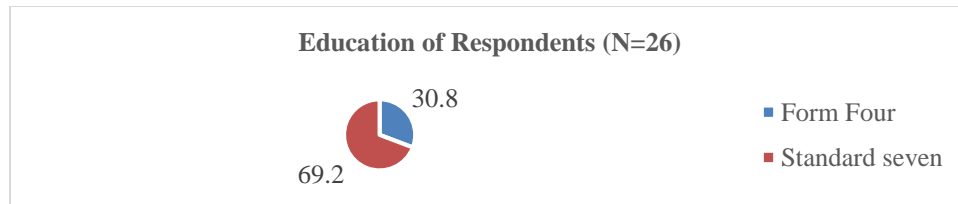
Figure 6. 10: Age of Agents/Brokers



Education: in terms of education, brokers were less educated as compared to wholesalers. More brokers were found to have an education level of standard seven (69.2%) than wholesalers (63.4%). Likewise, there were few brokers with form four level of education

(30.8%) compared to wholesalers (36.6%). As compared to farmers, brokers were more educated. This implies that in order to become a broker, one has to have attained a somehow higher level of education whereas farming can be considered as a jack of all trades (and master of none). The pie chart below: Figure 6.11 depicts brokers' classification in terms of education.

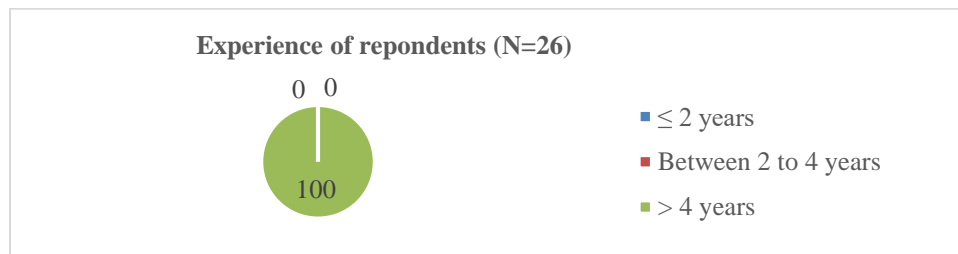
Figure 6. 11: Education of Agents/Brokers



Experience: It was found out that all the 26 brokers who were approached for data collection had an experience of over four years (100%). This indicates that in the brokerage business, the threat of new entry is low. This is very contrary to farmers' and wholesalers' groups where the threat of new entry was seen to be substantial as respondents were fairly distributed from less than 2 years, through 2 years to 4 years and over 4 years.

The pie chart below, Figure 6.12 depicts how tomato brokers are categorized by experience.

Figure 6. 12: Experience of Agents/Brokers

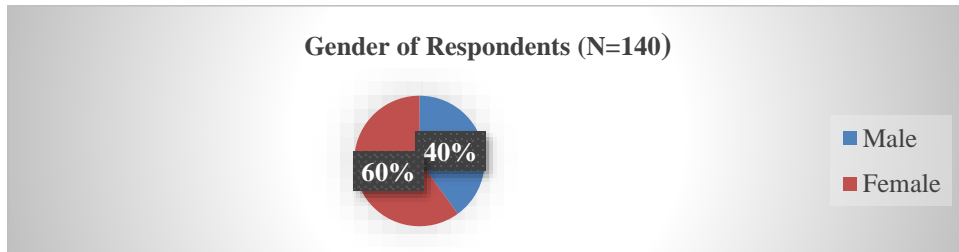


6.2.4 Retailers' biodata

Gender: In retailers' group of respondents, there were more female 84(60%) than men 56(40%). As such, it can be argued that tomato retail business is more appealing to women than men due to its nature – it is light duty and done during the convenient daytime. Moreover, tomato retailing involves no long-distance travelling and does not require large capital to start. On the other hand, men have got more options for employment in such sub-

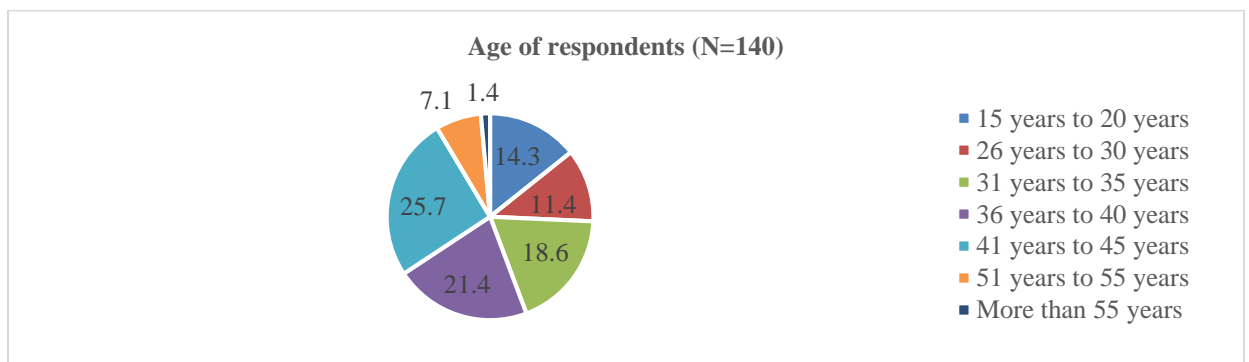
sectors like construction, and transportation – especially motorcycle transportation where ladies are not interested. Figure 6.13 below displays the way respondents are categorized by gender.

Figure 6. 13: Gender of Retailers



Age: age-wise, retailers were found to be fairly distributed in all age groups. The age groups of 41 years to 45 years (24.3%) was leading, followed by 36 years to 40 years (21.4%), 31 years to 35 years (18.6%), 15 years to 25 years (14.3%) and 26 years to 30 years (11.4%). However, it was also observed that as age increases, the involvement of a person into retail business decreases. This is because, few retailers were observed in the age groups of 46 years to 50 years (5.7%), 51 years to 55 years (1.4%) and 56 years and above (2.9%). This decrease is associated with ageing since retailing business is also tiresome. Figure 6.14 shows how tomato retailers are categorized in accordance with their age groups.

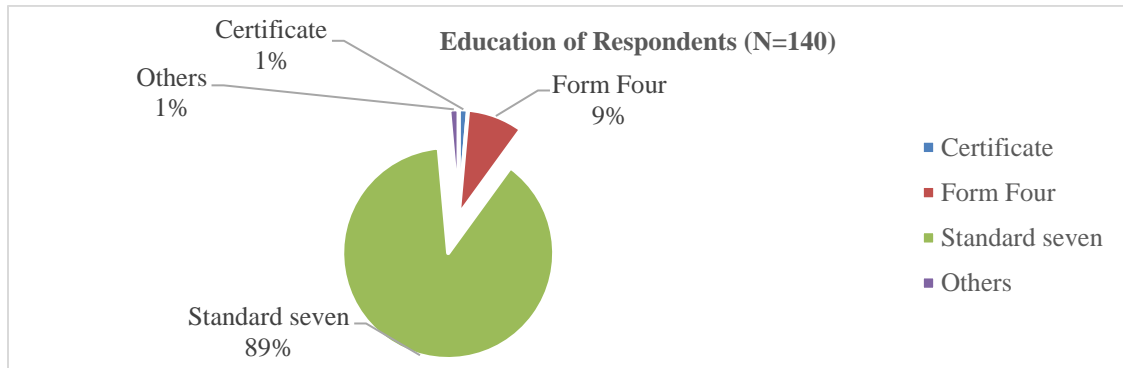
Figure 6. 14: Age of Retailers



Education: at the point of data collection, most of the retailers were found to have attained education level of standard seven (88.6%). Few retailers (8.6%) had an education level of form four and (1.4%) certificate level. Compared to other groups of respondents, more tomato retailers were found to possess the lowest level of education which is standard seven

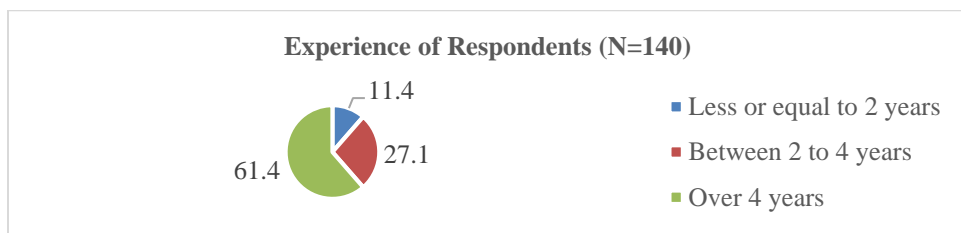
(88.6%) whereas farmers, brokers and wholesalers had (81.7%), (69.2%) and 63.4% standard seven levels of education respectively. The pie chart below: Figure 6.15 depicts brokers' classification in terms of education.

Figure 6. 15: Education of Retailers



Experience: for the case of experience, retailers demonstrated a fair distribution in all the three experience groups. Most of the retailers had an experience of over 4 years (61.4%), followed by those with experience ranging from 2 years to 4 years (27.1%) and lastly those with an experience of less or equal to 2 years (11.4%). Based on the experience above, it shows that new entrants join the retail business and those who are already in the business they remain there. This may be literally translated that the business is profitable. The pie chart below, Figure 6.16 depicts how tomato retailers are categorized by experience.

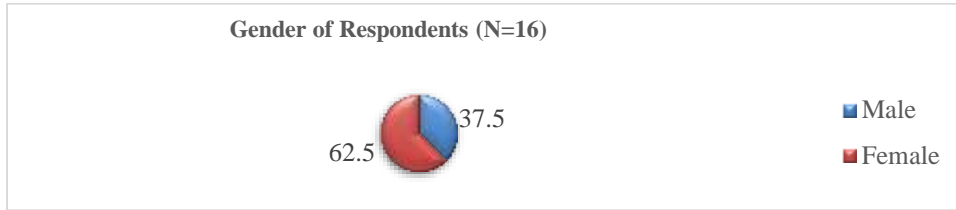
Figure 6. 16: Experience of Retailers



6.2.5 Input Retailers' biodata

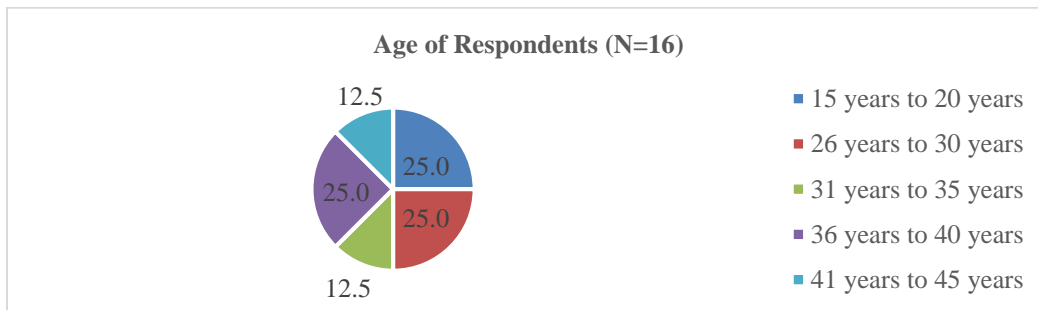
Gender: In input retailers' group of respondents, there were more female, 10 (62.5%) than any other group of respondents whereby the men were 6 (37.5%) only. Just like we saw under tomato retailers, input retailing is light duty and thus let to be done by females as men concentrate on other tough-masculine activities. Figure 6.17 below displays the way respondents are categorized by gender.

Figure 6. 17: Gender of Input Retailers



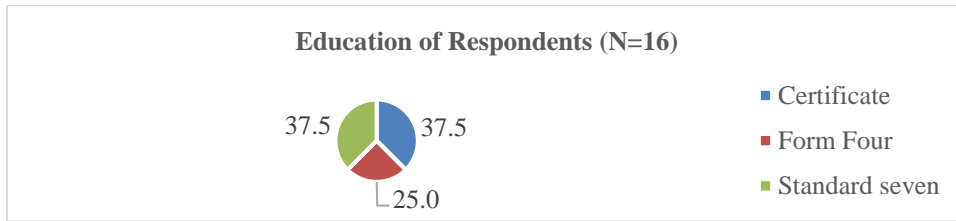
Age: age-wise, input retailers were seen to be fairly distributed in all age groups as follows: age group of 15 years to 25 years (25%), 26 years to 30 years (25%), 36 years to 40 years (25%), 31 years to 35 years (12.5%) and 41 years to 45 years (12.5%) arranged in descending order. However, no respondents were found to fall into the old age groups such as 46 years and above. It may be argued that shopkeeping of agricultural inputs is more appealing to youths especially ladies. Figure 6.18 shows how input retailers are categorized in accordance to their age groups.

Figure 6. 18: Age of Input Retailers



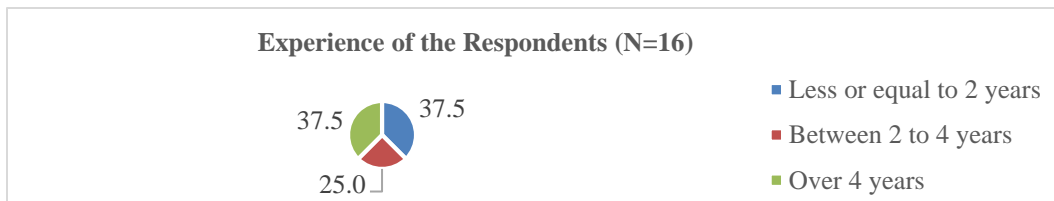
Education: in comparison to other groups of respondents, input retailers was leading in having fewer (37.5%) respondents who had just completed the compulsory-basic level of education which is standard seven. The other categories of respondents above had more standard seven leavers as follows: tomato retailers (88.6%), (farmers (81.7%), brokers (69.2%), and wholesalers (63.4%). It can be concluded here that; input retailing is somehow a professional activity that requires a somewhat higher level of education in order to be able to give professional advises to the customers (farmers). The pie chart below: Figure 6.19 depicts brokers' classification in terms of education.

Figure 6. 19: Education of Input Retailers



Experience: Most of the input retailers were found to have enough experience of over 4 years (37.5%) in the particular business. Moreover, more respondents were still joining the business as there were also more respondents with an experience of less than or equal to 2 years (37.5%). The remaining input retailers had an experience of 2 years to 4 years (25%). The pie chart below, Figure 6.20 depicts how input retailers are categorized by experience.

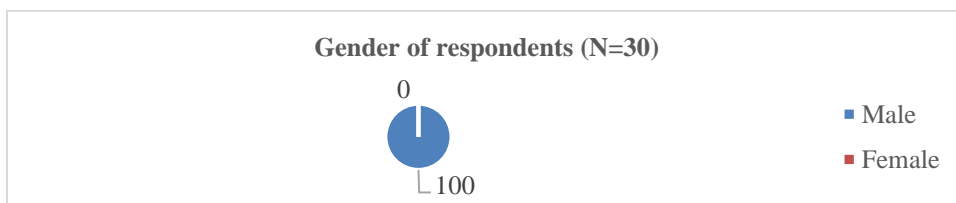
Figure 6. 20: Experience of Input Retailers



6.2.6 Transporters' biodata

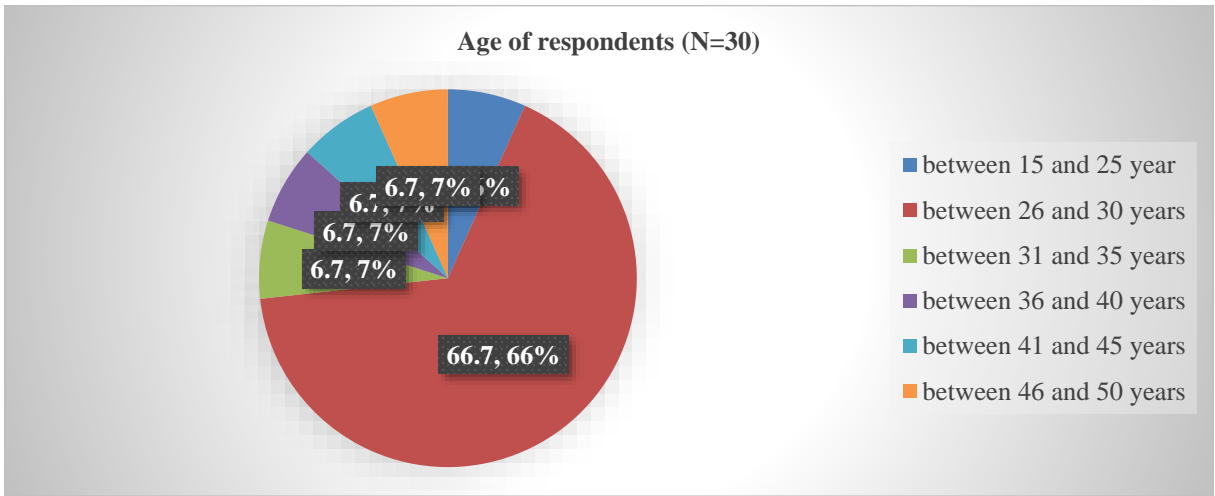
Gender: all the 30 respondents (100%) in the transporters' category were male drivers. This shows that driving as a profession in Tanzania is more for males rather than for females. Figure 6.21 below depicts this.

Figure 6. 21: Gender of Transporters



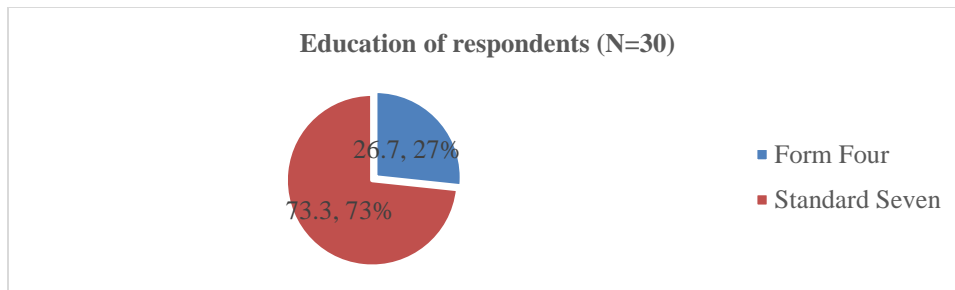
Age: age-wise most of the transporters (drivers) were found to be young men in the age group of between 26- and 30-years accounting to (66.7%). The other remaining age groups: between 15 and 25 years, 31 and 35, 36 and 40, 41 and 45 and 46 and 50 years had the same proportion of drivers (6.7%). Figure 6.22 below shows how transporters are categorized in accordance to their age groups.

Figure 6. 22: Age of Transporters



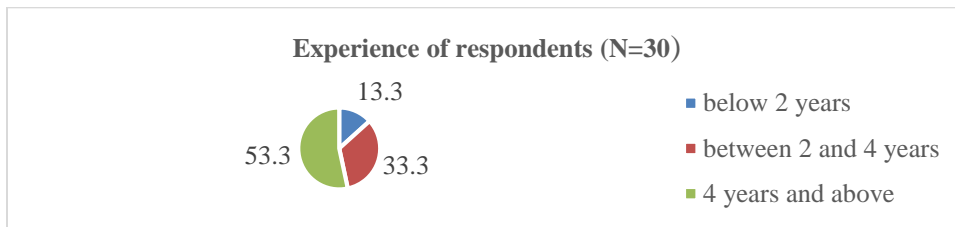
Education: Most of the transporters (73.3%) were of the education level of standard seven and the remaining (26.7%) had an education level of form four. This information tells us that in order for someone to become a professional driver, the basic level of education one should possess is standard seven, and above. The pie chart below: Figure 6.23 depicts transporters' classification in terms of education.

Figure 6. 23: Education of Transporters



Experience: most of the transporters/drivers were found to have enough experience of over 4 years (53.3%) in the transportation sector. Another big proportion of drivers were found to have experience of between 2 and 4 years (33.3%). A minimal number of drivers (13.3%) have an experience of below 2 years in transportation. The pie chart below, Figure 6.24 depicts how transporters are categorized by experience.

Figure 6. 24: Experience of Transporters



6.2.7 Processors' and government officials' biodata

Due to smaller number of respondents in the categories of processors (3 respondents) and government officials (6 respondents), the profile of each respondent in these two categories was considered immaterial.

6.3. Structure of the questionnaire and inherent variables

In collecting the information to meet the objectives of the study, the researcher divided the questionnaire into the following sections.

1. Respondents' personal bio-data
2. Qualitative data collection-General questions
3. The quantitative data collection form

Different variables were identified and included in the questionnaire in each section. Thereafter responses were collected from different respondents from the three selected regions of Arusha, Iringa and Dar es Salaam, Tanzania.

6.3.1. Respondents' personal bio-data

Information about respondents' personal data was collected in four variables including gender, age, education and experience of the respondents as analysed in detail in section 6.2 above.

6.3.2. TSC Status Quo

Five questions were constituted whose answers helped the researcher to be familiar with the current TSC structure, the actors involved, the roles of each actor along the chain and the flows of materials, information and money. Moreover, the researcher came to know factors (order winners) making customers buy from each respondent, factors (order

qualifiers) influencing each actor to buy from his or her suppliers as well as factors which influence each actor to buy from suppliers with broad product categories. The referred variables in this section are portrayed in Table 6.2 below.

Table 6. 2: Variables under Section-2A for Selecting immediate customers and suppliers and buying factors

Coded Name	Variables for Selection of immediate customers and suppliers and for customers' buying factors
s21a-s21h	Immediate customers – [Manufacturers, Wholesalers, Retailers, Consumers, Fresh Agro Processors, Brokers, Seed Companies, Others]
s22a- s22h	Immediate suppliers – [Manufacturers, Wholesalers, Retailers, Consumers, Fresh Agro Processors, Brokers, Seed Companies, Others]
s23a- s23g	Order winners – [Fast Delivery, Price (& Discounts), Delivery Reliability, Quality, Customer Care, Location, Others]
s24a- s24g	Order qualifiers – [Fast Delivery, Price (& Discounts), Delivery Reliability, Quality, Customer Care, Location, Others]
s25a- s25g	Order qualifiers (with broad product categories) – [Fast Delivery, Price (& Discounts), Delivery Reliability, Quality, Customer Care, Location, Others]

6.3.3 TSC relationship dynamics

The important variables considered by SC actors in maintaining relationships were included in this section. The variables were given for rating. The five-points Likert scale rating was used where rating 5 means strongly agree and 1 means strongly disagree. There were sixty-two (62) variables listed in Table 6.3 below and responses were collected on each of them.

Table 6. 3: Variables with their coded names

S/No.	Coded Name	Variables
1	s2b1a	I personally go to buy my consignment from suppliers
2	s2b1b	I send someone to buy for me
3	s2b1c	I buy in consortium with my fellow farmers
4	s2b1d	I use a mobile phone to place my orders
5	s2b1e	Others
6	s2b2a	I use spot purchase to any seller available at the market
7	s2b2b	I use long-term purchase agreements from the supplier(s) of my choice
8	s2b2c	I use loan (government subsidies)
9	s2b2d	I use loan (NGO's guarantees)
10	s2b2e	I use loan (financial institutions for example banks' guarantees)
11	s2b2f	I use loan (contract on own arrangement with suppliers)
12	s2b4a	There are benefits to all partners if the good relationship with each other is maintained
13	s2b4b	Good TSC relationships result in high-profit-margin to producers
14	s2b4c	Good TSC relationships result in increased sales at each stage
15	s2b4d	Good TSC relationships generate high-value-added products
16	s2b4e	Other benefits of a good relationship

Table 6. 3: Variables with their coded names

S/No.	Coded Name	Variables
17	s2b5	I do access tomato markets to a more formalized market segment such as supermarkets, exporters, hotels, and fresh agro-processors
18	s2b6a	Quality constraints
19	s2b6b	Quantity constraints
20	s2b6c	Seasonality/Reliability
21	s2b6d	Location
22	s2b7a	We share risks due to loss occurring as a result of an unforeseen event
23	s2b7b	We share resources (transport and storage,) in our operations
24	s2b7c	We assist our fellow farmers to buy inputs or selling their produce
25	s2b8	My suppliers are honest and hence trustworthy
26	s2b9	My customers are honest and hence trustworthy
27	s2b11i	NGOs
28	s2b11ii	Donor agencies
29	s2b11iii	Banks
30	s2b11iv	Microfinance actors (for example SACCOS)
31	s2b11v	Agricultural research / Training institutions
32	s2b11vi	Central government officials
33	s2b11vii	Local government officials
34	s2b11viii	Others
35	s2d1a	Degree of collaboration between farmers and input distributors/agents/wholesaler
36	s2d1b	Degree of collaboration between farmers and retailers of inputs
37	s2d1c	Degree of collaboration between farmers and brokers/agents
38	s2d1d	Degree of collaboration between farmers and wholesalers
39	s2d1e	Degree of collaboration between farmers and retailers
40	s2d1f	Degree of collaboration between farmers and final customers
41	s2d1g	Degree of collaboration between farmers and fellow farmers
42	s2d2a	We share information with brokers/agents
43	s2d2b	We share resources with brokers/agents
44	s2d2c	We trust each other with brokers/agents
45	s2d2d	We share information with wholesalers
46	s2d2e	We share resources with wholesalers
47	s2d2f	We trust each other with wholesalers
48	s2d2g	We share information with retailers
49	s2d2h	We share resources with retailers
50	s2d2i	We trust each other with retailers
51	s2d2j	We share information with final customers
52	s2d2k	We share resources with final customers
53	s2d2l	We trust each other with final customers
54	s2d2m	We share information with fellow farmers
55	s2d2n	We share resources with fellow farmers
56	s2d2o	We trust each other with fellow farmers
57	s2d2p	We share information with retailers of inputs
58	s2d2q	We share resources with retailers of inputs
59	s2d2r	We trust each other with retailers of inputs
60	s2d2s	We share information with input distributors/agents/wholesalers
61	s2d2t	We share resources with input distributors/agents/wholesalers
62	s2d2u	We trust each other with input distributors/agents/wholesalers

The first five variables in Table 6.3 above (s2b1a-s2b1e) refer to the possible ways by which the respondents prefer buying from their suppliers.

The six variables in Table 6.3 above (s2b2a-s2b2f) refer to the buying methods commonly used by the actor. From SC point of view, a rating of these buying methods implies something important as far as SC relationships are concerned.

Supply/value chain competitiveness depends on how an actor cooperates with other chain partners. Based on this fact, five variables in Table 6.3 above (s2b4a-s2b4e) were given for rating by respondents about their feelings on this matter.

Access to formalized markets such as supermarkets, exporters, hotels and fresh agro-processors is paramount to the development of fresh agri-food SCs. Ten variables were used to assess actors' access to such markets (s2b5), associated constraints (s2b6a-s2b6d), interaction aspects (for example risks, resource sharing) (s2b7a-s2b7c) and level of honesty and trustworthiness of customers and suppliers (s2b8-s2b9).

In due course of performing daily activities, SC actors interact with other stakeholders directly and indirectly. The researcher wanted to make the satisfaction rating of the primary actors as they mutually interact with secondary actors. Eight variables in Table 6.3 above (s2b11i-s2b11viii) were assessed.

6.3.4 Nature of TSC relationships and TSC configuration/structural interactions

SCM approach is all about collaboration of all the actors in a particular SC. However, these collaborations are given in a continuum. In this respect, respondents were asked to rate the variable 'degree of collaboration' with other actors. These included seven variables (s2d1a-s2d1g) as given in Table 6.3 above.

Alternatively, existence or absence of collaboration/relationships were determined by using other variables/parameters namely: information sharing, resource sharing and trust between one actor and another. Consequently, the following twenty-one variables (s2d2a-s2d2u) were used as shown in Table 6.3 above.

6.4. Reliability Measurement Results

The 62 variables listed under section 6.3.3 above were subjected to a filtering process of assessing internal consistency or reliability on the basis of Cronbach's alpha reliability coefficient. All the 62 variables were assessed and such variables that would improve reliability through their omission were deleted from the group of variables. Consequently, 2 variables were deleted from the list to leave 60 variables only that were then used to the final stage. Table 6.4 below depicts the reliability statistics and the determined Cronbach's alpha values. These values were as follows: 0.668 for the ten survived variables for preferred buying methods where one variable (s2b1e-Others) was deleted; 0.937 for the four survived variables for respondents feelings on how an actor cooperate with other chain partners-after deleting one variable (s2b4e-Other benefits of good relationship); 0.682 for the survived ten variables for actors' access to formalized markets; 0.647 for the eight survived variables for actors' interaction with other stakeholders; 0.709 for the survived seven variables for the degree of collaboration with other actors; and 0.869 for the twenty-one variables for relationship parameters. Since, all the Cronbach's Alphas are higher than 0.6, then there is internal consistence reliability in the questionnaire (Cooper and Schindler, 2008). Table 6.5 to Table 6.10 depict item total statistics for the buying methods; contribution of good TSC relationship to supply/value chain competitiveness; actors' access to formalized markets; satisfaction rating with partners other than primary customers and suppliers; degree of collaboration and relationship parameters respectively.

Table 6. 4: Reliability Statistic

		Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
1	Buying methods	.668	.604	10
2	Contribution of good TSC relationship to supply/value chain competitiveness	.937	.938	4
3	Actors' access to formalized markets	.682	.679	10
4	Satisfaction rating with partners other than primary customers and suppliers	.647	.692	8
5	Degree of collaboration with other actors	.709	.707	7
6	Relationship parameters	.869	.847	21

Table 6. 5: Item-Total Statistics for buying methods

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
I personally go to buy my consignment from suppliers	12.10	15.183	.514	.342	.586
I send someone to buy for me	12.15	15.322	.520	.313	.584
I buy in consortium with my fellow farmers	11.92	11.808	.727	.533	.486
I use mobile phone to place my orders	12.37	16.234	.409	.227	.627
I use spot purchase to any seller available at the market	12.43	22.601	.225	.091	.673
I use long term purchase agreements from supplier(s) of my choice	12.27	23.424	.115	.027	.685
I use loan (government subsidies)	12.27	23.424	.115	.027	.685
I use loan (NGO's guarantees)	10.12	15.062	.105	.023	.607
I use loan (financial institutions for example banks' guarantees)	10.12	15.062	.105	.023	.607
I use loan (contract on own arrangement with suppliers)	11.22	15.869	.495	.297	.635

Table 6. 6: Item-Total Statistics for Contribution of good TSC relationship to supply/value chain competitiveness

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
-There are benefits to all partners if the good relationship with each other is maintained	10.55	21.392	.805	.706	.932
-Good TSC relationships results in high profit margin to producers	10.57	20.416	.892	.804	.905
-Good TSC relationships results to increased sales at each stage	10.73	19.525	.834	.743	.925
-Good TSC relationships generate high-value added products	10.65	19.994	.879	.783	.908

Table 6. 7: Item-Total Statistics for Actors' access to formalized markets

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
I do access tomato markets to a more formalized market segment such as supermarkets, exporters, hotels, and fresh agro-processors	39.25	106.912	-.192	.188	.723
Major limiting factors to accessing formalized markets:					
Quality constraints	39.57	98.701	.132	.424	.683
Quantity constraints	38.38	90.289	.274	.340	.669
Seasonality/Reliability	38.38	93.684	.181	.477	.682
Location	38.50	89.832	.297	.265	.665
Collaboration aspects with chain partners:					
-We share risks due to loss occurring as a result of an unforeseen event	39.17	90.426	.372	.351	.656
-We share resources (transport and storage) in our operations	37.83	86.863	.422	.581	.647
-We assist our fellow farmers to buy inputs or selling their produce	37.82	93.260	.198	.476	.680
Level of honest and trustworthiness of suppliers and customers:					
My suppliers are honest and hence trustworthy	37.87	92.688	.242	.447	.673
My customers are honest and hence trustworthy	37.60	100.074	.008	.307	.704

Table 6. 8: Item-Total Statistics for Satisfaction rating with partners other than primary customers and suppliers

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
NGOs	41.98	13.726	.624	.	.647
Donor agencies	42.02	13.760	.640	.	.645
Banks	42.12	14.772	.438	.	.676
Microfinance actors (for example SACCOS)	41.76	14.165	.384	.	.691
Agricultural research / Training institutions	42.02	15.299	.358	.	.689
Central government officials	42.02	14.376	.568	.	.657
Local government officials	43.68	18.066	.040	.	.714
Others	42.29	15.352	.469	.	.673

Table 6. 9: Item-Total Statistics for Degree of collaboration

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Degree of collaboration between farmers and input distributors/agents/wholesaler	19.70	29.556	.347	.226	.694
Degree of collaboration between farmers and retailers of inputs	18.52	27.613	.435	.308	.672
Degree of collaboration between farmers and brokers/agents	18.52	27.378	.446	.453	.669
Degree of collaboration between farmers and wholesalers	18.37	27.596	.505	.328	.655
Degree of collaboration between farmers and retailers	19.07	25.743	.511	.434	.650
Degree of collaboration between farmers and final customers	19.78	29.112	.352	.479	.693
Degree of collaboration between farmers and fellow farmers	17.35	31.490	.337	.208	.695

Table 6. 10: Item-Total Statistics for Relationship parameters

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
We share information with brokers/agents	29.15	25.708	.226	.	.870
We share resources with brokers/agents	28.90	24.124	.504	.	.861
We trust each other with brokers/agents	28.88	23.734	.510	.	.861
We share information with wholesalers	29.07	23.996	.578	.	.859
We share resources with wholesalers	28.98	23.647	.621	.	.857
We trust each other with wholesalers	28.97	23.764	.547	.	.860
We share information with retailers	28.92	23.775	.503	.	.861
We share resources with retailers	28.72	23.869	.479	.	.862
We trust each other with retailers	28.87	23.747	.508	.	.861
We share information with final customers	28.65	24.431	.508	.	.861
We share resources with final customers	28.58	24.749	.488	.	.862
We trust each other with final customers	28.77	24.281	.486	.	.862
We share information with fellow farmers	29.37	26.957	-.085	.	.872
We share resources with fellow farmers	29.25	25.803	.231	.	.870
We trust each other with fellow farmers	29.37	26.990	-.110	.	.872
We share information with retailers of inputs	29.05	24.787	.392	.	.865
We share resources with retailers of inputs	28.88	24.037	.522	.	.861
We trust each other with retailers of inputs	29.03	24.234	.508	.	.861
We share information with input distributors/agents/wholesalers	28.82	24.622	.403	.	.865
We share resources with input distributors/agents/wholesalers	28.70	23.976	.583	.	.859
We trust each other with input distributors/agents/wholesalers	28.75	23.752	.609	.	.857

6.5 General Analysis of the primary actors

6.5.1 TSC Status Quo

In trying to capture the TSC status quo in the three selected regions of Tanzania, the results are as presented below.

6.5.1.1 Immediate Customers

A question “who are your immediate customers?” was asked to all the five primary tomato actors namely: small-scale tomato farmers, wholesalers, brokers, retailers and the input suppliers. The results are as provided below.

6.5.1.1.1 Farmers’ Immediate Customers

Tomato farmers in Arusha and Iringa regions were involved. It was found out that generally, farmers’ produce is sold/ channelled to numerous immediate customers. However, three main customers accounting for over (89%) of the farmers’ sales were found. These main customers include wholesalers (37.5%), brokers (27.7%) and retailers (24.1%). These farmers’ immediate customers are located at different places along the TSC. It was further noted that a few proportions of farmers’ produce (3.6%) is sold to Fresh Agro Processors both in Arusha and Iringa regions, (4.5%) is also sold to seed companies in Arusha region where most of the seed companies are based. A very little amount of farmers’ tomatoes (2.7%) are channelled directly to end users/consumers who constitute most of the households - purchasing tomatoes for their daily consumption and business consumers like hotels and institutions such as schools and hospitals inter alia.

Discussion

Given the three surveyed regions of Arusha, Iringa and Dar es Salaam, in Arusha City, for instance, the Kilombero Market is dedicated for farmers’ commodities –tomato inclusive. Thus, bulk tomatoes are delivered and auctioned there. Another big farmers’ collection market is at Tengeru in Meru District. In Iringa region, two major farmers’ collection markets are identified. These include the Mlandege Market in Iringa town and the Ilula market – commonly known as TASAF market in Kilolo District. In Dar es Salaam, farmers’ major collection markets are Urafiki Market for Kinondoni Municipal Council,

Temeke Stereo Market for Temeke Municipal Council and Ilala Market for Ilala Municipal Council. The markets above act as hubs of distribution of tomatoes within their localities. The tomato traders are mostly based at these markets; however, they sometimes travel to the growing regions where they get into direct contact with the farmers. Farmers' higher sales to middlemen: wholesalers (37.5%) and brokers (27.7%) is among others reasons attributed by prior production contracts between farmers and middlemen. Whereby, the middlemen supply farming inputs to the farmers during farming whose recovery is made at harvest time. In this case, the middlemen become automatic immediate customers to farmers. Nyamba, et al. (2016). The fact that most farmers supply most of their products to wholesalers is in line with the findings by Eskola (2005) and by Dome and Prusty (2016) despite their studies were not for tomato per se but rather for several vegetables. Generally, farmers sell little amount to consumers (10.8%) than through middlemen (89.2%). These findings are in agreement with Mwangike (2015b) whose findings indicated that (11%) of farmers' produce in Kilolo district were sold to processors (1%) and final consumers (10%).

6.5.1.1.2 Wholesalers' Immediate Customers

Over (81.7%) of the wholesalers' tomatoes are sold to two main customers namely: retailers (56.3%) and other fellow wholesalers (25.4%). It was further noted that small proportions of wholesalers' tomatoes (8.5%) are sold to fresh agro-processors, (7.0%) to brokers and lastly (2.8%) sold directly to consumers.

Discussion

Retailers being the main customer to the wholesaler is same as findings by Dome and Prusty (2016) who found out that most fresh vegetable-wholesalers sell to petty/retail traders. Compared to farmers, the wholesalers' sales to agro-processors is higher than farmers.

6.5.1.1.3 Brokers' Immediate Customers

Brokers' immediate customers arranged in weight of business include the following: retailers (40.9%), wholesalers (36.4%), fellow brokers (9.1%), fresh agro-processors (9.1%), and consumers (4.5%).

Discussion

Over 77.3% of brokers' tomatoes are sold to retailers (40.9%) and wholesalers (36.4%). A few brokers' tomatoes (9.1%), however, higher than wholesalers' and farmers' tomatoes are sold to processors. Moreover, brokers sell more direct to consumers (4.9%) than wholesalers' (2.8%). In principles, brokers were not expected to assume ownership of the tomatoes, instead, they were to facilitate the exchange of tomatoes for a commission from producers to wholesalers and/retailers (Eskola, 2005). However, some have acquired their own capital and they do also purchase and sell in their own names, and this was the main reason for the small number of brokers' respondents for this research. It was difficult for a broker to be distinguished from being a wholesaler and vice versa.

6.5.1.1.4 Retailers' immediate customers

The main retailers' immediate customers include consumers – both household consumers and institutional consumers (64.5%) and fellow retailers (29.9%). Other immediate retailers' customers include wholesalers (2.8%), brokers (1.9%) and processors (0.9%).

Discussion

Of all the tomato traders, retailers constitute a huge population and they are spread all over major regional, district, ward, and village markets through streets to roadsides. That is why retailers sell more to consumers (64.5%).

6.5.1.1.5 Input-retailer's immediate customers

The immediate customers for input retailers were found to be the farmers (100%).

Discussion

Most of the input retailers are located in villages where tomatoes are grown. It follows therefore that this proximity to farmers facilitates selling farming inputs directly to farmers.

6.5.1.2 Immediate suppliers

A question “who are your immediate suppliers?” was asked to all the five primary tomato actors named above. The results are as provided below.

6.5.1.2.1 Farmers' Immediate Suppliers

Farmers' immediate suppliers are suppliers of farm inputs like seeds, fertilizers, chemicals (pesticides, fungicides) as well as farm implements in such capacities as retailers, wholesalers, brokers or manufacturers. It was found out that most of the smallholder

farmers because of their size – smallholders (67.6%) were purchasing their inputs from input-retailers located near their localities. Few farmers amounting to (17.6%) were found to be purchasing their inputs from input-wholesalers followed by those who got their inputs from seed companies (10.8%) in Arusha region. Moreover, some very few farmers bought their farming inputs from input brokers (2.7%) and manufacturers (1.4%).

Discussion

These results support the fact that most of the farmers from whom data were collected are smallholders with small farm size ranging from a quarter of an acre to two acres. Because of their size (small), their input needs are also small in nature hence the reason for most of them to source from input-retailers and few from wholesalers. Farmers who get supplied their inputs with seed companies are all found in Arusha. The seed companies get into farming contracts with farmers whereby, the seed companies supply the inputs to the farmers and in return, the farmers sell their raw ripen tomatoes to the seed companies and the seed companies recover their input/material costs from tomato sales due to farmers. One example to explain how farmers act in the capacity of supplier-customer relationship with seed companies is as follows:

“In Arusha, especially in Maweni, for instance, there are seed companies which enter into contracts with farmers to grow tomatoes for them (the former –seed companies). The farming contracts are for one year. These companies include for example Kibo Seed, Alpha Seed, E. A. Seed, East-West Seed. The Seed Companies give the farmers primary seed for replanting. These arrangements are highly regarded by the farmers since the market and price for the crops are known”

6.5.1.2.2 Wholesalers’ Immediate Suppliers

It was found out that many wholesalers got their supplies from farmers (83.3%). Some other wholesalers were supplied by brokers (10.4%) and some very few (6.2%) were supplied by other fellow wholesalers.

6.5.1.2.3 Brokers’ Immediate Suppliers

Brokers got their supplies from three suppliers namely farmers (61.1%), fellow brokers/agents (22.2%) and from wholesalers (16.7%).

6.5.1.2.4 Retailers' immediate suppliers

Most of the respondents voted for brokers (54.3%) as their main suppliers. Other suppliers to retailers included wholesalers (21.9%) and farmers (19.0%). It was also found out that sometimes retailers got supplied by their fellow retailers (4.8%).

6.5.1.2.5 Input-retailer's immediate suppliers

Results showed that the immediate suppliers for input-retailers were wholesalers/distributors (55.6%) and input manufacturers (44.4%).

6.5.1.2.6 General discussion on the industry stakeholders and activities

It is derived from above results that TSC in Tanzania especially in the surveyed production regions of Arusha and Iringa on one hand and Dar es Salaam as main target market on the other, involves many actors and many processes/activities. Taking farmers as a focal point, on the upstream, there are suppliers and manufacturers of farm inputs. On the farmers' downstream side, there are other main actors who facilitate in taking the fresh tomatoes to the final consumers. These actors include wholesalers, brokers/collectors, retailers, agro-processors, and seed companies. The processes or activities performed along the TSC include: production of the farming inputs by input manufacturers; distribution/transportation of the produced inputs to warehouses and/or direct to farmers; production of raw tomatoes by the farmers; distribution/transportation and storage by the distributors; and processing of raw tomato (into seeds or into tomato pastes inter alia) – in case are not consumed in the fresh state. All these activities are performed in order to meet consumers' needs. These processes are sometimes performed sequentially or linearly. For instance, for the case of the inputs: from input supplier/manufacturer to the farmer; and for the case of ripen fresh tomatoes: from the farmer to the wholesaler to the retailer to the consumers. However, sometimes, some of the processes are bypassed. For example, when the farmer bypasses the middlemen and supply directly to the consumers: household consumers, institutional consumers (like schools) or the processors and the seed companies. However, as summarized below, very little percentage of tomatoes take the route to seed companies and agro-processors meaning that the majority of raw tomatoes go through the middlemen and to the final consumers, hence consumed in the fresh state.

6.5.1.2.7 Summary of immediate customers and suppliers

Table 6.11 below summarises the results of the two questions on immediate suppliers and immediate customers of the primary tomato actors in the three selected regions of Arusha, Iringa and Dar es Salaam, Tanzania. It can be summarized that most farmers get their farm inputs supplies from input retailers (67.6%) and sell most of their tomatoes to at least three main customers: wholesalers (37.5%), brokers (27.7%) and retailers (24.1%). Tomato wholesalers buy most of their tomato for sale from farmers (83%) and sell mostly to retailers (56.3%). Tomato brokers buy most of their tomato for sale from farmers (61.1%) and sell mostly to retailers (40.9%) and wholesalers (36.4%). Most of the tomato retailers buy tomatoes for sale from brokers (54.3%) and sell mostly to consumers (64.5%) such as household customers and institutional customers like schools, hotels and restaurants.

Table 6. 11: Immediate suppliers and customers for primary actors in TSC

Primary Actor	Suppliers	Customers
Farmers	Input retailers (67.6%) Input wholesalers (17.6%) Seed companies (10.8%) Input brokers (2.7%) Manufacturers (1.4%)	Wholesalers (37.5%) Brokers (27.7%) Retailers (24.1%) Processors (3.6%) Seed companies (4.5%) Consumers (2.7%)
Wholesalers	Farmers (83.3%) Brokers (10.4%) Fellow Wholesalers (6.2%)	Retailers (56.3%) Fellow Wholesalers (25.4%) Processors (8.5%) Brokers 7.0%) Consumers (2.8%)
Brokers	Farmers (61.1%) Fellow Brokers (22.2%) Wholesalers (16.7%)	Retailers (40.9%) Wholesalers (36.4%) Processors (9.1%) Fellow Brokers (9.1%) Consumers (4.9%)
Retailers	Brokers (54.3%) Wholesalers (21.9%) Farmers (19.0%) Fellow retailers (4.8%)	Consumers (64.5%) Fellow Retailers 29.9%) Wholesalers (2.8%) Brokers (1.9%) Processors (0.9%)

The above information on Table 6.11 above was then used to draw or map the current or status quo of the flows of farming inputs from input suppliers to farmers and then the flow of fresh tomatoes from farmers downstream through intermediaries and processors until the products reach the consumers.

Several maps/configurations can be drawn –short ones, medium and the longest. See the depictions below:

Maps for the supply of farming inputs to the farmers include the following:

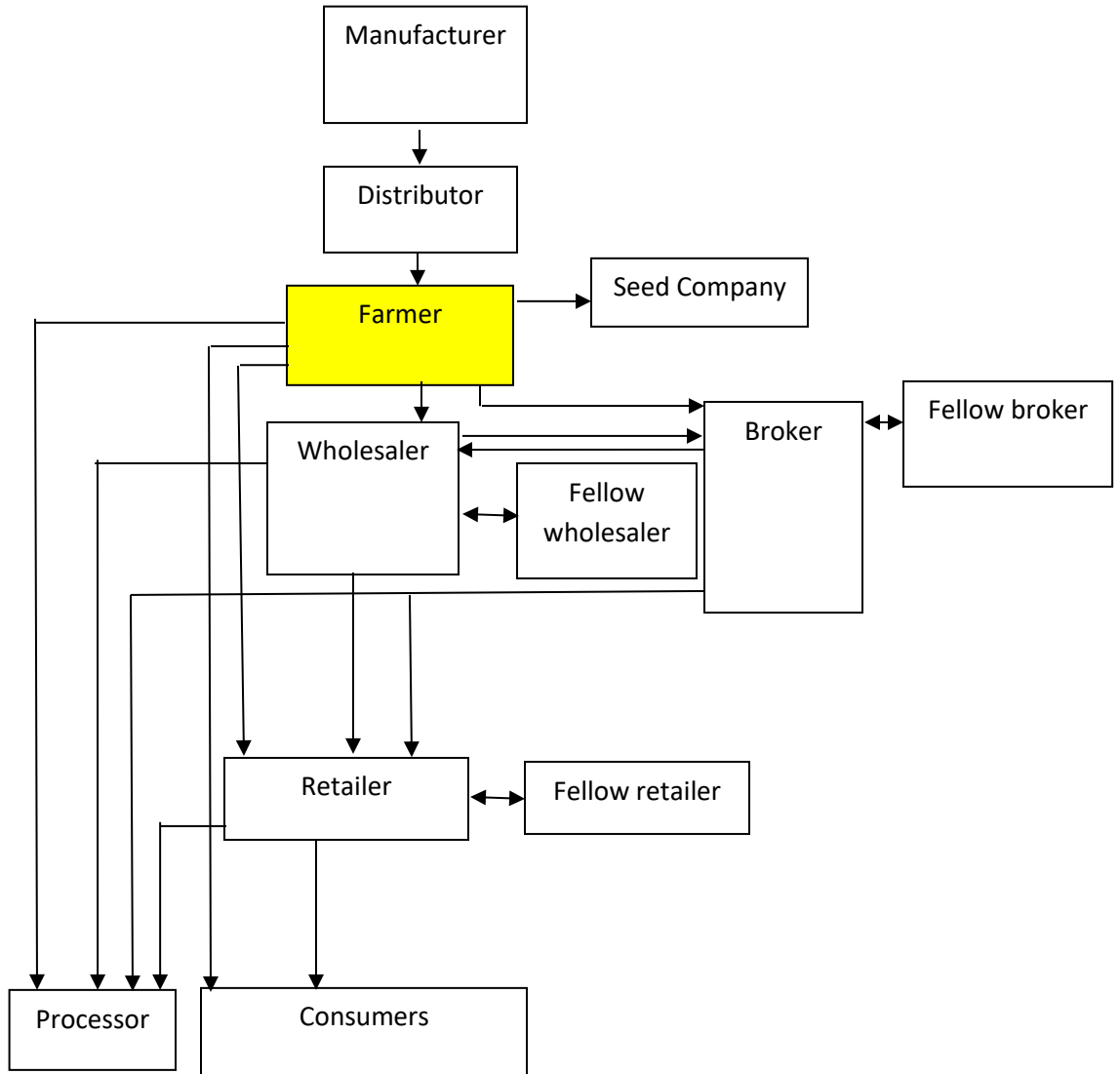
1. Input manufacturers \Rightarrow Farmers (the shortest)
2. Seed company \Rightarrow Farmers (the shortest)
3. Input manufacturers \Rightarrow Input wholesalers \Rightarrow Farmers (medium)
4. Input manufacturers (Longest) \Rightarrow Input wholesalers \Rightarrow Input Retailers \Rightarrow Farmers

The same maps may be drawn to address the issue of delivering raw tomatoes from the farmers to the consumers as follows.

1. Farmer \Rightarrow Consumer [household consumer, processors, seed companies (the shortest)]
2. Farmer \Rightarrow Retailers \Rightarrow consumers (the medium)
3. Farmer \Rightarrow wholesalers \Rightarrow Broker \Rightarrow Retailer \Rightarrow Consumers (the longest)

The above maps for the TSC when combined all together lead to a complicated map as shown in Figure 6.25 below.

Figure 6. 25: The Existing Tomato SC Map (Configuration)



Thus, the formation of these maps depends on the decisions made by the SC actors when deciding the route to be taken by their products.

6.5.1.3 Factors making customers buy from TSC actors (Order winners)

The TSC primary actors were requested to tell from their own experience the factors which make their customers buy from them. Seven multiple choices were given as follows: 1. Fast delivery, 2. Price (& discounts), 3. Delivery reliability, 4. Quality, 5. Customer care, 6. Location and 7. Others. Selection of more than one criterion was allowed. The sections below present the results.

6.5.1.3.1 Factors making customers buy from farmers

About sixty percent (59.8%) of the farmers acknowledged that most of their customers look for tomatoes of the highest quality. Customer care (14.1%), delivery reliability (12%) and location (8.7%) were also found to be the reasons for tomato customers to buy from farmers. Lastly, price (& Discounts) (5.4%) offered by the farmers was also found to be one of the reasons for the customers to buy from farmers. Fast delivery was not considered at all as one of the factors to buy from farmers.

6.5.1.3.2 Factors making customers buy from wholesalers

Most of the wholesalers (55.2%) said the quality of the tomatoes was number one in terms of the factors which make most of their customers to buy from them. The second order winner was price (& discount) that accounts for (19.4%) of the respondents. The third, fourth and fifth order winners as perceived by wholesalers are customer care (14.9%), delivery reliability (9.0%) and fast delivery (1.5%) respectively.

6.5.1.3.3 Factors making customers buy from brokers

Regarding the factors which make customers buy from brokers, the brokers ranked quality with highest weight (47.8%) followed by price (& discounts) (26.1%), customer care (13%), delivery reliability (8.7%), and fast delivery (4.3%).

6.5.1.3.4 Factors making customers buy from retailers

The following factors were declared by the retailers that they influence their customers to buy from them. The first and foremost factor was quality (44.1%), followed by customer care (22.1%), price (& discounts) (17.2%), delivery reliability (9.0%) and lastly fast delivery (7.6%).

6.5.1.3.5 Factors making customers (farmers) buy from input-retailers

Results showed that the order winners of the input retailers were as follows: quality (38.5%), price (& discounts) (23.1%), customer care (23.1%) and delivery reliability (15.4%).

6.5.1.3.6 Summary of the factors making customers buy from TSC actors

The above results on the factors making customers buy from any of the TSC actors are being summarized on the Figures: 6.26a-b, 6.27a-b and 6.28 below. The combination is done by taking one factor at a time and considering all the TSC actors.

Quality: Generally speaking, the quality of the product is considered to be the most preferred buying criterion by many customers as perceived by the TSC actors. Quality is considered the foremost important criterion for the customers of farmers (59.8%), wholesalers (55.2%), brokers (47.8%), and retailers (44.1%). These results can be attributed to the nature of the product – fresh-food with short shelf life. In the case of input suppliers, quality is also considered very important and it is the highest requirement for buying. Efficacy of inputs like chemicals (pesticides and fungicides) and fertilizers can quickly be known and proved beyond reasonable doubts when applied by the farmers in tomato farming. Thus, poor quality inputs sold today may soon or later badly impact future/return-orders from farmers. Even after combining the results from individual TSC actors, quality continues to be the most important criterion. Quality is more important in buying with retailers (37%) than with farmers (32%), wholesalers (22%) and brokers (6%). This is due to the detailed kind of inspection done by end users (consumers) when they come to buy the tomatoes in small quantities for their daily consumption. At the retail level, consumers are able to totally inspect the tomatoes: visually to certify themselves on issues like cleanliness, colour, freshness, shape, presentation and packaging and can single out any spoiled tomato. On the other hand, one hundred percent (100%) inspection is limited at farmers', brokers' and wholesalers' levels because of the huge quantity being transacted, hence, calling for sampling inspection. Figure 6.26a below refers.

Price (& discount): With most TSC customers, price as order winner is considered second in terms of importance after quality. This applies to brokers' (26.1%), input suppliers' (23.1%) and wholesalers' (19.4%) customers. However, the price is not highly considered

as order winner by farmers' customers (5.4%) where price is ranked fourth after quality, customer care and delivery reliability. By retailers' customers (17.2%), price is ranked third – after quality and customer care. However, overall, the price is found to be a very sensitive factor for retailers' customers (45%) and minimum with input suppliers' customers (5%). This is because retailers sell to end users and due to the risk of frequent price fluctuation in a day or two, postponement of a transaction is possible. Further, the price is least sensitive at input supply because of the importance of the products they sell to farmers. For example, if it is the only pesticide available for a particular disease, farmers find no choice other than buying. Figure 6.26b below refers.

Customer care: individually, at one actor's level, customer care is found to be second by farmers' (14.1%), retailers' (22.1%) and input suppliers' (23.1%) customers. This is due to the presence of many sellers at these levels. For example, during tomato season, most of the farmers happen to have readily available ripen tomatoes and markets get saturated. The same applies to retailers whereby, the tomato is dispensed for sale by at least every trader in farmers' and urban general markets and along road sideways. On the other hand, in such villages famous for tomato production, there are several agro vets – shops, hence, these call for good customer care. As discussed above, generally, customer care is observed to be the foremost important criterion with retailers' customers than any other customers in the TSC. This is because of the fact that too many retailers chasing too many customers and is found least with brokers' customers (5%). Figure 6.27a below refers.

Delivery reliability: delivery reliability is found not to attract most of the customers in the TSC. In most cases, delivery reliability is ranked fourth in terms of importance by the customers of: wholesalers (9.4), brokers (8.7), retailers (9%) and input supplier (15.4%). However, delivery reliability is ranked third by farmers' customers (12%). This can be attributed by the presence of wholesalers and brokers in urban markets who sometimes don't travel to production places to buy tomatoes but they simply maintain contacts with reliable farmers who can just ship a tomato consignment when requested to do so. Generally, delivery reliability is high with retailers' (38%) and farmers' (32%) customers but is least with brokers' (6%) and input suppliers' (6%) customers. Figure 6.27b below.

Fast delivery: fast delivery is considered to be a suppliers’ selection criterion for wholesalers’, brokers’, retailers’ customers. However, fast delivery is missing in other actors’ groups like farmers’ customers. Generally, fast delivery is higher with retailers (84.6%) customers than with any other TSC actors. Figure 6.28 below refers.

Location: the location is found to be not an order winner at all. This is attributed to the nature of the product – seasonal. Thus, for instance, in scarcity (low) season, traders can make all the efforts possible to access tomatoes at any place in the country or even by importing.

Figure 6. 26a-b: Quality and Price (& discounts)

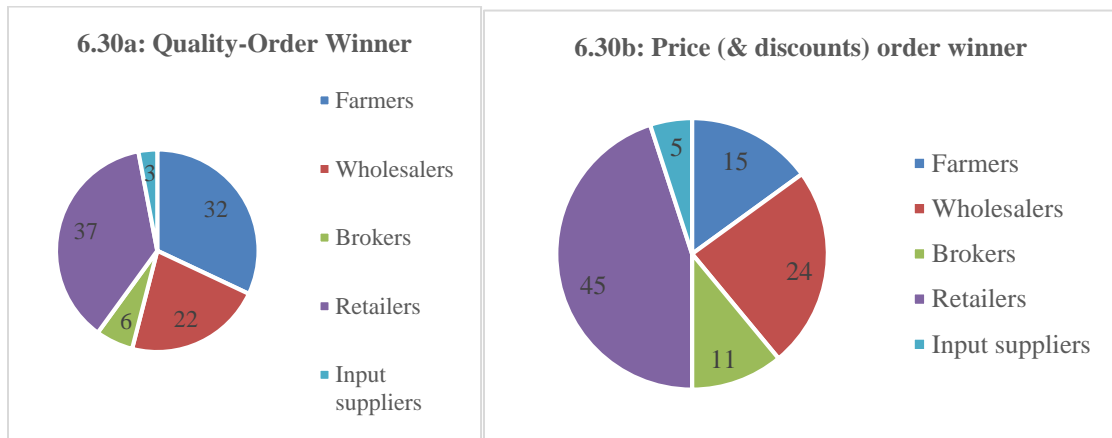


Figure 6. 27a-b: Customer Care and Delivery Reliability

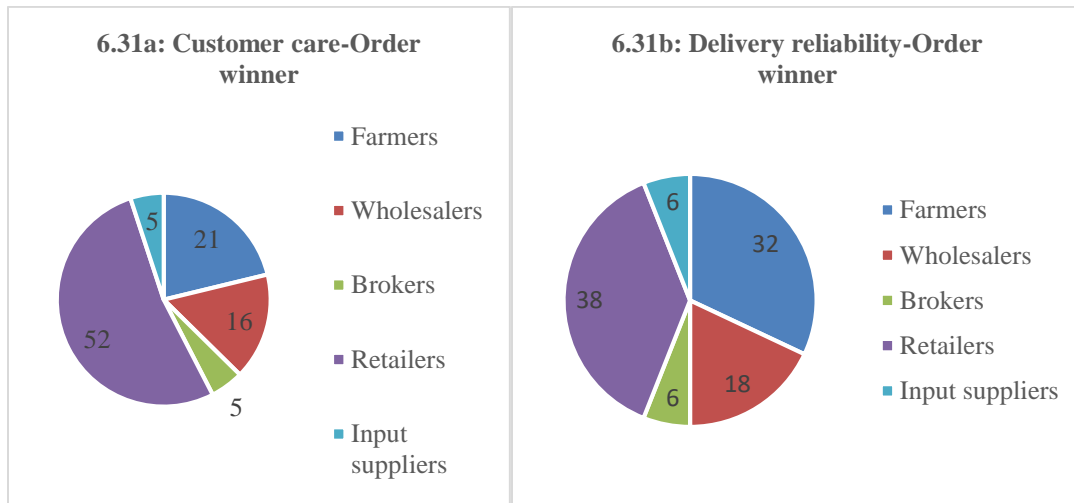
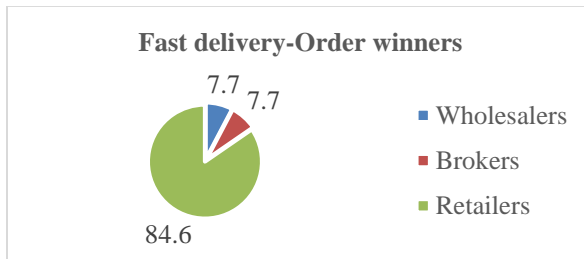


Figure 6. 28: Fast Delivery-Order Winners



6.5.1.4 Factors making TSC actors buy from their suppliers

The TSC actors were asked to tell the factors which influence them to buy from their upstream suppliers. The same seven factors namely: Fast delivery, Price (& discounts), Delivery reliability, Quality, Customer care, Location, and others (if any) were given for selection. Results from the actors are as described in the following sections.

6.5.1.4.1 Factors influencing farmers to buy from input suppliers

By looking at the farmers' responses, over (61%) of them buy inputs from input suppliers (mostly retailers and wholesalers) by considering two prominent factors: quality (33.7%) and price (& discounts) (27.9%). Delivery reliability and fast delivery were also considered (10.5%) and (9.3%) respectively. It was further found out that some few farmers (7%) and (4.7%) choose to buy from input-suppliers due to the level of customer care and a supplier's location respectively.

6.5.1.4.2 Factors influencing wholesalers to buy from tomato suppliers

Results showed that wholesalers also highly regard 'quality' (52.4%) as their main supplier selection criterion. Wholesalers' second order buying criterion is price (& discount) (25.4%). Other wholesalers' order criteria being arranged in descending order of preferences are delivery reliability (9.5%), customer care (6.3%), fast delivery and location (3.2%) each.

6.5.1.4.3 Factors influencing brokers to buy from suppliers

The brokers considered quality (47.4%) as the most important criterion when buying from their suppliers. Other order criteria with their ranking in brackets include the following: price (& discounts) (21.1%), fast delivery (15.8%), customer care (10.5%) and delivery reliability (5.3%).

6.5.1.4.4 Factors influencing retailers to buy from suppliers

Quality (49.2%) was found to be the most influencing factor to retailers when buying from their suppliers. Retailers also make their decision to buy based on price (& discounts) (28.8%) followed by delivery reliability (12.7%) and customer care (8.8%). Fast delivery (2.5%) as one of the buying requirements was not given more weight by retailers.

6.5.1.4.5 Factors influencing input-retailers to buy from suppliers

Results showed that the buying requirements for the input-retailers were as follows: delivery reliability (28.6%), quality (28.6%), price (& discounts) (21.4%), fast delivery (14.3%) and customer care (7.1%).

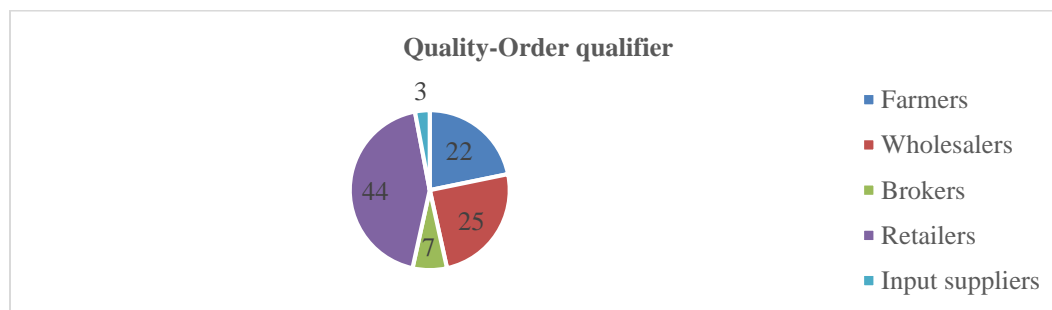
6.5.1.4.6 Summary of the factors making TSC actors buy from their suppliers

A discussion on the individual factors (as applies to all the actors) which make TSC actors buy from their suppliers is given below.

Quality: Results show that when the TSC actors want to buy inputs (for farmers) and goods for sale (for traders) from their suppliers, quality is a foremost preferred criterion for suppliers' selection. We see above the quality percentages required by individual actors when they buy from upstream suppliers are as follows: wholesalers (52.4%), retailers (49.2%), brokers (47.4%), farmers (33.7%) and input suppliers (28.6%). However, after combining individual quality requirements as a purchasing criterion, the retailers (44%) are found to be demanding more quality products from their suppliers than any other actor in the TSC. The same reason given above regarding the possibility of consumers conducting a detailed inspection in buying from retailer apply to the retailers as well. These retailers are small in size with little capital and normally buy tomato consignments in small quantity – one to three crates enough for sale on that particular day. One hundred percent (100%) inspection is possible for this small quantity purchased. Moreover, the requirement to return back to suppliers (farmers, wholesalers and brokers) the tomato packaging crates

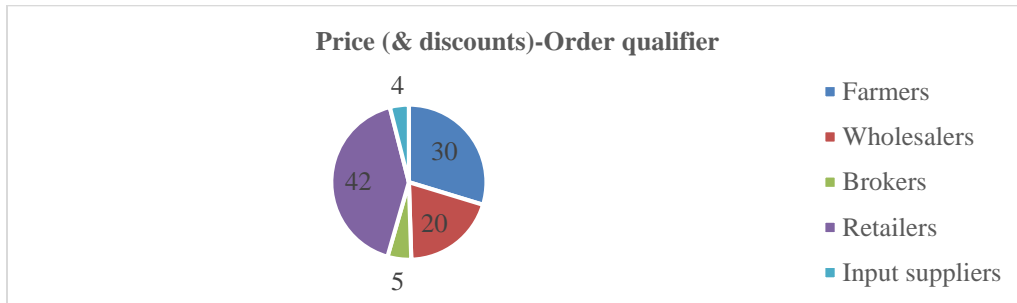
at the point of farmer-retailer, wholesaler-retailer or broker-retailer exchange points makes one hundred percent (100%) inspection more simplified. One hundred percent inspection is done when retailers shift tomatoes from suppliers' containers to their own containers and in case of any quality problem, the supplier is informed instantly and agreement to resolve such problem is reached. The quality rating of other actors - other than retailers are as follows: wholesalers (25%), farmers (22%), brokers (7%) and input suppliers (3%). See Figure 6.29 below.

Figure 6. 29: Quality



Price (& discounts): Price is found at the second place in farmers (27.9%), wholesalers (25.4%), brokers (21.1%) and retailers (28.8%) when they want to buy from their suppliers. However, the price is ranked as the third most preferred criterion by input suppliers (21.4%). After combining all the actors and price as their main purchasing criterion, retailers (42%) are found to demand more at price than other actors followed by farmers (30%), wholesalers (20%), brokers (5%) and input suppliers (4%). The act of retailers demanding more on price (and discount) in buying from their suppliers can be attributed due to the fact that retailers are at the last stage of an SC who pass the product to the consumers. If retailers will buy tomatoes at a price which cannot be afforded by the consumers then they will not be able to pass their products to the consumers. However, for the case of farmers, wholesalers and brokers they might not demand much on price (& discount) because the product still has some several echelons to push through. See Figure 6.30 below.

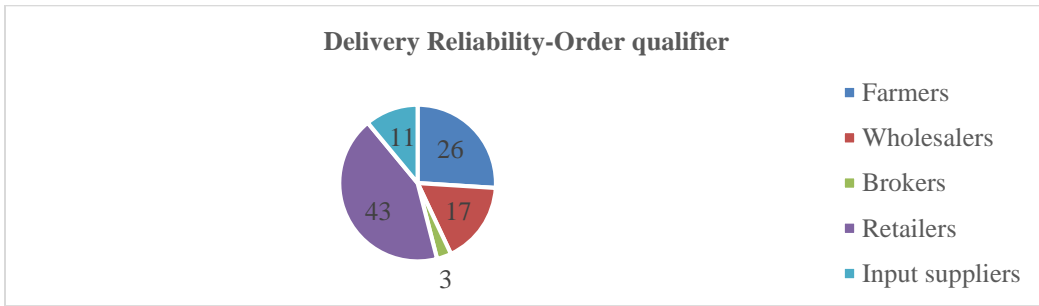
Figure 6. 30: Price (& discounts)



Delivery reliability: Delivery reliability is found as a purchasing criterion by farmers (10.5%), wholesalers (9.5%) and retailers (12.7%). However, delivery reliability in input suppliers is highly considered as a purchasing criterion on the same-first place like quality (28.6).

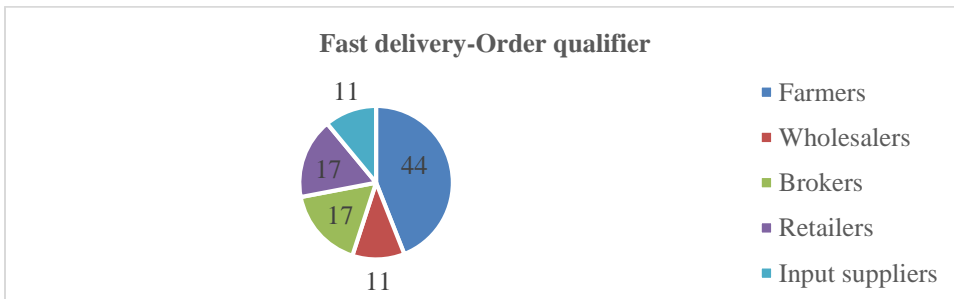
After combining all the individual rankings of all the TSC actors on delivery reliability as their supplier selection criterion, it is again found out that delivery reliability is highly regarded by retailers (43%) because they want not to experience an out-of-stock situation. An out-of-stock situation by the retailers will be a great embarrassment to them and a total failure of the TSC. This is because retailers facilitate the passage of the SC's product to the consumers. It should be remembered here that, one of the objectives of any SC of any product is to facilitate movement of the chain's product from the sources of supply of raw materials through production and movement of the final product from production through distributors until when the product is on the hands of the end users/consumers. The farmers (26%), are found on second place in taking delivery reliability as supplier selection criterion. This can be attributed due to the sensitivity and urgency need of some agricultural inputs like chemicals especially when there is an outbreak of tomato diseases. The other TSC actors and their delivery reliability share as supplier selection criterion are as follows: wholesalers (17%), input suppliers (11%) and brokers (3%). See Figure 6.31 below.

Figure 6. 31: Delivery Reliability



Fast delivery: Fast delivery is ranked the third criterion for supplier selection in brokers (15.8%) when they want to buy tomatoes for sale from their suppliers. However, fast delivery is lowly used as supplier selection criterion in input suppliers (14.3), farmers (9.3%), wholesalers (3.2%) and retailers (2.5%). After combining all the individual rankings of all the TSC actors on fast delivery as their supplier selection criterion, farmers (44%) are found to highly need it, followed by retailers and brokers (17%) each; and input suppliers and wholesalers (11%) each. The same reasons for farmers in placing more importance on delivery and reliability when buying from suppliers mentioned above can also be thought to apply with fast delivery. See Figure 6.32 below.

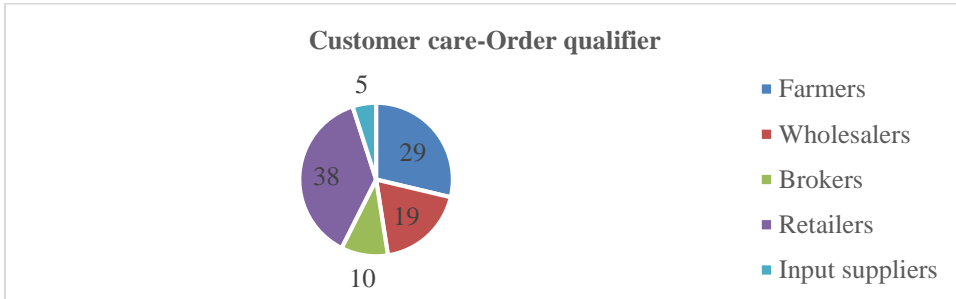
Figure 6. 32: Fast Delivery



Customer care: Customer care as a criterion for supplier selection is ranked very low mostly at fourth position and above in all the TSC actors as follows: brokers (10.5%), input suppliers (7.1%), farmers (7%), retailers (6.8%) and wholesalers (6.3%). However, when all the actors are combined and customer care considered as their supplier selection criterion, retailers (38%) are found to demand more customer care, followed by farmers (29%), wholesalers (19%), brokers (10%) and input suppliers (5%). Customer care to retailers is very important because they don't specialize with one supplier; that is, they are free to buy from farmers, wholesalers and brokers. The principle for too many suppliers

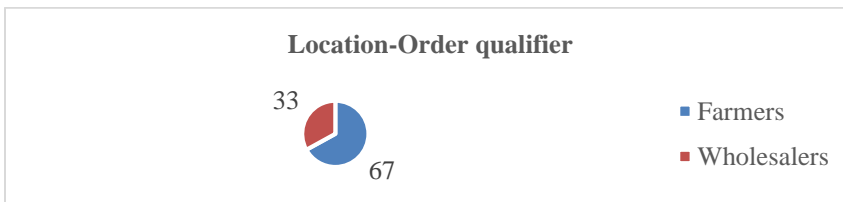
chasing too many goods applies. hence, the need for suppliers to differentiate themselves and they can do so by giving extraordinary customer care service to their customers - retailers in this case for reliable future orders. See Figure 6.33 below.

Figure 6. 33: Customer Care



Location: Individually, location is considered as a factor to be considered when buying from suppliers by two TSC actors only, namely: farmers (4.7%) and wholesalers (3.2%). After combining the two actors and the importance they consider ‘location’ as buying criterion, the farmers are found to highly regard location factor followed by wholesalers in the proportionate of (67%) and (33%) respectively. There are many reasons which can be attributed to farmers’ choice to use location as their purchasing criterion including the following: most small farmers are located in villages where infrastructures like roads are poor, travelling long distance is time-consuming and expensive, because of the bad past experience farmers in Tanzania have undergone, for example buying seeds which cannot germinate, chemicals or fertilizers with low efficacy level when applied. By considering all these hassles, farmers prefer locating their input suppliers from a nearby place and from people they know so that in case of anything wrong they can easily reach such suppliers within any possible shortest period and minimum resources. See Figure 6.34 below.

Figure 6. 34: Location



6.5.2 TSC Relationship Dynamics

In exploring the TSC relationship dynamics, questions were asked to the five primary actors of the TSC namely: farmers, wholesalers, brokers, retailers and the input suppliers.

6.5.2.1 Actors' (farmer/trader) preference in buying inputs/goods from suppliers

The respondents were asked about the way(s) they prefer buying their incoming materials both farming inputs for use in tomato farming and tomatoes for the case of tomato traders. Four ways were suggested for the respondents to rank their preferences by a 5-point Likert Scale. The results are presented in four sections below from section 6.2.2.1.1 to section 6.2.2.1.4 below. Given the nature of data collected – ordinal or categorical, a mode as a measure of central tendency was used in data analysis.

6.5.2.1.1: I personally go to buy my consignment from suppliers

In responding to “I personally go to buy my consignment from suppliers”, most of the respondents in each category of the TSC agreed with the statement in the following percentages (98%), (94%), (85%), (71%) and (54%) for farmers, retailers, wholesalers, input suppliers and brokers respectively. Alternatively, by combining: agree and strongly agree; and disagree and strongly disagree; (89.6%) of all the respondents preferred the method of “personally going to buy” compared to only (10%) for those who disliked the method. In contrast, (0.5%) of the respondents were not sure.

6.5.2.1.2: I use a mobile phone in placing orders

In responding to “I use a mobile phone to place my orders”, most of the respondents agreed that they use mobile phones in placing orders from their suppliers with exception of farmers who disagreed by 63%. Those actors who supported the use of mobile phones, they supported the statement in the following percentages: (100%), (92%), (88%), and (63%) for input suppliers, brokers, wholesalers and retailers respectively. By combining: strongly agree and agree; and strongly disagree and agree groups, (61.3%) of the respondents agree whereas (36.7%) disagree and (2.1%) of the respondents were neutral or not sure.

6.5.2.1.3: I send someone to buy for me

In responding to the statement “I send someone to buy for me”, input retailers and wholesalers agreed with the statement by (57%) and (66%) respectively. The other actors:

retailers, farmers and brokers disagreed with the statement in the following percentages: (77%), (63%) and (62%). By combining: strongly agree and agree; and strongly disagree and agree groups, (35.6%) of the respondents agree whereas (61.3%) disagree and (3.1%) of the respondents were neutral or not sure.

6.5.2.1.4: I buy in consortium with my fellow farmers and traders

In responding to the statement “I buy in consortium with my fellow farmers and traders”, input retailers, wholesalers and brokers agreed with the statement in the following percentages: (71%), (66%) and (54%) respectively. The remaining actors: farmers and retailers disagreed by (65%) and (76%) respectively. By combining: strongly agree and agree; and strongly disagree and disagree groups, (35.6%) of the respondents agree whereas (59.6%) disagree and (4.7%) of the respondents were neutral or not sure.

Interpretation of the results

The results above suggest that the prevailing TSC in Tanzania is still more of traditional food SC rather than value-based SCs (Stevenson and Pirog, 2013). The act of, for instance, an actor going personally to buy despite having alternatives of sending someone, or using mobile phones is an evidence of this. The situation was found worse with farmers and retailers in the persistence of the use of spot markets (Eaton et al., 2007). Other traders like input retailers, wholesalers and brokers were somehow better-off. The input retailers, for example, were found to have contacts with input-distributors whom they simply call in case of any need to be replenished with particular inputs. Likewise, the wholesalers acknowledged using mobile phones in placing orders to some particular farmers they know or to a transporter to ask for a collection of tomatoes from sources of supply to the markets. Additionally, brokers’ physical presence at every place to buy or sell tomatoes is not necessary. Instead, they simply make calls to their counterparts in different places and a business deal is concluded over the phone and goods are delivered. However, the rigidity of farmers in accepting mobile orders is very serious and should not be underestimated and, if left unattended will exacerbate the problem. However, one farmer-respondent was quoted saying:

“The use of mobile phones in the recent past has been misused by some unfaithful tomato traders. In the past, we used to accept telephone orders from tomato traders whom we

knew. However, some of these traders have defaulted payment for tomato consignments whose orders were placed through mobile phones. And since then such traders don't come to our localities to buy tomatoes”

The retailers were found to be conservative in allowing their fellow retailers to do their activities on behalf, as such, they prefer being at every place to buy and collect their consignments. However, this happens because of the fact that the tomato retailers don't normally make long-distance travels in the search of tomatoes from production areas – a wholesalers'/brokers'/transporters' function. However, unlike farmers, retailers have positively adopted the use of mobile phones for a better situation.

Buying in the consortium is one of the characteristics in value-based chains where people trust each other. Input retailers and wholesalers were found to like this option. The option comes with numerous benefits to the practising parties such as an advantage in transportation costs due to shared transport. Moreover, consortium purchasing increases the negotiation power due to economies of scale gained through working together. Retailers, farmers and brokers were found not to use it seriously.

6.5.2.2 Ranking of the common methods used to buy from suppliers

The respondents were asked to rank using a 5-point Likert scale (from 1 to 5, strongly disagree to strongly agree) the given five methods commonly used by farmers and traders in buying farming inputs and goods for sale from suppliers. Given the nature of data collected – ordinal or categorical, a mode as a measure of central tendency was used in data analysis. Below are the results.

6.5.2.2.1: I use long-term purchase agreements from the supplier(s) of my choice

In responding to the statement “I use long-term purchase agreements from the supplier(s) of my choice”, all the respondents disagreed in the following percentages: (77%) for both brokers and retailers, (75%), (71%) and (66%) farmers, input suppliers and wholesalers respectively. After combining: strongly agree and agree; and strongly disagree and disagree, (73.8%) of the respondents disagreed whereas those agreed were (26.2%).

6.5.2.2.2: I use loan (subsidies) from the government

In responding to the question “I use loan (subsidies) from the government”, all the respondents: disagreed in the following percentages (100%) for both wholesalers and

brokers, and (99%), (86%) and (67%) for retailers, input suppliers and farmers respectively. After combining: strongly agree and agree; and strongly disagree and disagree, (88.5%) of all the respondents disagreed and (11%) of them agreed and (0.5%) were neutral.

6.5.2.2.3: I use loan (guarantees) from NGOs

In responding to the statement “I use loan (guarantees) from NGOs”, all the respondents disagreed in the following percentages: (99%), (98%), (92%), (92%) and (86%) for retailers, wholesalers, brokers, farmers and input suppliers respectively. By combining: strongly disagree and disagree; and strongly agree and agree, results show that (95.3%) of all the respondents disagreed and (4.7%) only agreed.

6.5.2.2.4: I use loan (financial institutions for example banks' guarantees)

In responding to the statement “I use loan (financial institutions for example banks' guarantees)”, all the respondents disagreed in the following percentages: (93%) for both farmers and retailers, (86%) for input suppliers and (85%) for both wholesalers and brokers. Results after combining: strongly agree and agree, and strongly disagree and disagree show that (90.6%) and (8.9%) for disagreed and agreed respectively.

6.5.2.2.5: I use loan (contract on own arrangement with suppliers)

In responding to the statement “I use loan (contract on own arrangement with suppliers)”, farmers, input suppliers and retailers disagreed with the statement in the following percentages: (75%), (71%) and (57%) respectively whereas brokers and wholesalers agreed by (69%) and (54%) respectively.

Discussion of the results

Long-term purchase from suppliers is another characteristic of the formal markets. This practice leads to the growth of the actors' businesses due to the assurance of future orders. However, this practice was not found to work with any of the respondents visited. This could be the reason why farmers have remained small throughout. All the actors in the TSC need to be financed. The government, for instance, is supposed to assist her farmers in many ways including supporting farmers with subsidized inputs like chemicals, seeds and chemicals. The farmers' respondents when asked whether the government provides

subsidies, they all said “no” – to tomatoes but, “yes” to grains. Moreover, few actors hardly admitted to have received financial assistance from NGOs, financial institutions and loan-personal arrangement. However, very few NGOs were reported to exist. In Arusha region, AVRDC is one of the NGOs that assists tomato farmers in the region. Others include World Vision, Meru Community Bank (for finance), TAHA (for training), Oikos for rehabilitation of water drainage in Uwiro village. Moreover, the Great African Food Company (GAFCo) sometimes was reported to assist farmers with agricultural inputs and payment is made after harvest. GAFCo are also customers for organic products, such as those farmers who grow organic tomatoes have the ready-made market to GAFCo. In Iringa region the following institutions (NGOs and financial institutions were reported that help farmers in one way or another: MUVI provides training to farmers and assists them in search for market; Rural-Urban Development Initiatives (RUDI) among the NGOs that provide training in the agricultural sector, they are also financiers for farmers in Iringa; YARA Tanzania Ltd is among the non-bank financial institution that assists farmers in Iringa; Promotion of rural initiative and development enterprises (PRIDE) Tanzania is a microfinance institution involved in provision of credit to small and micro entrepreneurs in Tanzania; others include FINCA and Mufindi Cooperative Bank.

6.5.2.3 Problems/challenges with primary actors of the TSC

Each of the primary actors of the TSC were requested to mention at least two problems and/or challenges which they were facing in their day-to-day activities in relation to tomato farming and business in Tanzania. This question attracted many respondents hence, the actors were able to list as many problems/challenges as possible. In the following sections the resultant problems/challenges from each group of respondents are presented.

6.5.2.3.1 Farmers’ main problem(s)/challenges

It was realized that the main problem facing most of the farmers were “ineffectiveness of farm inputs (for example pesticides, fertilizers, seeds) and lack of a guarantee’ which scored high percent (37.4%). Other most common problems being arranged in order with their percentages in brackets include the following: Fluctuation of input price (18.2%), Tomato diseases (15.2%), Fluctuation of tomato price in the market (10.1%), Variations in weather conditions affect tomatoes (for example excessive rain, drought) (5.1%),

Ineffective professional advice given by input sellers/suppliers (3%), Brokers' opportunism in price setting (2%), Inability of farmers to determine prices in CF (2%), and Lack of enough capital to finance farming activities (2%). Likewise, Higher interest rates offered by financiers, Tomato quality deterioration due to time (perishability), Lack of tomato collection (selling) centres in villages, Unfaithful Input sellers for example using faked weighing scales, and Farmers ignorance, hence unable to follow inputs' use directives given on the packages (1%) each.

6.5.2.3.2 Wholesalers' main problem(s)/Challenges

The top seven problems encountered by wholesalers (with score of more than (5%) each) with their scores in brackets include the following: Tomato price fluctuation (17.6%); Presence of numerous taxes as tomatoes move along its SC (16.2%); Roadblocks/vehicle breakdown leading to delay of tomatoes to the market (9.5%); Poor road conditions to some production areas (9.5%); Bad debts (6.8%); High competition due to increased number of traders/markets (6.8%) and Market environments are not friendly (untidy) for food trading (5.4%). Other problems with their percentages in brackets include the following: Delay in payment after product delivery to buyers (4.1%); Cheating in tomato grading by upstream SC actors (4.1%); Small capital, hence small profit (2.7%); Seasonal availability of tomato (2.7%); PHL loss as tomatoes are perishable (2.7%); some farmers are unfaithful when assisted with capital for farming (2.7%); Delay in product delivery after advance payment to farmers/brokers (1.4%); Lack of export market during high season (1.4%); Financial Institutions are reluctant to give loans to tomato traders (1.4%); Operational costs of tomato business are too high (for example transport costs) (1.4%); Long distance from farm to market increases trading costs (1.4%); Sometimes farmers bypass wholesalers and sell directly to town market at farm price, hence low price (1.4%) and Unreliable market and price given by tomato processors (1.4%).

6.5.2.3.3 Brokers' main problems/challenges

With brokers, tomato price fluctuation (28.1%) was found to be the prime problem. The second problem was unfaithfulness of some customers when allowed to procure tomatoes on credit (18.8%) and the third problem was unfaithfulness of farmers when assisted with capital for farming (12.5%). The list goes on in ascending order from the fourth problem to the last as follows: Delay in payment after product delivery to buyers (6.2%); Cheating in tomato grading by upstream SC actors (6.2%); Lack of trust among brokers/agents (6.2%); Lack of sufficient capital (6.2%); Roadblocks/vehicle breakdowns leading to delay of tomatoes to the market (3.1%); Cheating in weights and measures (3.1%); Presence of numerous taxes as tomato move along its SC (3.1%); Market environment are not friendly for tomato business (3.1%) and Unreliable mobile-phone payment systems (3.1%).

6.5.2.3.4 Retailers' main problems/challenges

With retailers, the results showed that tomato price fluctuation (34.6%) is the biggest problem in the surveyed areas, followed by cheating in tomato grading by upstream SC actors (24.4%), decay of tomatoes while in transit (8.7%), presence of numerous taxes as tomatoes move along its SC (7.9%), and occasional imbalance demand and supply (5.5%). Others include: Unfaithful/opportunist brokers/transporters (4.7%), Cheating in weights and measurements (4.7%), Customers are too demanding in terms of quality (4.7%), Lack of conducive marketplaces (1.6%), No room for fully tomato inspection during buying (1.6%), Brokers/agents dictate buying and selling of tomatoes (0.8%) and Delay in payment after product delivery to buyers (0.8%).

6.5.2.3.5 Input-retailers' main problems/challenges

Input retailers faced the following problems: Presence of counterfeit farm inputs (53.8%), Low purchasing power of farmers (15.4%), Delay in payment after product collection by farmers (15.4%), Difficulty in farm input availability (7.7%) and Agro input price fluctuation (7.7%).

6.5.2.3.6 Discussion on the challenges and/problems faced by different actors

The identified challenges encountered by different actors along the TSC were then contrasted to get to know their relationships such as similarities as well as the differences. One common characteristic/similarity identified is a '**lack of coordination**' as the result one member blames the upstream or downstream member in the chain for not performing

their duties or for failure to perform them properly, hence the cause of most of the problems in TSC in the three selected regions of Tanzania. In the sections below, incidences of lack of coordination by different actors are explained:

i) Farmers

Taking farmers as the main actors in the TSC in the three selected regions in Tanzania, lack of coordination results in numerous complaints and blames by the farmers to the other actors as follows: Ineffectiveness of farm inputs like chemicals (pesticides and fungicides), fertilizer, and seeds and lack of guarantee are among of the outcries of most of the farmers. The purchased farming inputs are reported not to function accordingly as per their prior communicated efficacy. For instance, very highly priced seeds claimed to be hybrid could be purchased and grown by following all the instructions but only to find poor fruits during harvest. One farmer-respondent in Image No. 7 village-Kilolo district in Iringa region was quoted saying

“The first release of seed brand sometimes gives best results, however, as time goes on, the same brand’s yield declines, for instance, the case of Rio-grande tomato seeds”.

He continued:

“Moreover, some other inputs may be released by manufacturers for the first time and when used by farmers they give best results. However, when farmers want to rebuy them, they encounter an out-of-stock situation. For instance, it happened with Profecron insecticide”.

Some farmers are also found disconnected from upstream suppliers as the result, they blame suppliers of farm inputs for their failures to advise them on the best ways of using the agricultural inputs they sell.

The farmers also blame the contractors for being opportunists in setting unfavourable prices in CF agreements in case the farmers are contracted for farming tomatoes by receiving farming inputs and/or money for the same from traders or food processors to be returned after tomato harvest.

The NGOs, banks and/any other financial institutions like VICOBA and SACCOS are blamed by the farmers for their high-interest charge on borrowed money by farmers. One

farmer in Iringa region was quoted blaming “MUVI” - an NGO that provides training to the farmers and assisting them in market search, saying:

“MUVI went to collect tomato from farmers at a low price and they took the tomatoes to DARSH factory for sale at a high price”.

Farmers blame their input suppliers for using faked weights and measures, hence the farmers paying for uncollected goods, for example fertilizer packed in a full bag purported to weigh 50 kilograms while already reduced for 1 or 2 kilograms by unfaithful suppliers but sold as if full. Moreover, the farmers blame Seed Companies which they sign contracts to work with. Farmers’ blames, in this case, include the delayed release of seed to farmers in the growing season; lack of transparency between farmers and seed companies as explained in the following scenario: “The farmer may weigh seeds at home and get a certain quantity in kilograms. However, when he takes it to the seed companies, and reweigh, the latter gets fewer kilograms than before. When asked for the reason for the variation, the seed companies claim that they sort it first before weighing, hence the initial weight is reduced by the sorted-out impurities and the farmer gets paid less amount than expected”. Other farmers’ blame to the seed companies include “contract agreements do close opportunities for other best potential buyers or markets”. A blame by farmers to DARSH-food processor is the act of the latter of buying tomatoes from the former through agents who are not honest.

ii) Wholesalers

By considering the challenges faced by tomato wholesalers, their blames to other members are directed to the farmers for cheating in tomato grading, farmers unfaithfulness when assisted with capital for farming and delays in product delivery after being paid in advance. Other wholesalers’ blames are directed to their downstream customers for delaying payment after product delivery. Sometimes the buyers completely default to pay hence the need to be considered bad debts. Moreover, wholesalers blame the processors for unreliable market and price they offer in buying tomato as raw materials for their factories. The wholesalers blame transporters for charging high transportation costs that are adding to their operational costs. The wholesalers blame the government for many reasons including poor road conditions in some production areas, hence causing delays as well as increased

PHLs; failure by the government in improving untidy market environments where agricultural food products like tomatoes are transacted – despite the taxes collected from the traders and excessive roadblocks by traffic police leading to delays and possibilities for PHLs. Banks and other financial institutions are blamed for their reluctance in giving loans to tomato wholesalers.

iii) Brokers

The brokers blame their upstream suppliers: farmers and/or wholesalers for the cheating in tomato grades and weights and measures. They also blame the farmers for being unfaithful when assisted financially in their farming activities under the condition of the former selling their products to the broker. Brokers also blame their customers for delayed payments after being supplied with the goods – tomatoes. The brokers go to the extent of blaming their fellow brokers for lack of trust. The issue of excessive roadblocks by traffic police is also reported as a problem to the government plus the presence of numerous taxes as tomato products are exchanged from one actor to another and also the issue of unfriendly untidy market environments.

iv) Tomato retailers

The tomato retailers also complain and blame their upstream suppliers in the issues of tomato grading, weights and measures, their suppliers – mostly brokers' dictatorship in buying and selling tomatoes, and unfaithful/opportunistic transporters. The issue of numerous taxes charged to the traders as well as a failure by government to maintain the urban markets hygienically are some of the retailers blames to the government. The retailers also blame their customers for being too much demanding in terms of quality of the tomatoes they sell and buyers delay in settling their dues after being supplied with tomatoes on credit.

v) Input suppliers (retailers)

The input suppliers blame their upstream suppliers for supply of counterfeit farm inputs and difficulty in farm input availability. On the other hand, input suppliers blame their downstream customers (farmers) for their low purchasing power and delayed payment after product collection.

vi) Transporters

The transporters blame their customers' delay and/or default in paying transportation costs, and for the countless follow-ups (by mobile phones) - traceability on the drivers' whereabouts by consignee and/or consignor. The trucks' drivers are also accusing their employers for the latter's failure to offer former-driving-employment-contracts hence, making their jobs insecure.

vii) Processors

The processors blame the government for its several bodies such as TFDA, TBS and OSHA (Occupational Safety and Health Administration) for their practice of requesting the processor to seek for individual approval/certification at a certain substantial fee amount per year. Also, the processors blame the farmers for their unreliability in supplying raw materials – tomato for processing.

6.5.2.3 Actors' perception of the benefits of relationships amongst TSC actors

Supply/value chain competitiveness depends on how the actors of that particular supply/value chain cooperate with each other. Based on this fact, the primary actors of the TSC were asked a question to rank the four given SC relationship statements by using a 5-point Likert scale from strongly agree to strongly disagree. The statements included the following: There are benefits to all partners if the good relationship with each other is maintained; Good TSC relationships result in high-profit-margin to producers; Good TSC relationships result in increased sales at each stage; and Good TSC relationships generate high-value-added products.

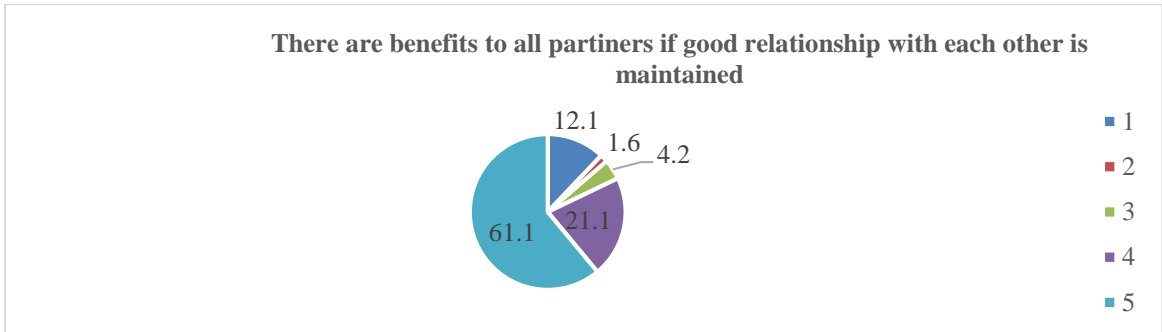
Results from tomato farmers, wholesalers, brokers, retailers and input suppliers on their perceptions of each benefit of the relationship were obtained and summarized as follows.

6.5.2.4.1 There are benefits to all partners if the good relationship with each other is maintained

Based on the nature of the data such as ordinal in nature, "mode" was used as a measure of central tendency. By looking at the mode which is 5, it is generally evident that most respondents ranked high on the relational statement. Results show that all the respondents in all the respondents' categories ranked the statement with "strongly agree" followed by

few “agree” and very few disagree. This can clearly be seen after combining strongly agree/agree and strongly disagree/disagree whereby (82.2%) of the respondents agreed and only a few (13.7%) disagreed. A pie chart in Figure 6.35 below provides a clearer view of the actors’ rankings and figure 6.36 below depicts for its corresponding bar chart.

Figure 6. 35: Pie Chart: There are benefits to all partners



Key: 1-Strongly disagree; 2-disagree; 3-not sure; 4-agree; 5-strongly agree

Figure 6. 36: Bar Chart: There are benefits to all partners



Discussion: From Figure 6.36 above, of all the TSC actors, brokers and wholesalers were found to believe more in a relationship with other players than the rest of the players. This behaviour can be attributed to the traders’ understanding of the need to collaborate as Noemi (2013) puts forward “the main objective of the members of an SC is to satisfy customer demands in the interest of which they cooperate with each other: 131-134”. On the contrary, the farmers are found not to believe much about the gained benefits from maintaining good relations with each other. When the farmers were asked about the reasons

for having less expected benefits from relationships, most of them were referring to their own worse past experiences. One farmer in Kalenga village in Iringa was quoted saying:

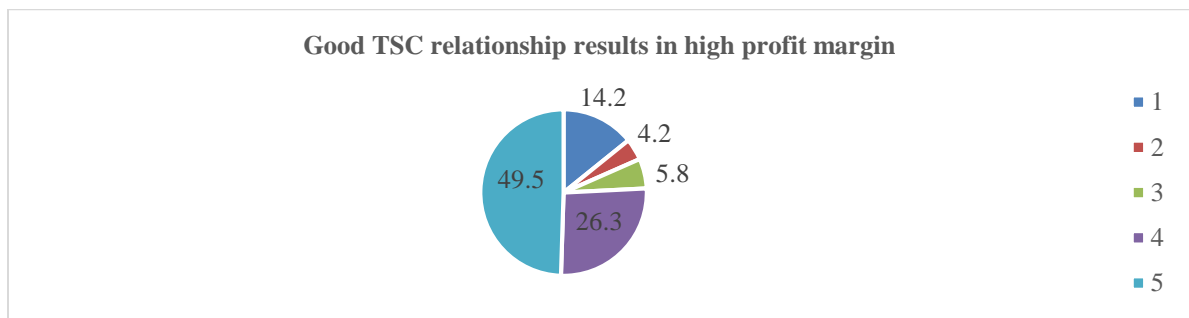
“Cooperative union have a very bad experience in Iringa-Kalenga to an extent that no one wishes to join unless the government gives mobilization and awareness seminars.”

However, such failed relationships in the past were not economical relationships as they were based on the failed socialist economy in Tanzania whereby all major economic activities were put under the control of the government.

6.5.2.4.2 Good TSC relationships result in high-profit-margin to producers

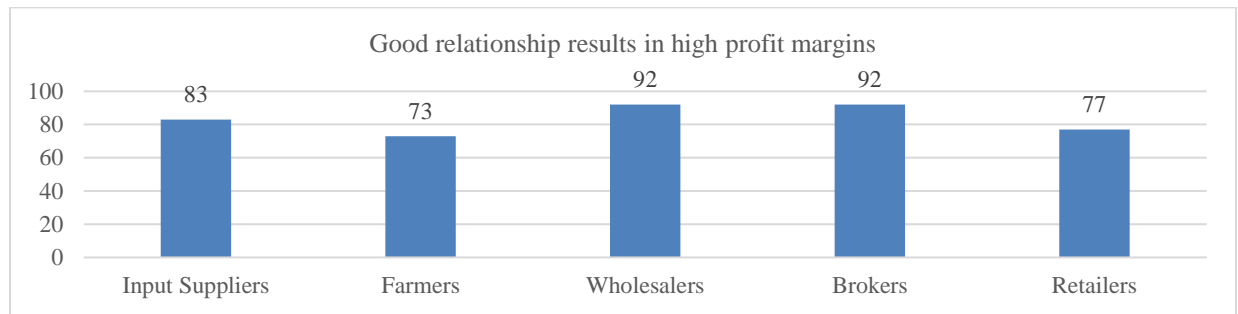
In ranking the relational statement “Good TSC relationships results in high-profit-margin to producers”, results from the SC actors show a mode of five (5). This means, the scale: ‘strongly agree’ was dominant than the other scales. A clearer picture can be seen after combining strongly agree/agree and strongly disagree/disagree whereby (75.8%) of all the actors strongly agreed, only (18.4%) of them disagreed and (5.8%) were not sure. A pie chart below – Figure 6.37 provides a good pictorial view and Figure 6.38 below depicts its corresponding bar chart.

Figure 6. 37: Pie Chart: Good TSC relationship results in a high-profit margin



Key: 1-Strongly disagree; 2-disagree; 3-not sure; 4-agree; 5-strongly agree

Figure 6. 38: Bar Chart: Good TSC relationship results in high-profit-margin

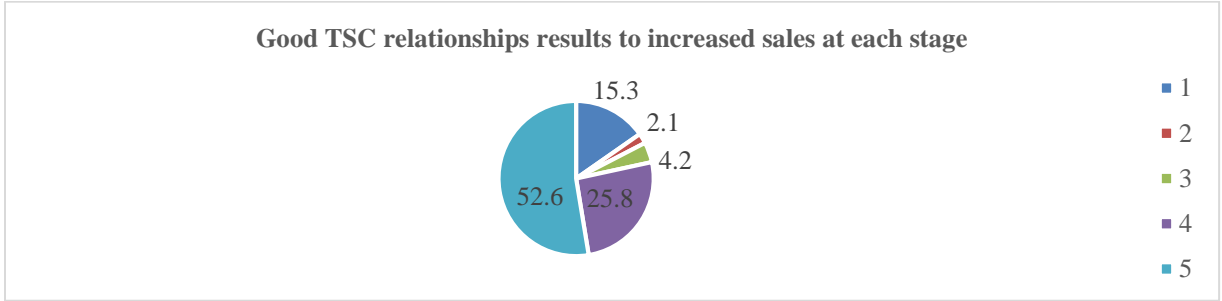


Discussion: Looking at Figure 6.38 above, again the farmers (73%) compared to other actors are found not to believe much about relationships and its contribution to high-profit margins. However, results show that the traders especially the wholesalers (92%) and brokers (92%) have a high belief in the contribution of a good relationship to maximizing profit margins. However, according to Mwangi (2015) traders' higher profit margin is attributed to economies of scale such as traders handle more volume of tomatoes – as they collect from different farmers than farmers who are limited to their own-grown tomatoes. Likewise, Xaba and Masuku (2013), associated high-profit margin with the possibility of exploitation of producers or consumers or a justification of the intermediaries of getting high profit.

6.5.2.4.3 Good TSC relationships result in increased sales at each stage

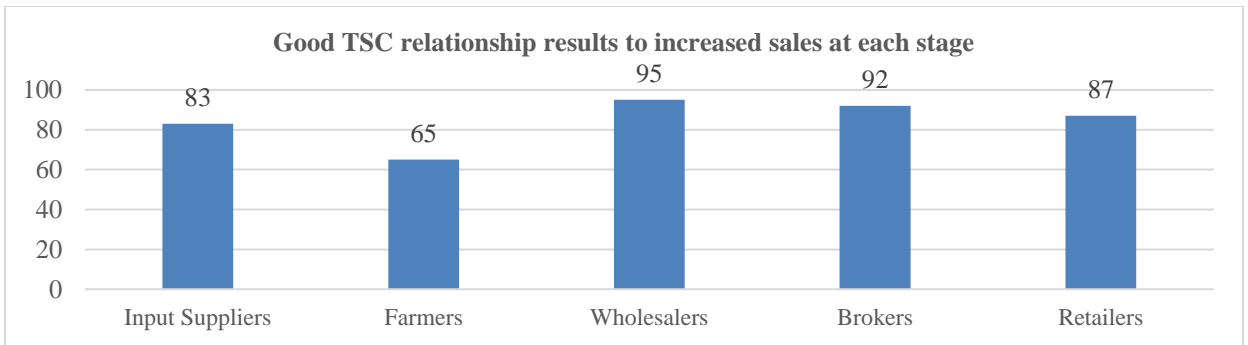
In ranking whether or not the relational statement “Good TSC relationships results in increased sales at each stage”, a mode was used. After the analysis, a mode of 5 was found out that means, all the TSC actors strongly agreed with the statement and the ranking scale was more skewed to 5 than any other scale. After combining the strongly agree/agree and strongly disagree/disagree the results show that (88.4%) of all the actors agreed with the statement while (17.4%) of them disagreed and (4.2%) were not sure. A pie chart in Figure 6.39 below was then drawn for a clearer view of the actors' rankings and Figure 6.40 below for its corresponding bar chart.

Figure 6. 39: Pie Chart: Good TSC relationship results in increased sales



Key: 1-Strongly disagree; 2-disagree; 3-not sure; 4-agree; 5-strongly agree

Figure 6. 40: Bar Chart: Good TSC relationship results in increased sales



Discussion: By looking at Figure 6.40 above and by comparing farmers and traders, the traders such (wholesalers, brokers and retailers) highly associate increased sales with good relationship than farmers. These results are in agreement with Plazibat et al., (2016) who said single producers cannot meet exporters’ and large retailers’ requirements in terms of sales volumes. Thus, it can be argued that, if farmers want to increase sales, they have to first collaborate together with other farmers so as to raise their bargaining power or volume as Mwangi (2015) puts it, hence, increased sales. Moreover, the great appreciation of input suppliers that good relationship results to increased sales can be attributed by some special arrangements between buyers and suppliers of farming inputs as one seller in one of the agro-inputs in Ilula area is quoted admitting that:

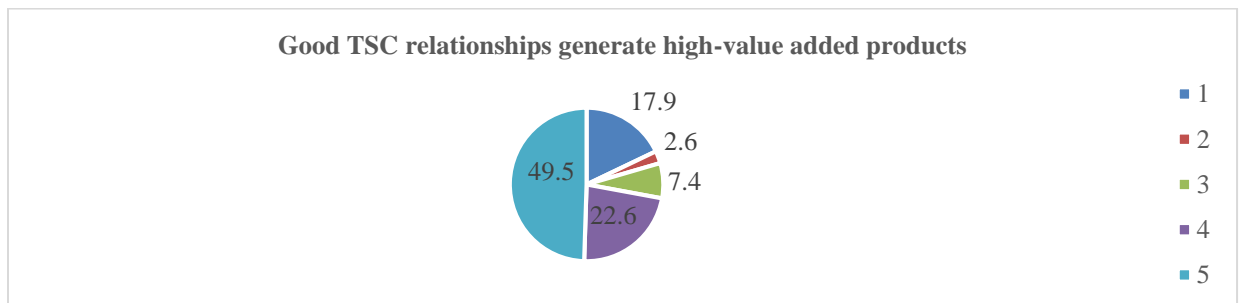
“There are seed and other agro-input companies which supply their agricultural inputs directly to our last-mile-village shops for example Positive International Limited of Arusha, ETG Inputs Ltd, Balton Tanzania, Bytrade Tanzania Ltd, Suba Agro-Trading &

Engineering Co. Ltd (SATEC)...in this case, our duty is to sell and their duty is to make sure that they replenish their stocks whenever we request, but also they have their own scheduled distributions. As such, we normally don't experience any out-of-stock situations, consequently our customers have built trust in us and our sales have also increased”

6.5.2.4.4 Good TSC relationships generate high-value-added products

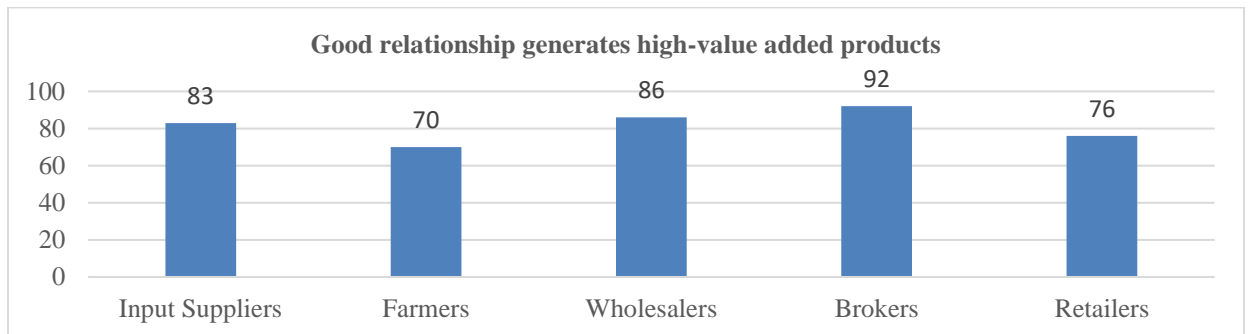
The TSC actors ranked the relational statement “Good TSC relationships generate high-value-added products” by using 5-points Likert scale and a mode of 5 was found. This means, on average, all the five TSC actors strongly agreed with the statement. After combining the two extreme scales of strongly agree/agree and strongly disagree/disagree, results show that (72.1%) of all the respondents agreed, (20.5%) disagreed and (7.4%) were undecided. A good pictorial view of these results is shown in Figure 6.41 below and its corresponding bar chart on Figure 6.42 below.

Figure 6. 41: Pie Chart: Good TSC relationship generate high-value-added products



Key: 1-Strongly disagree; 2-disagree; 3-not sure; 4-agree; 5-strongly agree

Figure 6. 42: Bar Chart: Good TSC relationship generate high-value-added products



Discussion: By looking at the bar chart above, farmers when compared to traders they lag behind in terms of the potential benefits – “generating high-value-added products”

emanating from a good relationship. However, farmers cannot afford to isolate themselves from the TSC because their value-creating activities should be linked to other players to generate greater value than they can individually (NIAEM, n.d). On the other hand, the traders’ especially the brokers’ and wholesalers’ results above indicate that they know the advantages of collaboration that is why they have higher expectations in the contribution of relationship to generating high-value-added products.

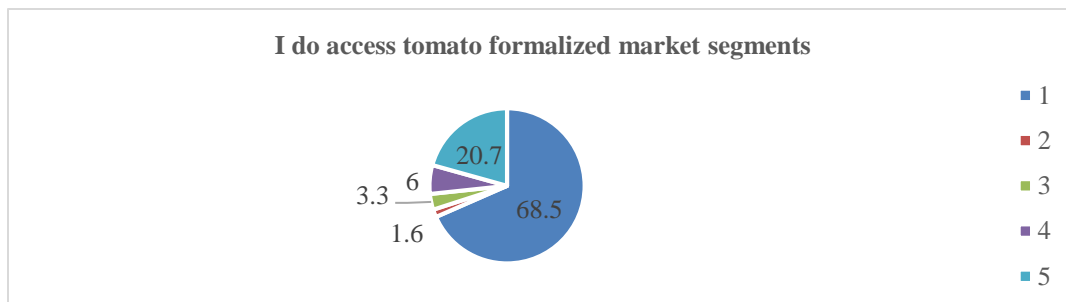
6.5.2.5 Access to more formalized tomato market segments

Four categories of respondents: farmers, wholesalers, brokers and retailers were asked to rank by using 5-point Likert scale the statement “I do access tomato markets to a more formalized markets such as supermarkets, exporters, hotels and fresh agro-processors”

Testimony in accessing these formalized markets are summarized hereunder.

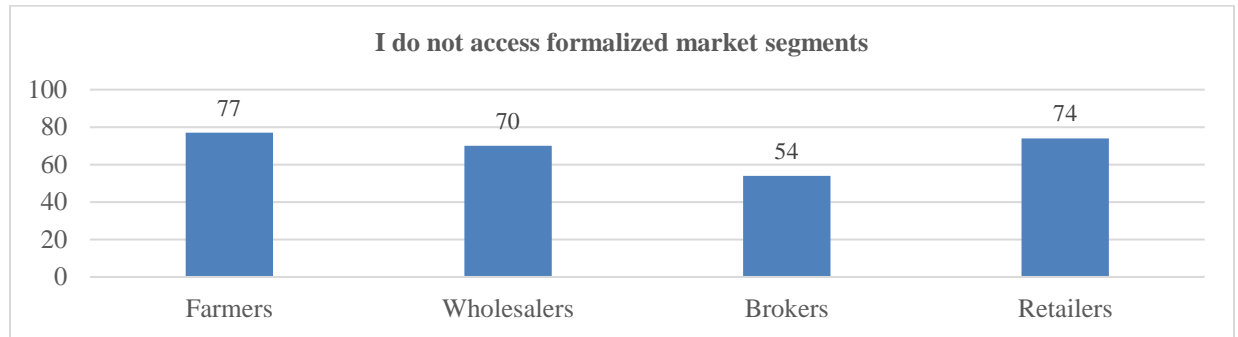
A mode of (1) was noted, signifying that most of the respondents strongly disagreed with the statement. By combining the two extreme scales on both sides such as strongly agree/agree and strongly disagree/disagree, the results showed that (26.7%) of all the respondents agreed whereby (70.1%) of them disagreed and (3.3%) were not sure of the statement. A pie chart in Figure 6.43 below shows clearly the actors’ ranking in a pictorial view. Figure 6.44 shows its corresponding bar chart.

Figure 6. 43: Pie Chart: I do access tomato formalized market segments



Key: 1-Strongly disagree; 2-disagree; 3-not sure; 4-agree; 5-strongly agree

Figure 6. 44: Bar Chart: I do not access tomato formalized market segments



Discussion: From the bar chart above, when compared with traders, farmers lag behind in accessing formalized market segments such as supermarkets, exporters, hotels, and fresh agro-processors. Like farmers, the retailers also lag behind in accessing formalized markets. The tomato farmers and the tomato retailers have one thing in common which is a big number of uncoordinated individual players. One farmer in Arusha region was quoted saying:

“Special markets? These are for greenhouse tomatoes and I know them, they include Nakumat Supermarket and Home Vege (for export). However, these markets are sensitive to Global GAP of which we are not empowered.”

It can, therefore, be generalized that, choice of suppliers in more formalized market segments does not favour choosing from a big number of uncoordinated individual suppliers (like small-scale tomato farmers and tomato retailers), but would like to source from few coordinated suppliers like wholesalers and brokers. These results are in line with Vorley, et al., (2008) who said that purchasing from a large number of fragmented small-scale farmers entails incurring high transaction costs. Moreover, a large number of fragmented small-scale farmers are perceived to have less technical skills – hence, unable to produce the right products at the right time and by maintaining consistency, also not reliable in honouring trading agreements (ibid).

6.5.2.6 Major limiting factors to accessing the formalized market segments

As follow-up question to the answers given in section 6.5.2.6 above, the respondents were asked to rank for the major limiting factors in accessing the more formalized market segments such as supermarkets, exporters, hotels and fresh agro-processors. The given

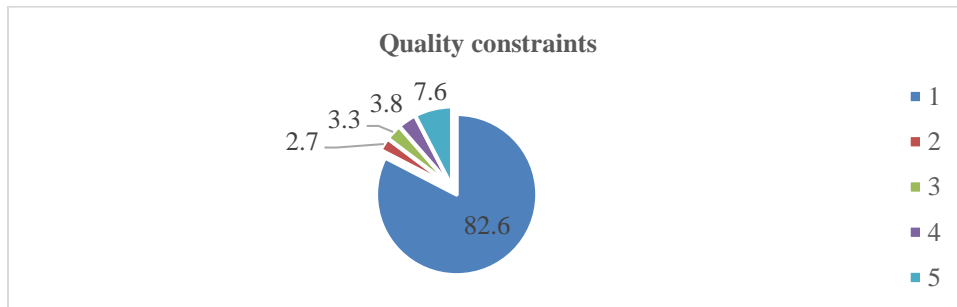
major limiting factors for ranking were: 1. Quality constraints, 2. Quantity constraints, 3. Seasonality constraints, and 4. Location constraints.

After processing respondents' data, the following were the results.

6.5.2.6.1 Quality constraints

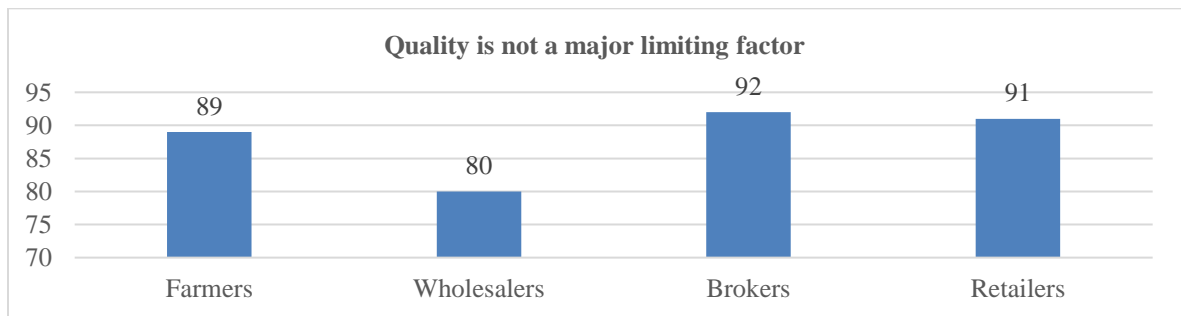
After summarizing the results for ranking “quality constraints” by four actors of the TSC, a mode of 1 was obtained which means, most of the respondents (farmers, wholesalers, brokers and retailers) voted for strongly disagree. Even after combining the scores in the two extreme sides: strongly agree/agree and strongly disagree/disagree, still, those who disagreed were many (85.3%) compared to those who agreed (11.4%) only and (3.3%) were not sure. A pie chart was then drawn on Figure 6.45 below to clearly depict the scale ratings for a quality constraint as perceived by the actors and Figure 6.46 shows its corresponding bar chart.

Figure 6. 45: Quality Constraints



Key: 1-Strongly disagree; 2-disagree; 3-not sure; 4-agree; 5-strongly agree

Figure 6. 46: Quality is not a major limiting factor

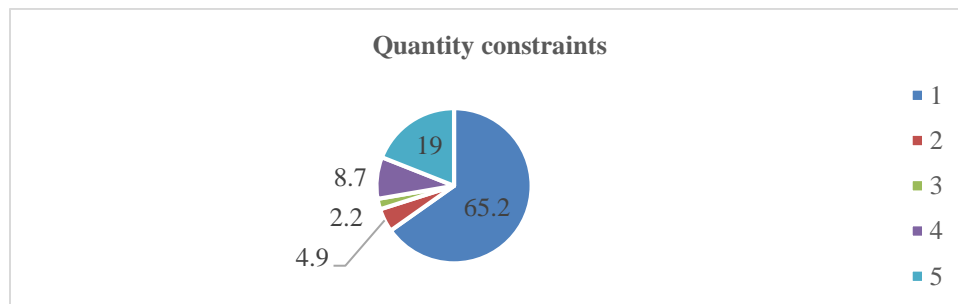


Discussion: From Figure 6.46 above, although, all the four players are overconfident about the quality of their products, however, brokers and retailers are more confident than wholesalers and farmers. It is generally acknowledged that access to more formalized market segments such as supermarkets, exporters, hotels and fresh agro-processors is advantageous to small-scale farmers. Unlike wet markets, formalized markets are highly lucrative, however, they focus exclusively on the quality of the products (Cadilhon, et al., 2006).

6.5.2.6.2 Quantity constraints

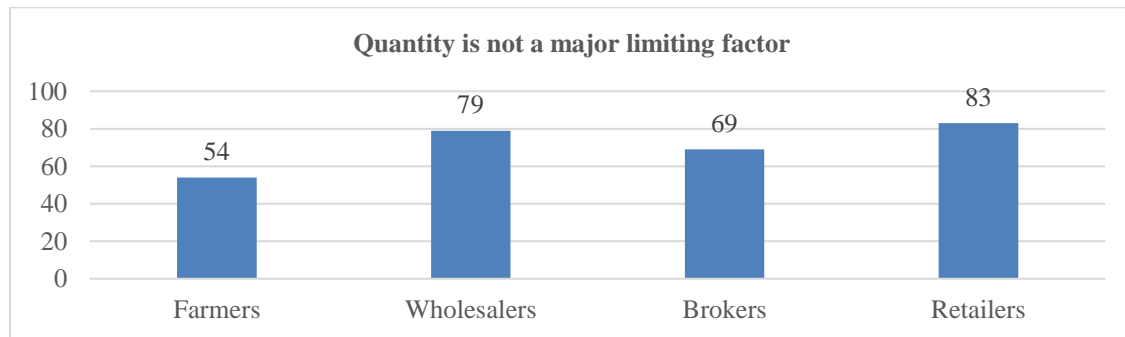
After summarizing the results for ranking “quantity constraints” by the four actors of the TSC, a mode of 1 was obtained which means, most of the respondents voted for strongly disagree. Even after combining the scores in the two extreme sides: strongly agree/agree and strongly disagree/disagree, still, those who disagreed were many (70.1%) compared to those who agreed (27.7%) only and (2.2%) were not sure. A pie chart was then drawn on Figure 6.47 below to clearly depict the quantity scale ratings and subsequently Figure 6.48 shows its corresponding bar chart.

Figure 6. 47: Quantity Constraints



Key: 1-Strongly disagree; 2-disagree; 3-not sure; 4-agree; 5-strongly agree

Figure 6. 48: Quantity is not a major limiting factor

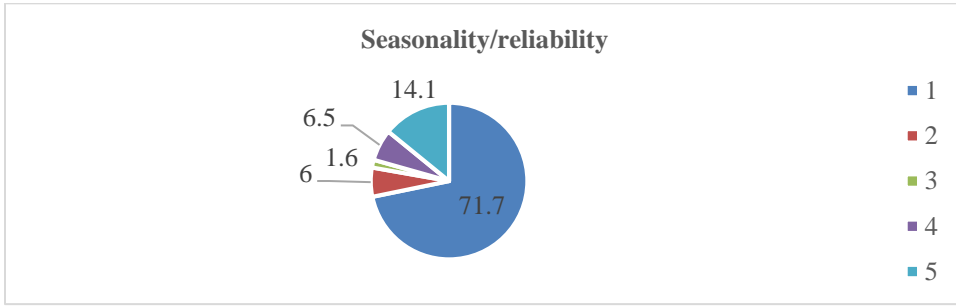


Discussion: By considering the bar chart in Figure 6.48 above, the farmers were found to have more doubt (54%) on their ability in terms of quantity to supply to the special markets. This can be attributed by the individual acre sizes farmed by individual farmers in a particular season. According to MUVI-SIDO (2009), in average tomato farmers grow tomatoes on a five-acre size land. The farmers they also report some instances of total loss of a complete farm in some seasons due to pests and diseases and other acts of nature like excessive droughts and/or rainfall. With traders, things are different because of the fact that traders are able to go and collect tomatoes from any region in the country and even by importing from neighbouring countries in case of shortage of domestically grown tomatoes. Retailers are the most confident players in terms of quantity; however, this confidence is dependent on the fact that, wholesalers and brokers have never let them down.

6.5.2.6.3 Seasonality constraints

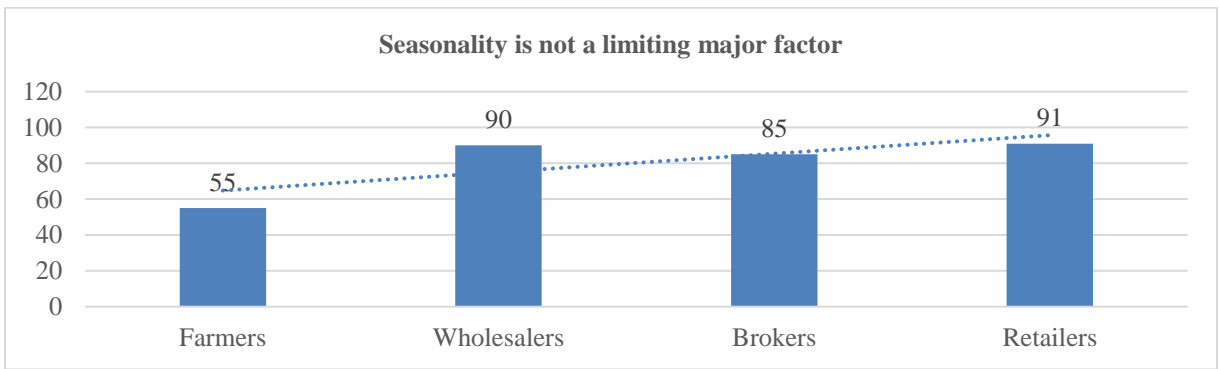
After summarizing the results for ranking seasonality/reliability constraints by farmers, wholesalers, brokers and retailers, a mode of 1 was obtained which means, most of them voted for strongly disagree. Even after combining the scores in the two extreme sides: strongly agree/agree and strongly disagree/disagree, still, those who disagreed were many (77.7%) compared to those who agreed (20.6%) only and (1.6%) were not sure. A pie chart was then drawn on Figure 6.49 below and subsequently Figure 6.50 shows its corresponding bar chart.

Figure 6. 49: Seasonality/reliability constraints



Key: 1-Strongly disagree; 2-disagree; 3-not sure; 4-agree; 5-strongly agree

Figure 6. 50: Seasonality is not a limiting major factor



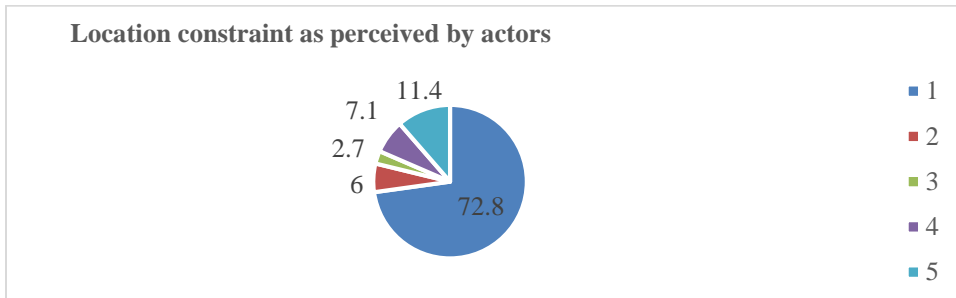
Discussion: By looking at Figure 6.50 above, seasonality in production of tomatoes is more acknowledged by farmers than traders. This is due to the fact that most of the surveyed farmers depend on rainfall in growing tomatoes because they cannot afford greenhouse and/or irrigated farming due to lack of capital. On the other hand, the traders especially wholesalers and brokers don't have a season since they travel all over the country to fetch tomatoes depending on the national and regional seasons. According to MMA (2017), Tanzania's tomato peak season/availability is throughout the year except for November and December.

6.5.2.6.4 Location constraints

After summarizing the results for ranking location constraints by the farmers, wholesalers, brokers and retailers, a mode of one (1) was obtained which means, most of the respondents voted for strongly disagree. Even after combining the scores in the two extreme sides: strongly agree/agree and strongly disagree/disagree, still, those who disagreed were many

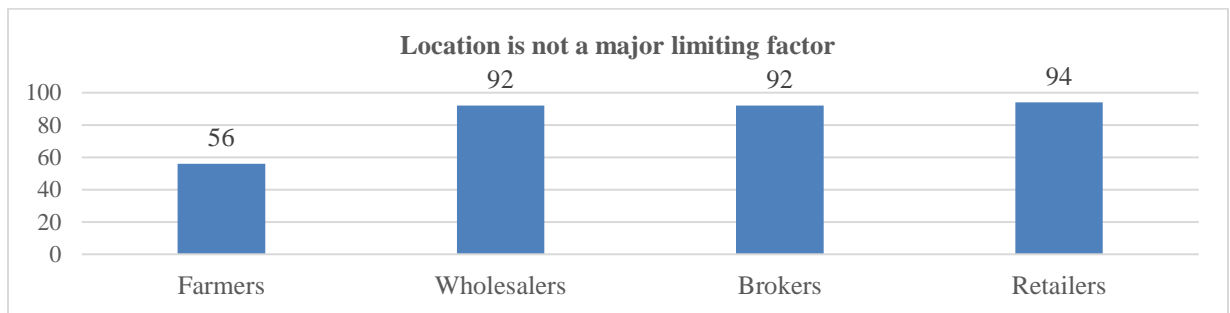
(78.8%) compared to those who agreed (18.5%) only and (2.7%) were not sure. A pie chart was then drawn on Figure 6.51 below and Figure 6.52 shows its corresponding bar chart.

Figure 6. 51: Location constraints as perceived by actors



Key: 1-Strongly disagree; 2-disagree; 3-not sure; 4-agree; 5-strongly agree

Figure 6. 52: Location is not a major limiting factor



Discussion: By referring to the bar chart above, the farmers unlike traders, are more worried by location in accessing more formalized markets. This is due to the fact that production of tomatoes by small-scale farmers is conducted in the villages where road networks are not good whereas, the formalized markets such as supermarkets, exporters, hotels and fresh agro-processors are mostly located in urban areas and/or along the highways. It is for instance, very difficult for a farmer from Nzihi village in Iringa rural to access the tomato market at Ivori Industry processing plant located in Iringa Municipality (MUVI-SIDO, 2009). In the case of tomato traders, location is not a problem for them, because they are capable economically, they own and/or hire trucks to carry tomatoes from production areas to the urban market. This is justified by most of the interviewed transporters who said their vehicles are dedicated to transporting tomatoes from production areas depending on the season to domestic markets as well as markets in the neighbouring countries.

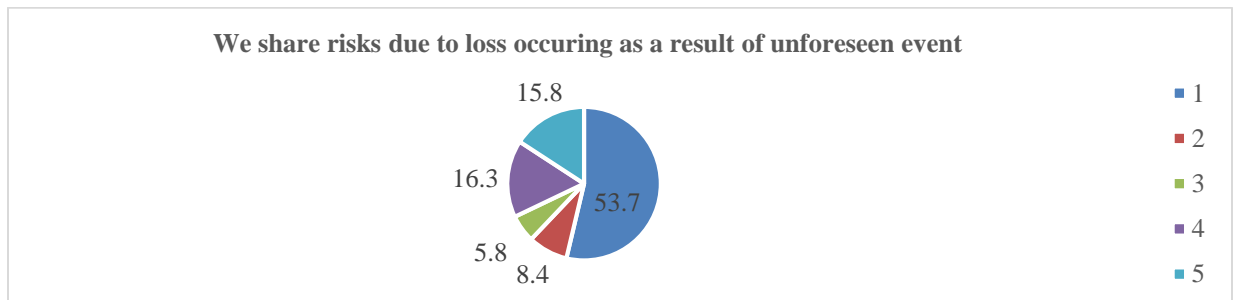
6.5.2.7 Collaboration aspects by SC actors

The four primary TSC actors were asked to rank three statements related to collaboration aspects of risk sharing, resource sharing and assisting others. A 5-point Likert scale, 1 to 5, strongly disagree to strongly agree respectively was used. The respondents' findings for each statement are presented hereunder.

6.5.2.7.1 We share risks due to loss occurring as a result of an unforeseen event

After summarizing the results for ranking the statement “We share risks due to loss occurring as a result of the unforeseen event”, a mode of 1 was obtained which means, most of input suppliers, farmers, wholesalers and retailers voted for strongly disagree with exception case in brokers. Even after combining the scores in the two extreme sides: strongly agree/agree and strongly disagree/disagree, still, those who disagreed were many (62.1%) compared to those who agreed (32.1%) only and (5.8%) were not sure. A pie chart was then drawn on Figure 6.53 below to clearly depict the scale ratings. Then, Figure 6.54 below shows the corresponding bar chart.

Figure 6. 53: We share risks as a result of unforeseen events



Key: 1-Strongly disagree; 2-disagree; 3-not sure; 4-agree; 5-strongly agree

Figure 6. 54: We don't share risks

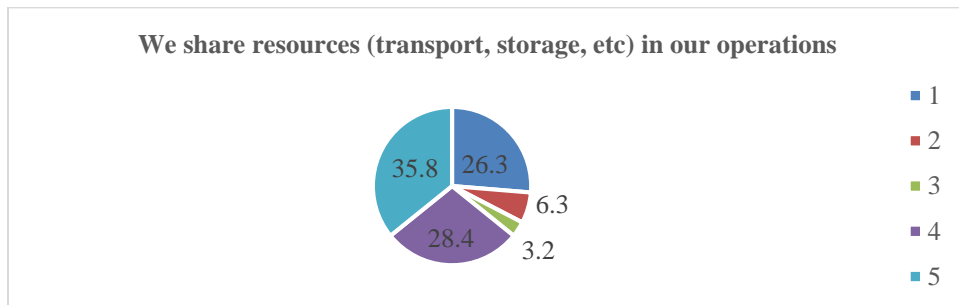


Discussion: Risk sharing is one of the characteristics of SCM. Findings above show that brokers (85%) share risks more than any other actors followed by wholesalers (46%). According to Basole and Bellamy (2014), it can be summed up here that, brokers and wholesalers in the TSC in Tanzania are best positioned to diffuse risks among the SC actors whereas farmers and other actors are positioned to suffer the risk consequences.

6.5.2.7.2 We share resources (transport and storage) in our operations

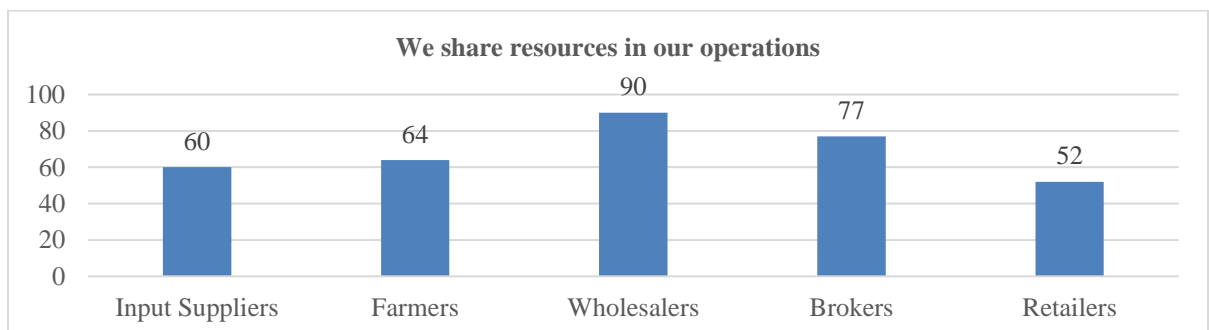
After summarizing the results for ranking the statement “We share resources (transport and storage) in our operations”, a mode of 5 was obtained which means, most of the input suppliers, farmers, wholesalers, brokers and retailers voted for strongly agree. Even after combining the scores in the two extreme sides: strongly agree/agree and strongly disagree/disagree, still, those who agreed were many (63.2%) compared to those who disagreed (32.6%) only and (3.2%) were not sure. A pie chart was then drawn in Figure 6.55 to show how resources are being shared amongst actors. Then Figure 6.56 below shows its corresponding bar chart.

Figure 6. 55: Pie Chart: We share resources in our operations



Key: 1-Strongly disagree; 2-disagree; 3-not sure; 4-agree; 5-strongly agree

Figure 6. 56: Bar Chart: We share resources in our operations

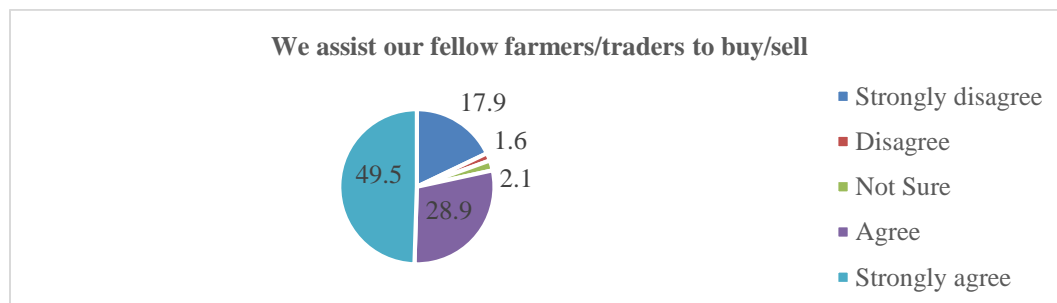


Discussion: By referring to the bar chart above, wholesalers are found to share more resources than any other players in the TSC. The shared resources include transport, storage facilities, and packaging materials. The brokers are found at second place in sharing resources with their fellow brokers followed by farmers (64%), input retailers (60%) and finally retailers (52%). The benefits gained by leveraging resources through the collaboration of chain actors are higher than if each party operates independently. Such resources referred here include production equipment, facilities, and technology. (Cao and Zhang, 2011). The retailers are found to lead in terms of less sharing of resources. Actually, tomato retailers are competitors and they sit side by side at the marketplace. Thus, they compete in getting customers. For the case of farmers, resources are shared by 64% and the examples of the shared resources include water pumps for irrigation purposes, spray pumps, digging of ponds for crop-watering, inter alia.

6.5.2.7.3 We Assist our fellow farmers/traders to buy inputs/goods or selling their produce

A mode of 5 was obtained which means, most of the input suppliers, farmers, wholesalers, brokers and retailers voted for strongly agree. Even after combining the scores in the two extreme sides: strongly agree/agree and strongly disagree/disagree, still, those who agreed were many (78.4%) compared to those who disagreed (19.5%) and (2.1%) were not sure. A pie chart was then drawn on Figure 6.57 below and its corresponding bar chart in Figure 6.58 below.

Figure 6. 57: Pie Chart: We assist our fellow to buy/sell



Key: 1-Strongly disagree; 2-disagree; 3-not sure; 4-agree; 5-strongly agree

Figure 6. 58: Pie Chart: We assist our fellow to buy/sell



Discussion: By looking at the results depicted on Figure 6.57 above, tomato brokers are the most players who declare a low interest in assisting their fellow brokers in buying or selling. One of the brokers is quoted shouting:

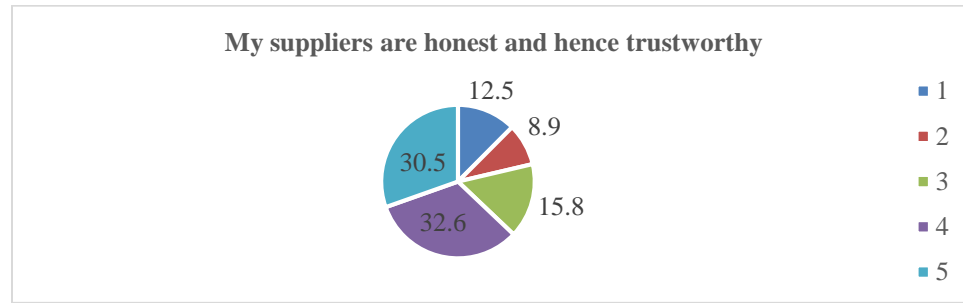
“So, I buy for someone or sell for someone, how about my products”?

This is an indication of this broker’s opportunistic behaviour. For the case of farmers, the chances of assisting their fellow farmers to buy (farming inputs) are high than that of assisting their fellow farmers to sell (tomatoes). However, assisting to sell is possible when a farmer doesn’t have to sell or the buyer shows signs of dissatisfaction of the quality of tomato of this particular farmer.

6.5.2.8 My Suppliers are honest and hence trustworthy

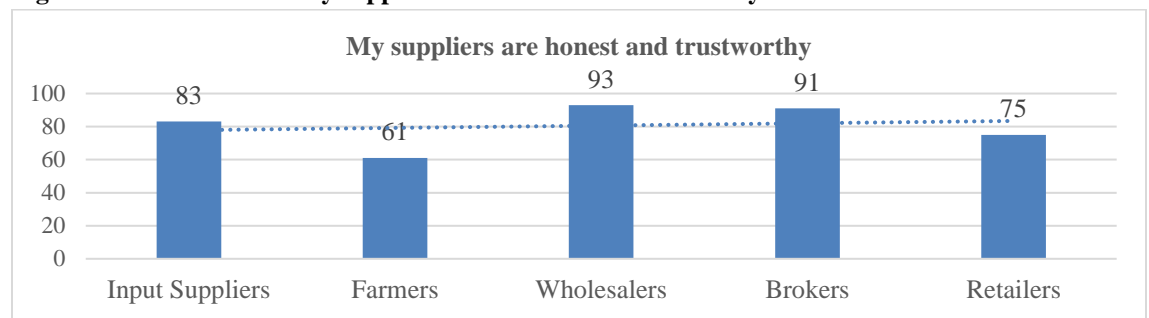
The respondents: input suppliers, farmers, wholesalers, brokers and retailers were asked to rank using 5 points Likert scale 1 to 5 the statement “My suppliers are honest and hence trustworthy”. After the analysis, a mode of 4 was obtained which means, most of the respondents voted for ‘agree’. Even after combining the scores in the two extreme sides: strongly agree/agree and strongly disagree/disagree, still, those who agreed were many (63.1%) compared to those who disagreed (21.4%) only and a somehow greater number of respondents (15.8%) were not sure. A pie chart was then drawn on Figure 6.59 below to clearly depict the scale ratings. Figure 6.60 below is its corresponding bar chart.

Figure 6. 59: Pie Chart: My suppliers are honest and trustworthy



Key: 1-Strongly disagree; 2-disagree; 3-not sure; 4-agree; 5-strongly agree

Figure 6. 60: Bar Chart: My suppliers are honest and trustworthy



Discussion: By looking at the bar chart above, out of all the TSC actors, farmers are the most dissatisfied players with regards to the level of honesty of their suppliers. One farmer is quoted at Maweni Village in Arusha region where seed companies subcontract farmers to grow tomatoes for these Seed companies saying:

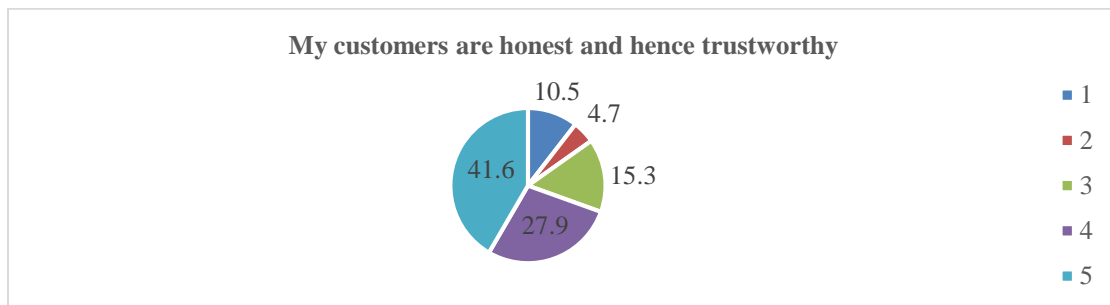
“Honest suppliers are only those which issue contract to us, the rest are not honest at all”.

In fact, farmers are found to have a very bad experience with the suppliers of inputs. Apart from buying the farming inputs such as seeds, fertilizers, chemicals – pesticides and fungicides at very high prices, the efficacy of these inputs is not very good. Incidences of a farmer buying highly-priced inputs in anticipation of good return but which turn oppositely are reported. Moreover, some cheatings on weights and measures are reported by the farmers, hence, exacerbating the level of untrusting the suppliers. The retailers are also complaining about their suppliers in such aspects like quality, price and the like, however, they don’t have much alternative to do rather than buying from the middlemen, however, given any chance of buying directly from farmers, they effectively use it.

6.5.2.9 My customers are honest and hence trustworthy

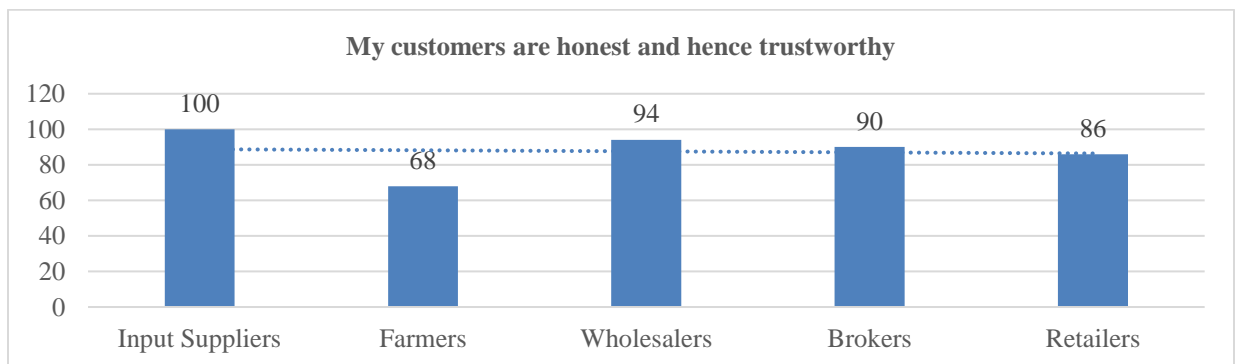
The input suppliers, farmers, wholesalers, brokers and retailers were asked to rank using 5 points Likert scale 1 to 5 the statement “My customers are honest and hence trustworthy”. After the analysis, a mode of 5 was obtained which means, most of the respondents voted for ‘strongly agree’. Even after combining the scores in the two extreme sides: strongly agree/agree and strongly disagree/disagree, still, those who agreed were many (69.5%) compared to those who disagreed (15.2%) only and a somehow greater number of respondents (15.3%) were not sure. A pie chart was drawn on Figure 6.61 below to clearly depict the scale ratings. Figure 6.62 below the corresponding bar chart.

Figure 6. 61: Pie Chart: My customers are honest and trustworthy



Key: 1-Strongly disagree; 2-disagree; 3-not sure; 4-agree; 5-strongly agree

Figure 6. 62: Bar Chart: My customers are honest and trustworthy



Discussion: From the pie chart above, of all the TSC actors, farmers lead in distrusting their customers. Many reasons can be attributed to these findings. First, the farmers sometimes are financed by the middlemen (brokers and wholesalers) during farming whereby, the former gets soft loans in cash for the farming inputs or the middlemen supply

the farmers with farming inputs as per farmers' choice. The condition for this assistance is that, when tomatoes are ready for harvest, the farmer will sell to the respective financing middleman. However, farmers are complaining of the very low prices offered by these middlemen compared with the available market prices. Secondly, farmers are the most disadvantaged actors in terms of access to capital, and therefore cannot afford to hire trucks for taking their crops to urban markets. Even when they are able, the traders in the urban markets have their own associations and curtails and they don't allow farmers to sell their crops direct. Thus, for a farmer who dares to take tomatoes direct to urban markets, upon arrival, has to look for a registered broker or wholesaler to facilitate the selling, however at a certain commission. When a farmer calculates the profit after deducting all the costs related to direct selling including transportation costs, handling costs, living costs, as well as market broker's commission, the chances for earning more than what was to be earned by selling to the middlemen at the farm gate, are lower. This is why most farmers sell their tomatoes within their localities, however, not by choice but by force due to unfavourable conditions instituted at urban wholesale markets.

6.5.2.10 TSC actors' interaction with supporting (secondary) SC actors

In identifying farmers' interaction with supporting (secondary) SC actors, a multiple-choice question was posed whose choices included eight supporting (secondary) SC actors as follows: NGOs, Donor agencies, Banks, Microfinance actors (for example SACCOS), Agricultural research / Training institution, Central government officials, Local government officials and others (if any).

Farmers' interaction with supporting (secondary) SC actors: The results show that, out of all the SC supporting actors other than primary suppliers and customers of the farmers; the local government officials (44.2%) were found to be the most important supporting actors who interact with farmers. Microfinance actors (for example SACCOS) (15.8%) were ranked the second, followed by NGO's (11.6%), Agricultural research / Training institution (11.6%), Donor agencies (9.5%), Central government officials (4.2%), Banks (2.1%) and Others (1.1%). Farmers' rate of satisfaction with the interaction they make with the secondary SC actors was generally found to be poor.

This is to say, an unfavourable relationship was found to prevail between farmers and banks as well as the central government. It was further found out that, agriculture input suppliers collaborate with the government bodies like TFDA and TPRI through registration. Registration with this bodies was said to increase sales as shops for unregistered agro-vets sometimes get closed by the same bodies. Moreover, NMB PLC and TPB PLC were mentioned as examples of the financial institutions which assist input suppliers with loans. One farmer was quoted explaining about the loan she got from VICOBA by saying:

“for VICOBA financing: you get a loan of say, Tanzanian Shillings: 200,000.00 for three months and you are requested to return it by paying Tanzanian Shillings: 250,000.00. This is too demanding and unbearable”

Traders’ interaction with supporting (secondary) SC actors: The interaction of wholesalers, brokers and retailers with financial institutions and government officials was also studied. The results showed that wholesalers’ interaction with financial institutions was found to be very low. For instance, in Dar es Salaam, very few tomato wholesalers (9.8%) admitted to have obtained loans from financial institutions, like banks and Village Cooperative Bank (VICOBA). For Brokers and retailers, (28.6%) and (7.1%) respectively admitted to have received loans from financial institutions to finance their businesses. The given sources of loans included banks, but in most cases, non-bank lending institutions like PRIDE, SACCOS and VICOBA. It was further found out that, the received loans were not very much beneficial to the traders due to many reasons including the following: lack of prior education in loan usage, unreliability of tomato business – perishable goods, high-interest rates up to (40%) within short time, unfavourable weather affected crops on open airfields and the risk of pests and diseases.

6.5.3 Nature of TSC Relationships and TSC Configuration/Structural Interactions

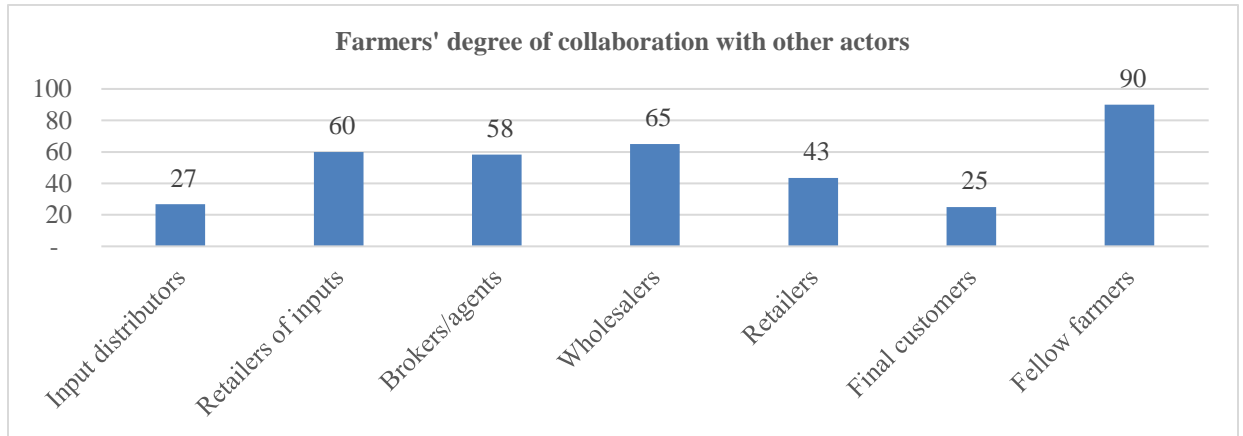
6.5.3.1 Degree of collaboration in TSC

The five primary TSC actors namely: farmers, wholesalers, brokers, retailers and input suppliers (retailers) were asked to rank the degree of collaboration they have with other actors in the TSC. A 5-points Liker scale was used ranging from 1-very low to 5-very high. The results are as presented below taking one actor after another.

6.5.3.1.1 Farmers' degree of collaboration with other actors in TSC

It was found out that there was a very high and high degree of collaboration combined all together between farmers and fellow farmers (90%). Subsequently, the following pairs of collaboration have noticeable very high and high degree of collaboration combined altogether between farmers and tomato wholesalers (65%); farmers and inputs retailers (60%); farmers and brokers/agents (58%). Conversely, some pairs of collaboration showed minimum (below 50%) degrees of collaborations after combining very high and high degree of collaboration. These include the following pairs in descending order: farmers and retailers (43%), farmers and input distributors (27%) and farmers and final customers (25%). Figure 6.63 below summarizes farmers' degree of collaboration with other actors.

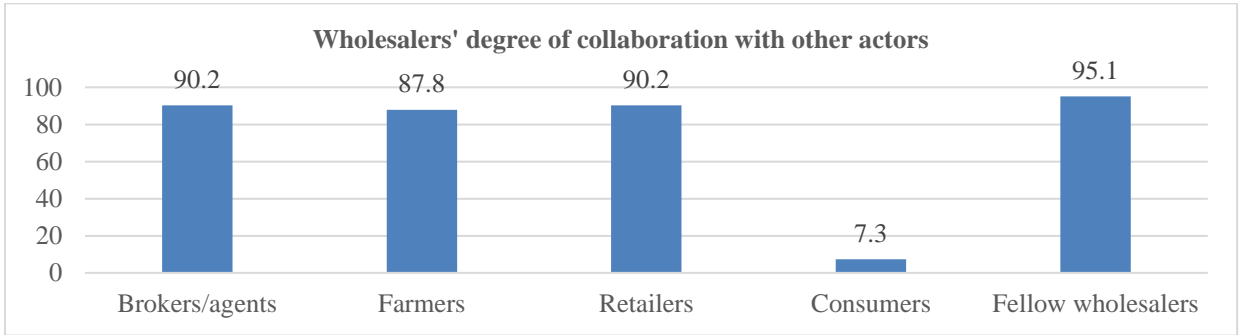
Figure 6. 63: Farmers' degree of collaboration with other actors



6.5.3.1.2 Wholesalers' degree of collaboration with other actors in TSC

Findings showed that the degree of collaboration between tomato wholesalers and other actors along the SC is very high and high (combined) in four collaborations with other wholesalers (95.1%), brokers/agents (90.2%), retailers (90.2%), and farmers (87.8%). However, it was further noted that the degree of collaboration between tomato wholesalers and consumers was very low (7.3%). Figure 6.64 below summarizes the wholesalers' degree of collaboration with other actors.

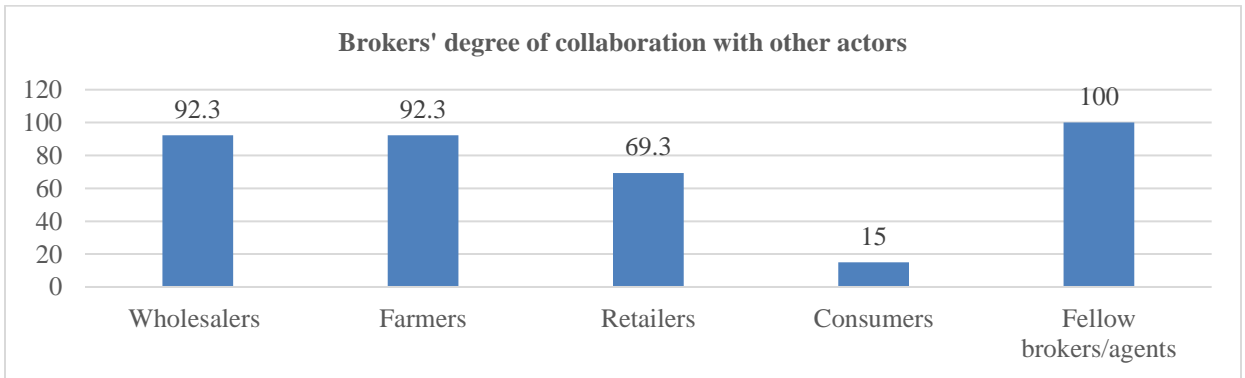
Figure 6. 64: Wholesalers' degree of collaboration with other actors



6.5.3.1.3 Brokers' degree of collaboration with other actors in TSC

From brokers perspective, the results show that there is very high and high relationship between brokers and their fellow brokers (100%), brokers and wholesalers (92.3%), brokers and farmers (92.3%) and brokers and retailers (69.3%). However, results show that brokers' relationship with consumers is very poor by (15%) only. Figure 6.65 below summarizes the brokers' degree of collaboration with other actors.

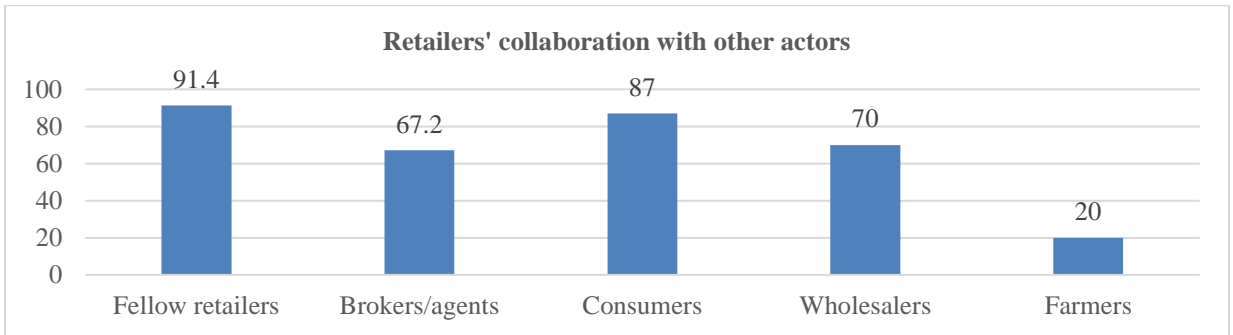
Figure 6. 65: Brokers' degree of collaboration with other actors



6.5.3.1.4 Retailers' degree of collaboration with other actors in TSC

After combining very high and high, the degree of collaboration between retailers and other SC actors are as follows being arranged in descending order: retailers and fellow retailers (91.4%), retailers and consumers (87%), retailers and wholesalers (70%), retailers and brokers (67.2) and last and least is between retailers and farmers (20%). Figure 6.66 below summarizes retailers' degree of collaboration with other actors.

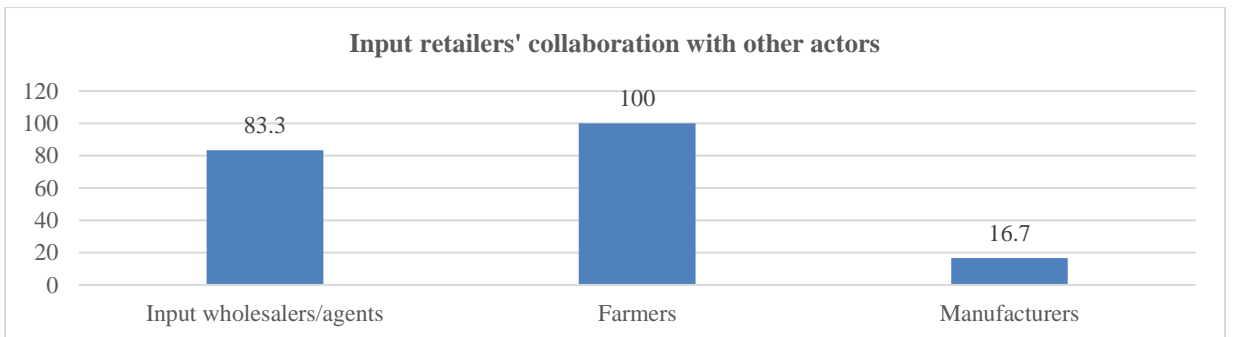
Figure 6. 66: Retailers’ degree of collaboration with other actors



6.5.3.1.5 Input suppliers (retailers) degree of collaboration with other actors in TSC

The results show that the degree of collaboration between input suppliers (retailers) and farmers is (100%) after combining very high and high. Also, the degree of collaboration between input suppliers (retailers) and input wholesalers is reasonably high (83.3%). However, the degree of collaboration between input suppliers (retailers) and manufacturers was found to be very low (16.7%) only. Figure 6.67 below depicts these results.

Figure 6. 67: Input Retailers’ degree of collaboration with other actors



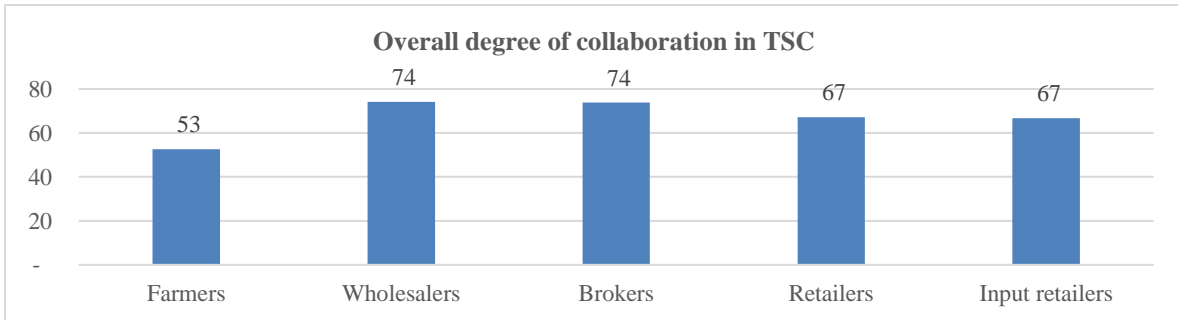
6.5.3.1.6 Summarized degree of collaboration amongst TSC actors

Table 6.12 below summarizes all the above individual analysis of the degree of collaboration. The table shows that the degree of collaboration in most of the actors is high based on the mode value of 5. Which means, in average terms, the degree of collaboration between wholesalers, brokers, retailers and input suppliers (retailers) with other actors is very high. However, the average degree of collaboration between farmers and other actors in the TSC is very low (mode=1). Table 6.12 below depicts the overall degree of collaboration in TSC and Figure 6.68 shows its corresponding bar chart.

Table 6. 12: Summary of the degree of collaboration for each respondent category

Respondent Category	5-point Likert scale responses							Mode
	Frequency (N) Frequency (%)	1	2	3	4	5	(4+5)-Combined (%)	
Farmers	(N)	125	39	35	100	121		1
	(%)	29.8	9.3	8.3	23.8	28.8	52.6	
Wholesalers	(N)	38	4	11	43	109		5
	(%)	18.5	2.0	5.4	21.0	53.2	74.1	
Brokers	(N)	6	3	8	11	37		5
	(%)	9.2	4.6	12.3	16.9	56.9	73.8	
Retailers	(N)	62	37	16	103	132		5
	(%)	17.7	10.6	4.6	29.4	37.7	67.1	
Input suppliers (retailers)	(N)	4	0	2	5	7		5
	(%)	22.2	0	11.1	27.8	38.9	66.7	

Figure 6. 68: Overall degree of collaboration in TSC



6.5.3.2 Existing relationship parameters between TSC actors

Three main statements comprising the three relationship variables were given to the respondents to either say, “Yes” or “No” or “indifferent” depending on their day-to-day interactions with other SC actors. The three main statements were: 1. We share information with ... (name of possible actors to a particular actor), 2. We share resources with ... (name of possible actors to a particular actor), and 3. We trust each other with ... (name of possible actors to a particular actor).

These statements were duplicated in any possible number depending on the number of possible actors to interact with a particular actor. Sections 6.5.3.2.1 to section 6.5.3.2.5 below show the results whereas section 6.5.3.2.6 discusses the results.

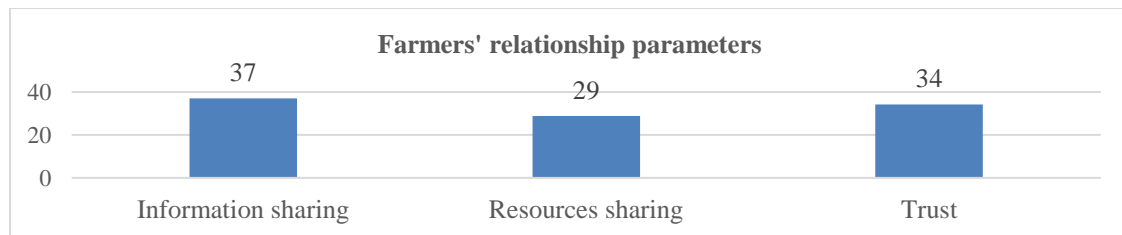
6.5.3.2.1 Relationship parameters in farmers

The farmers’ results show that all the three parameters: information sharing, resources sharing and trusting each other exist between farmers and their fellow farmers. Most of the

farmers said “yes” to information sharing (98.3%); resources sharing (88.3%) and trust each other (98.3%) with their fellow farmers. The farmers also admitted to be sharing information with other actors though in varying extents as follows: (76.7%), (68.3%), (66.7%), (56.7%) (43.3%), and (26.7%) with tomato agents, wholesalers, input retailers, tomato retailers, input distributors, and final consumers respectively. One noted trend was that as you move from the first-tier supplier and customer, upstream and downstream respectively, the less the information is shared.

The same trend was noted on resources sharing whereby resources are highly shared with fellow farmers (88.3%) than final customers (20%). In the case of a trust, high trust is with fellow farmers. It was also noted here that as you go away from the farmer, upstream, trust decreases up to (36.7%) with input distributors. To summarize on the three relationship parameters from farmers’ point of view, Figure 6.69 below was drawn. It is evident from the figure that farmers share more information (37%) followed by trust (34%) and resources sharing is the last and least in this sequence (29%).

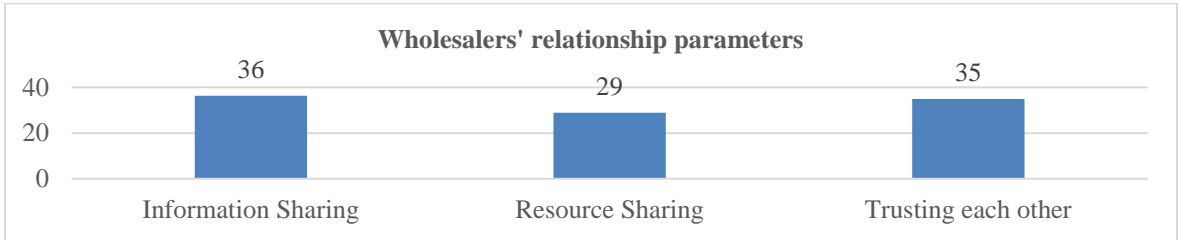
Figure 6. 69: Farmers’ relationship parameters



6.5.3.2.2 Relationship parameters in wholesalers

From the wholesalers’ point of view, more information (97.6%) is shared with their fellow wholesalers than they do with any other parameter within themselves and across the SC with other actors. Trust (90.2%) is higher than resources sharing (84.4%) with retailers and fellow wholesalers respectively. The same trend as reported on farmers was also noted here, that is as you move from the first-tier supplier and customer, upstream and downstream respectively, the less the information, resources and trusts are extended to other actors. These findings are summarized in Figure 6.70 below where information sharing (36%) is the highest followed by the trust (35%) and last is resources sharing (29%).

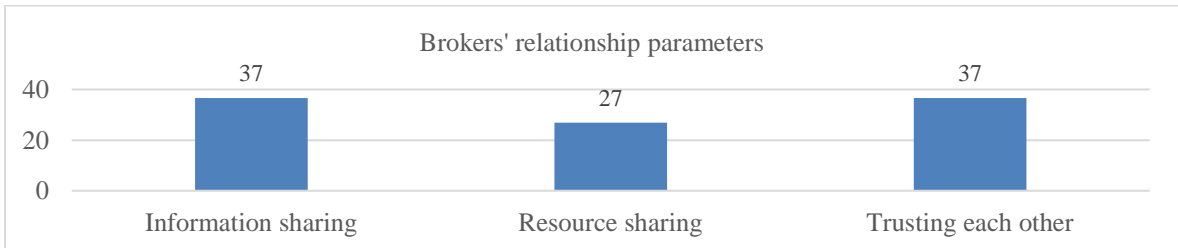
Figure 6. 70: Wholesalers' relationship parameters



6.5.3.2.3 Relationship parameters in brokers

Brokers were found to be very good in information sharing and trust amongst themselves and with farmers, (100%) in each. Resources sharing was high with fellow brokers at (93.3%). Although in information sharing with farmers it was (100%), it was not the case in resources sharing where it dropped to (53.8%). Brokers were found not interacting with consumers at all. Thus, brokers' most downstream actor was the retailers and the extent of information sharing, trust and resources sharing were the lowest in the following proportions (61.5%), (53.8%), and (30.8%) respectively. In totality, the three parameters from the brokers' point of view are as follows: information sharing (37%), Resources sharing (27%) and trust (37%). Figure 6.71 below summarizes these findings.

Figure 6. 71: Brokers' relationship parameters



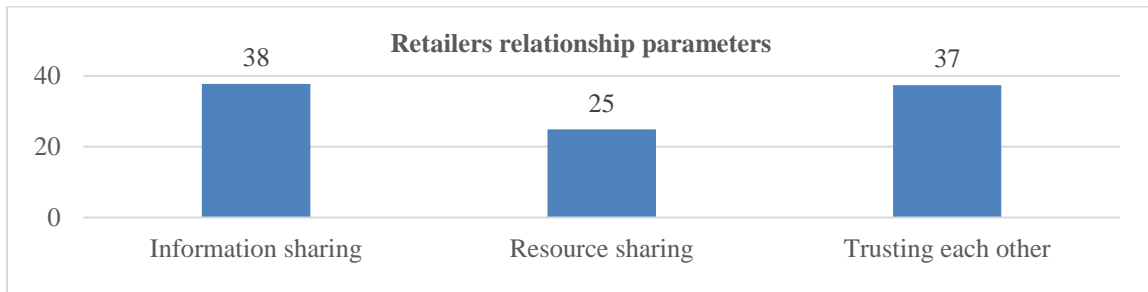
6.5.3.2.4 Relationship parameters in retailers

Information sharing was highest between retailers and their fellow retailers (97.1%), followed by the trust (91.4%) and resource sharing was (80%) with the same fellow retailers. The retailers shared less information with the farmers (21.4%), less resource sharing with consumers (15.7%) and less trust with farmers (21.4%). After fellow retailers, more information was shared with brokers (77.1%) than with wholesalers (74.1%). However, in terms of resource sharing, retailers shared more with wholesalers (50%) than brokers (34.3%). Trust is more with brokers (75.7%) than with wholesalers (68.6%). As

you can see from the findings, with retailers, there is no such systemic trend we observed on other actors, retailers collaborate with different actors differently regardless of the position of the actor (far/near) from the retailers.

Figure 6.72 below summarizes the relationship parameters: information sharing (38%), resources sharing (25%) and trust (37%) as experienced from retailer’s point of view.

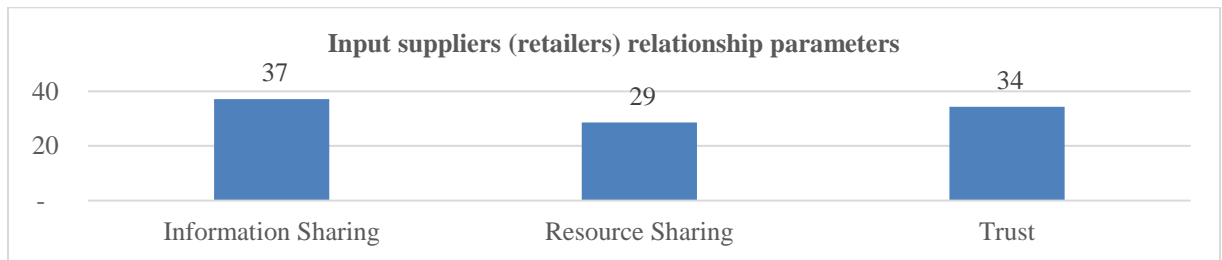
Figure 6. 72: Retailers’ relationship parameters



6.5.3.2.5 Relationship parameters in input suppliers (retailers)

By considering three relationship parameters namely: information sharing, resources sharing and trust, findings show that input suppliers share information exclusively with farmers (100%), followed by wholesalers (83.3%) and lastly by manufacturers (33.3%). Resource sharing between input suppliers and other SC actors is not as good as with information sharing. Most of the input suppliers’ resources are shared with wholesalers and farmers (66.7%) each. Resource sharing between input suppliers and input manufacturers is very low, (33.3%) only. The findings also inform us that input retailers highly trust each other with farmers (83.3%), followed by wholesalers (66.7%) and lastly with manufacturers (50%). Figure 6.73 below summarizes the relationship parameters: information sharing (37%), resources sharing (29%) and trust (34%) as experienced from input suppliers (retailers) point of view.

Figure 6. 73: Input suppliers (retailers) relationship parameters



6.5.3.2.6 Discussion: Existing relationship parameters between TSC actors

By comparing information sharing, resource sharing and trust, it is evident from the results that information sharing scores the highest performance with all TSC actors and appears the highest with tomato retailers and lowest with wholesalers. Resource sharing scores the lowest performance in each of the actors. This means that less resources are shared amongst the actors. However, retailers are found to share the least resources amongst all the actors. Further, retailers and brokers are found to have the highest trust with other actors and farmers and input suppliers demonstrate the lowest trust when interact with other actors.

6.6 General Analysis of the secondary actors

General analysis of the secondary actors namely: transporters, processors and government officials were very necessary in order to get the first-hand information for the fulfilment of the objectives of this study. As the matter of fact, the TSC primary actors frequently interact with these secondary actors and get affected thereof.

6.6.1 General Analysis of transporters

The primary role of the transporters in the TSC is to move the tomatoes from the source of production to the place of consumption. Thus, mistakes in transportation and handling of the tomatoes affect other actors in the chain. Below are the main researcher's results from the transporters.

6.6.1.1 Post-harvest loss during transportation

Drivers were asked about the possibility of occurrence of PHL during transportation. Interview findings from the respondents showed that there is a great possibility of occurrence of product loss during transportation (86.7%). These PHLs during

transportation are due to: vehicle breakdown (24%), poor goods' loading and arrangement by labourer (16%), road bumps and rough roads (16%), rainfall in transit if tomatoes not covered properly (16%), road accidents (8%), get stuck due to poor road condition (8%), delays caused by traffic police inspection (4%), poor/lack of inspection before and during loading of the goods (4%) and traffic jams (4%).

Counteractive measures to post-harvest loss during transportation

There are various means used by transporters to ensure that fresh tomatoes in transit remain fresh. These include the following: drive slowly in poor road condition (21.9%), cover with canvas (15.6%), changing vehicle in case of major problem (12.5%), use alternative route (if any) to avoid traffic jam (6.3%), avoid unnecessary stoppages for timely delivery (6.3%), supervising labourers while loading and offloading to avoid goods' damage (6.3%), transporting at night to avoid traffic jams and many police inspections during the day (6.3%), use appropriate goods' handling equipment to minimize damage (6.3%), sharing the loss by the consignee (6.3%), signal by other drivers to slow down in case of police or escape route in case of jam (3.1%), calling mechanics with spare parts in case of known problem to fix the vehicle's problem (3.1%), bearing/sustaining the whole loss if sharing is impractical (3.1%) and keeping the vehicle in roadworthy condition at all times (3.1%).

Responsibility for the loss

In case of any loss during transportation, responsibility for such losses are borne by the following: transporter in case of big loss otherwise consignee (25%), driver especially for lost consignment (17.9%), consignee (17.9%), sharing (14.3%), mostly the vehicle owner-though depends on the nature of the loss (10.7%), transporter-in case of accident (10.7%) and agreed together between transporter and consignee (3.6%).

6.6.1.2 Nature of relationship: short-term or long-term

It was found out that very few transporters have long-term agreement contracts with their customers (6.7%) only. The majority (86.7%) of the transporters had short-term contracts just limited to a single route and the remaining (6.7%) acknowledged to apply both long-term and short-term transportation contracts with some customers.

6.6.1.3 Challenges faced by transporters

Below are the challenges faced by transporters in due course of transporting tomato consignments: order seasonality (25%), customer's delay and/or default in paying transportation costs (25%), late loading leading to late delivery (18.8%), too much follow-ups (traceability) on whereabouts by consignee and/or consignor (18.8%), lack of transportation contracts, robbers especially during night time (6.3%) and variation of weather conditions affect the tomatoes (6.3%).

6.6.2 General Analysis of processors

6.6.2.1 Dabaga Vegetable and Fruit Canning Co. Ltd currently under Chai Bora

Interview findings were given by the Plant Manager.

Background of the plant

The plant started processing tomatoes in 1972 as Dabaga Vegetable and Fruit Canning Co. Ltd. However, during the time of data collection of this research, it was reported to have been acquired by Chai Bora in the operations side.

Source of raw materials - tomatoes

The company does not grow tomatoes for processing instead, it buys from contracted six suppliers (middlemen) who source from farmers. The company prepares a delivery schedule which is used by these suppliers each on own day. Apart from delivery arrangements from subcontracted suppliers, sometimes farmers come to the plant to solicit for direct supply. However, farmers' direct supply is only allowed when the contracted suppliers fail to supply enough tomatoes as per plant capacity.

Most of the tomatoes processed by the plant are sourced from nearby sources in Iringa region. However, during shortages and/or low production season, the suppliers sometimes get their supplies from other neighbouring regions like Morogoro, Njombe and Dodoma.

Price of tomatoes delivered to the plant varies from Tanzanian Shilling Two Hundred (200.00 to Three Hundred (300.00) per Kilogram. This means the plant and tomato suppliers have not agreed on any fixed price per kilogram and price is let to vary in

accordance with the demand and supply or market price. Tomato suppliers are paid on delivery. Processors challenges in buying raw tomatoes include: Price fluctuations and incidences whereby suppliers deliver more tomatoes than required. Remedies to the above challenges include regular price negotiation and receipt of whatever excess quantity is delivered in order to maintain a good relationship with suppliers respectively. When required to comment on whether the upstream suppliers are honest or not, the plant manager declared that tomato suppliers are honest enough. As future plan, the plant expects to support farmers in terms of farming inputs for the later to grow quality tomatoes required by the plant.

Receipt and inspection of incoming tomatoes

Upon delivery of the raw tomatoes to the plant, before acceptance, the tomatoes are sorted out to separate the unwanted ones (rotten, damaged, unripe ones) and thereafter, the good ones are weighed and accepted whereas the unwanted ones are rejected. Quantity is measured in terms of weight in kilogram whereas quality is checked based on various specifications including: ripe tomatoes, in good quality by appearance (visually). Inspection of the delivered tomatoes is very important due to the fact that the TSC in use does not apply specialized facilities for handling perishable products, for example cold rooms.

Processing

Due to perishability, to avoid further deterioration of the received and accepted raw tomatoes, the tomatoes once delivered are immediately semi-processed into pulp. Thereafter, food preservatives are used to maintain the quality of pulp before production of final customized products. Furthermore, Iringa weather condition is moderately cool, hence conducive for perishable products like tomatoes. The following sorts of tomato products are produced: sauce, ketchup, and different varieties of sauces. Apart from processing raw tomatoes, the plant processes other F&V such as chilli, and garlic which are sourced locally. The processing capacity of the plant during data collection was ten (10) tons per day and it was done throughout the year.

Markets

During the time of data collection for this research, the company's products were marketed domestically. However, the company was in the process to get certification for the export market. When required to comment on whether the downstream customers are honest or not, the plant manager declared that their customers were honest enough and they have never experienced any problems with them.

Challenges

Other challenges other than those experienced in sourcing raw tomatoes include the following: many government bodies such as TFDA, TBS, OSHA required the company to seek for their expensive certifications. These certifications are granted to the company not for free but at a certain charge. The amount charged by TFDA, TBS and OSHA per year range between Tanzania shillings (TZS.) six to seven million and it is too much for the business to bear as consequently affects the price of the finished products.

Recommendations to the government

The Plant Manager of Dabaga Vegetable and Fruit Canning Co. Ltd recommended that, the government has to promote organic farming to promote exports for agricultural products from Tanzania. This will enhance farmers' income as there is a ready-made market for organic products in most of the developed countries where many people are health conscious.

6.6.2.2 Iringa Vegetable Oils and Related Industries (IVORI)- Processor cum Farmer

Interview findings were given by a Plant Supervisor.

Background

The plant started processing tomatoes in 2006. At the time of data collection for this research, the plant had a processing capacity of 20 tons per day. IVORI's finished products include assorted sauces inter alia.

Source of raw materials - tomato

IVORI does not grow tomatoes for processing instead they buy from different farmers and traders in different villages and wards mostly from Kilolo District in Iringa Region. The company goes to those villages and wards with their own vehicles to buy and transport the raw tomatoes to their own plant. IVORI has neither specialized trucks (with controlled temperature) nor cold rooms, instead, it uses normal open-air vehicles.

Before purchasing tomatoes, inspection in both quantity and quality is done. Quantity is measured in terms of weight in kilogram whereas quality is checked based on physical appearance. During the time of data collection for this research, the price of tomatoes was TZS., one hundred and seventy-six only (176/=) per kilogram and payment was made in cash. Tomato price is set by farmers; however, it is negotiable depending on demand and supply. Apart from buying from outside farmers and/or traders, IVORI also does own tomato farms. When required to comment on whether the upstream suppliers are honest and thus trustworthy or not, the supervisor declared that their suppliers are trustworthy enough and all the arising problems are resolved harmoniously.

Processing

Tomato processing at IVORI is a continuous process in a year hence, demand for raw tomatoes from farmers is reliable throughout the year. At IVORI, tomatoes are not the only inputs to produce finished sauces. Other inputs include peppers which are as well sourced locally within the region.

Markets

The main market for IVORI's finished products is the domestic market in Tanzania. When required to comment on whether the downstream customers are trustworthy or not, the supervisor declared that their customers are trustworthy enough.

Challenges

Given the two roles of IVORI namely Processor cum Farmer in tomato business, the following challenges/problems were identified. In farming, tomato pests and diseases were the main identified challenges/problems. Whereas in sourcing raw tomatoes, such

challenges/problems were encountered: Price fluctuations and some farmers are not honest when they say/promise something, thus affect processing and other subsequent activities within and outside the organization.

6.6.2.3 Darsh Industries (Arusha)

Interview findings were given by a Factory Manager (Food Technologist)

Background

The plant started processing tomatoes in 2003 in Arusha Tanzania. However, during the time of data collection of this research, the factory had expanded and opened another factory in Iringa Region. For this research, data were collected from Arusha plant only.

From its inception, the company used to grow tomatoes on a land size of thirty to forty (30-40) acres in Nduruma village in Arusha Rural District (or Arusha District Council) for processing in her Arusha factory. But, during the time of data collection for this research, the company had reduced the farm size to ten acres only. In terms of yields, the company harvests about one hundred to two hundred metric tons of raw tomatoes and the preferred tomato brands grown by the company include Tania and Tengeru.

Sourcing raw materials - tomato

Apart from growing own tomatoes, the company also buys from both small and large farmers in surrounding areas. At the point of data collection, about (99%) of the tomatoes processed by the company were purchased from individual farmers around Arusha in a 20km radius from the processing plant. The farmers who sell their tomatoes to Darsh get some assistance from the company such as extension services by company extension officers and packaging materials which are plastic crates used to carry the tomatoes from farm to the factory, though transport is not provided by the company. Unlike Darsh Arusha, Darsh Iringa provides free transport from collection centres in the villages to the factory.

There is no formal written or oral farming contracts between farmers and Darsh related to growing tomatoes in Arusha. The purchasing agreements are reached when the tomatoes are ready for harvest and/or delivery whereby such aspects as quantity, quality, price and

means of delivery are negotiated accordingly. In the year 2005, the company tried to give cash assistance to farmers to enable the later to grow tomatoes for the former. But this practice was ceased as farmers were not honest in repaying back their debts.

Moreover, in Arusha region, there are seed companies that grow tomatoes for seed production. Initially, the farmers were processing tomatoes themselves to separate seeds from the paste. The seeds were then sold to the seed companies whereas the paste was wasted. Nowadays, farmers take their raw tomatoes to Darsh factory for processing to separate the seeds and the paste. By so doing, the farmers get triple benefits, first, the seeds are sold to seed companies, second, the paste is sold to Darsh Company and third, by selling the paste to Darsh, the farmers are alleviated from the hassles of disposing the paste which had become a problem before when farmers were growing tomatoes for seeds only.

When asked about challenges – if any encountered in buying raw tomatoes, the Factory Manager mentioned price fluctuations as the main challenge. It was further revealed that, as a control measure to the above problem, the company also sources tomato concentrates from abroad in countries like China and India. Moreover, the company buys more raw tomatoes during high season and semi-process it into a paste to be used during low season/scarcity period to produce finished products. But, tomato importation in the form of concentrates is cheaper as compared to tomatoes grown in the country by farmers who are mostly small farmers. Thus, farmers in the country have to increase their production in terms of acreage and in yields to meet the quantity required and achieve economies of scale. During interview, the Factory Manager said that Tanzania's yields in one acre as compared to yields in China-the main tomato grower in the world are incomparable; whereas in China one acre's yields range from thirty five to forty (35-40) metric tons in Tanzania one acre gives yields between nine to ten (9-10) metric tons.

Receipt and inspection

The procedure and/or conditions for the company to buy from individual tomato farmers include the following: first, there is no limit in terms of quantity, secondly, the purchased tomatoes should comply with quality specifications given by the company such as: the tomatoes should be consumable/not rotten, red ripe and free from spoilage, fourthly,

farmers should deliver their consignments to the plant, though in Iringa Darsh plant, the company collects from suppliers' premises/farms, fifthly, the unit of measure is in kilogram, sixthly, the price per kilogram ranges between TZS. one hundred and thirty to two hundred and fifty depending on the forces of demand and supply, and seventhly, the payment terms are both in cash or open cheque after two to three (2-3) days of delivery.

When required to rank on a five-point Likert scale from strongly disagree to strongly agree about whether the upstream suppliers are honest and hence trustworthy, the factory manager agreed that suppliers are honest and trustworthy and they trust each other.

Processing

The daily factory capacity in processing raw tomatoes is two hundred metric tons in Arusha whereas in Iringa Factory is one hundred metric tons. Tomato processing in both factories is done throughout the year in 24/7. Because the company lacks cold storage facilities for raw tomatoes, tomatoes once delivered at the factory are processed immediately to avoid deterioration. At Darsh factory in Arusha, tomatoes are not the only inputs to produce finished tomato-related products. Other inputs include salt, sugar, acid and water which are all sourced locally within the region. Others include food additives which are not available in the country, hence, imported from abroad, mainly Germany.

There are many sorts of tomato products manufactured by Darsh including the following: tomato sauce, tomato ketchup, tomato paste, fruits jam, juices and pickles. Apart from processing raw tomatoes, the plant also processes other F&V.

Markets

Currently, Darsh products are sold in the domestic market only. During data collection, export arrangements were on progress to such counties like DRC Congo, Rwanda, and Burundi and the preliminary market survey was declared complete.

When required to rank on a five-point Likert scale from strongly disagree to strongly agree about whether the downstream customers are honest and hence trustworthy, the factory manager strongly agreed that customers are honest and trustworthy and they trust each other.

Recommendations to the government

The factory manager recommended that the government should improve infrastructure in the country including, roads, drainage and have on place continuous and reliable power supply. Moreover, the government bodies like TRA, TFDA and TBS have to support local industries rather than burdening them. For instance, sometimes the local manufacturers like Darsh are unable to compete with imported raw materials or finished products in the country. The government bodies sometimes allow low quality, low priced items to be imported in the country and since the purchasing power of most Tanzanians is low, then, the customers go for low products at the expense of high-quality products produced in the country. Furthermore, some of the importers don't pay tax or are allowed – by unfaithful government employees to pay less tax than required by law. All these acts create unfair competition.

Also, there has been a lot of laxity at Tanzania's ports where clearance of imported goods takes more time compared to other countries like Kenya. One example was given whereby a machinery which was urgently needed at Darsh-Arusha processing plant took two (2) months to be cleared at Dar es Salaam port due to TRA's system that was not uploaded to Tanzania Ports Authority (TPA).

6.6.3 General Analysis of government officials

Government officials were involved in this research in many ways. One of the ways in which government officials were effectively involved by the researcher was during the time of seeking approval to conduct research in the three selected regions in Tanzania. The country has a system that has to be followed by any researcher wishing to have access to the general public for data collection. The process starts by writing an application letter to the Regional Administrative Secretaries (RAS), then from RAS to District Administrative Secretary (DAS) and from DAS to the Local Government Authorities (LGAs) under the management of the District Executive Directors (DED). If the research intends to collect data from the grassroots, then this process goes on to the Ward Executive Officers (WEO) and finally to the Village Executive Officer (VEO) for arrangements to meet the general public.

Thus, throughout this chain of command, the researcher had an opportunity of interviewing numerous government officials and was able to collect numerous information from them. Moreover, by visiting different offices and places the researcher was able to collect some of the data by observation method and others by documentary sources. However, some few government officials were interviewed especially at the grassroots in villages in order to get government's first-hand information. The interview results are as summarized below.

6.6.3.1 Current responsibilities of Extension Officers

The current responsibilities of the extension officers are as summarized below: to provide extension services (including training) to farmers in GAP in crop farming and animal keeping especially at dedicated Farmer Field School (FFS) or Shamba Darasa (in Swahili Language). Further, the respondents collect farmers' statistics and send them to district's office for further processing and use thereof. The statistics include crop farming and animal rearing-status quo in every month. Moreover, the extension officers organize formulation of farmers economic groups/associations and finally oversee all the farmers' associations and/or cooperative association and advise accordingly.

6.6.3.2 Experienced obstacles by Extension Officers

The respondents reported the following as obstacles in performing their day-to-day activities: difficulties in organizing farmers to work together in unions/associations (resistance to change), some farmers are laggard to accept the given GAP training let alone actual implementation, presence of dilapidated roads in growing areas that make provision of extension services and transportation of crops from farms to the market or nearby highways difficult.

6.6.3.3 Extension Officers' Recommendation in terms of government policy for agricultural development in Tanzania

The respondents suggested to the government: to intervene on the issue of construction of irrigation facilities/systems like digging irrigation ponds to enable tomato farming to be done throughout the year; to equip extension officers with means of transportation for example motorcycles in order to make them mobile and hence reach all the farmers' fields

for advice/training; intervene on the pricing issue of agricultural products to ensure that the primary farmer gets reasonable return from the sale of crops; to ensure that farmers' unions/associations are formed and strengthened to bring about farmers' bargaining power when dealing with traders; to intervene on the pricing issue of agricultural inputs – they are currently too high and unaffordable by most of the smallholder farmers; and to ensure that the agricultural policies should have such clauses stating clearly how the government will assist farmers in such issues related to market, supply of inputs and financing agriculture.

6.6.3.4 An Interview of the Market Manager-Temeke Stereo Market

The market manager responded to general questions which were raised by the researcher as follow-up questions from other respondents –TSC actors as follows:

Question 1: Why farmers are not allowed to sell direct to Temeke Stereo Market despite the market being commonly known “farmers’ commodity market”? Is this practice for all the crops or tomato only?

Answer 1: We don't allow all farmers to sell directly to this market for control purposes and it is for all crops. Allowing all farmers would cause a total chaos due to the following reasons: limited market space –too small and it wouldn't be enough to accommodate all farmers; farmers would be defrauded by city hooligans and to overcome this problem, we have a good number of registered trusted traders (wholesalers and brokers) through whom farmers should channel their crops.

Question 2: Why do you allow non-standardized measures (for example wooden boxes, plastic buckets, baskets made up of a bamboo tree, small containers of different sizes) to be used in commodity trading especially tomatoes? [**Hint:** the researcher had observed the usage of numerous units of measures throughout his research from Arusha, Iringa to Dar es Salaam. These measures, sometimes they looked different, sometimes over or under usage of “over packing materials”, which acts as a cushioning material to absorb normal vibrations and collisions during transit – this was thought to affect the quantity contained in the containers].

Answer 2: all the used containers are more or less the same. If they were different the farmers and/or traders wouldn't accept. However, the standard measure of the weight of tomato is kilogram (kg.).

Question 3: Why you don't maintain your markets' environments (for example the roof, floor, stall, drainage systems) up to standard despite collecting taxes from the traders? How about general cleanliness?

Answer 3: the money we collect through tax is not for this particular market, but it goes to the pool of our Municipal Council, and expenditures are decided centrally there. Our responsibility is to prepare our own budget for different activities including staff requirements and forward it to Municipal Council then we wait for allocation of funds. Therefore, even employment of cleaning companies is centrally administered by the Municipal Tender Board. Our responsibility is on monitoring the subcontracted cleaning companies and preparation of performance reports to the Head of Procurement Management Unit (HPMU) for further decision.

Question 4: What statistics would you like to share regarding the performance of your market especially in relation to the tomato?

Answer 4: Since we deal with all farmers' commodities, we therefore, don't keep records specifically for each commodity. However, on average we receive about one hundred (100) trucks full of farmers' commodities per day, about two-thirds of the delivered commodities are tomatoes.

6.7 Operationalization of the Research Model

The discrete logistic model was designed to run a total of twenty-one (21) empirical models for analysis. Results for these models are presented in this section. After running the model twenty-one times, twenty-one model equations were formed. An equation for "farmer to retailer" was picked for explaining the results. After running the model for "Farmer to Retailer" the following equation was formulated from the model test results:

Given the prediction equation: $\log(p/1-p)=b_0+b_1*x_1 + b_2*x_2 + b_3*x_3 + b_3*x_3+b_4*x_4.....(6)$

b: these are the values for the logistic regression equation for predicting the dependent variables from the independent variable. They are in log-odds units.

Where 'p' is the probability of being immediate customer. Expressed in terms of the variables used in this model. The logistic regression equation for Farmer to retailer (F-R) is

$$\text{Log}(p/1-p) = -.053 - .018*\text{Age} + .055*\text{Edn} - .150*\text{Exp} + .777*\text{FS} + .021*\text{rev}$$

In terms of probabilities, the equation above is translated into

$$P = \exp(-.053 - .018*\text{Age} + .055*\text{Edn} - .150*\text{Exp} + .777*\text{FS} + .021*\text{rev})$$

These estimates tell us about the relationship between the independent variables of Age, Ed (education), Exp (experience), FS (farm size) and rev (revenue) and the dependent variable (Farmer's immediate customer-Retailer) where the dependent variable is on the logit scale.

It should be noted here that positive sign of the coefficient (Ed, FS and rev) increases the amount whereas negative sign decreases the amount (age and exp) in the predicted log odds of farm_reta =1 that would be predicted by a 1 unit increase or decrease in the predictor, holding all other predictors constant. It should also be noted here that for the independent variables which are not significant the coefficients are not significantly different from 0. These include age, ed, exp, and rev).

To simplify interpretation - because these coefficients are in log-odds units, conversion to odds ratios is done by exponentiating the coefficient:

$$P = \exp(-.053 - .018*\text{Age} + .055*\text{Edn} - .150*\text{Exp} + .777*\text{FS} + .021*\text{rev})$$

The discrete logistic model was used to estimate the parameters of the factors which influence the choice of the immediate customer (SC channel) by tomato farmers, wholesalers, brokers, and retailers in the three selected regions of Arusha, Iringa and Dar es Salaam, Tanzania. The parameters and marginal effects were estimated by using the SPSS statistical package.

The results of discrete logistic regression including the marginal effects are presented in the tables below from Table 6.13 to Table 6.34 below.

Table 6. 13: Immediate Customer: Farmer to Wholesale

		Variables in the Equation						95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1 ^a	age	.002	.022	.005	1	.941	1.002	.959	1.047
	edn	.135	.117	1.321	1	.250	1.144	.909	1.439
	exp	-1.326	.383	11.986	1	.001***	.265	.125	.562
	FS	.625	.369	2.865	1	.091*	1.869	.906	3.855
	rev	-.005	.012	.182	1	.669	.995	.971	1.019
	Constant	3.476	1.799	3.732	1	.053	32.320		

a. Variable(s) entered on step 1: age, ed, exp, FS, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

From Table 6.13 above, experience of the farmer was significantly and negatively correlated with the choice of a wholesaler as farmers' immediate customer at (1%) significance level. This means as farmer's experience increases, the farmer's choice of immediate customer shifts from using middlemen in this case wholesalers. Instead, the farmer wishes to sell directly to end users or more formalized markets such supermarkets, seed companies and processors. These findings concur with those of Muthini (2015) who found out that farmers' experience in growing mangoes is significantly associated with selling directly to customers such as export channel relative to middlemen or brokers. Likewise, according to Matungul et al., (2001), age of the household head is considered synonymous with farming experience. Thus, older or experienced farmers have a greater propensity to sell their produce directly to the main exporters instead of to middlemen. (Angula, 2010). Elimination or reduction of middlemen along the SC is directly linked to elimination or reduction of operational costs along the particular SC—such as transportation and double handling costs in terms of TSC. Hence, the farmer's share from consumer price increases as he sells directly to end users and more formal customers.

Moreover, farm size of the farmer was significantly and positively correlated with the choice of the wholesaler as immediate customer at 10% significance level. That is, as the farmer increases farm size, the farmer's choice to selling to wholesalers increases due to

the fact that, wholesalers buy in large quantities and increased farmer's farm size means more harvests.

Table 6. 14: Immediate Customer: Farmer to Seed Company

		Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 ^a	age	.083	.051	2.653	1	.103	1.087	.983	1.201
	edn	-.623	.213	8.581	1	.003**	.536	.353	.814
	exp	.086	.679	.016	1	.899	1.090	.288	4.124
	FS	.721	1.132	.406	1	.524	2.057	.224	18.914
	rev	.036	.022	2.541	1	.111	1.036	.992	1.083
	Constant	3.228	2.994	1.162	1	.281	25.233		

a. Variable(s) entered on step 1: age, ed, exp, FS, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

From Table 6.14 above, education of the farmer was significantly and negatively correlated with the choice of Seed Companies as farmers' immediate customer at (5%) significance level. This happens due to the fact that, as farmers' education increases, the farmers become aware of the double benefits inherent into fresh tomatoes such as the seeds and the tomato juice or paste. An educated farmer may get into a supply agreement with tomato processors that, the former supplies the fresh tomato to the later, and the later processes the tomato to separate tomato juice from seeds. The farmer is paid for the supply of fresh tomato to the processor and at the same time, takes the tomato seeds to the Seed Company and sells separately, hence double benefit by the farmer. These findings are in agreement with Edoge's (2011) findings, that is, education positively improves decisions about selection of marketing channel and design.

Table 6. 15: Immediate Customer: Farmer to Retailer

		Variables in the Equation						95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1 ^a	Age	-.018	.019	.842	1	.359	.982	.946	1.020
	Edn	.055	.113	.233	1	.629	1.056	.846	1.318
	Exp	-.150	.342	.193	1	.661	.860	.440	1.683
	FS	.777	.383	4.106	1	.043**	2.175	1.026	4.612
	rev	.021	.012	3.195	1	.074*	1.021	.998	1.046
	Constant	-.053	1.727	.001	1	.975	.948		

a. Variable(s) entered on step 1: Age, Edn, Exp, FS, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

From Table 6.15 above, farm size of the farmer was significantly and positively correlated with the choice of retailers as farmers’ immediate customer at (5%) significance level. This is to say, as the farmer’s farm size (in acres) planted with tomatoes increases, the chances of the farmers selling directly to retailers increases. Large farm size means more harvest and with more harvest, the farmer can afford hiring a truck alone or share with other farmers and take directly their produce to markets especially the urban markets. As we have seen above, bypassing the middlemen is beneficial to the farmer as he enjoys a big price share from consumers’ price. These findings correspond with that of Edoge (2014) and Zivenge and Karavina (2012). They also recognized a positive relationship between farm size and choice of marketing channel. Also, revenue of the farmer was significantly and positively correlated with the choice of retailers as immediate customer at 10% significance level. Thus, as farmer’s revenue increases, the farmers choice to selling to retailers increases too. This is because, the farmer can afford the transportation costs, hence, bypassing the middlemen.

Table 6. 16: Immediate Customer: Farmer to Consumer

		Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 ^a	age	-.041	.073	.314	1	.575	.960	.832	1.108
	edn	3.067	1601.147	.000	1	.998	21.468	.000	.
	exp	-.916	.767	1.427	1	.232	.400	.089	1.799
	FS	10.793	4.821	5.012	1	.025**	48659.418	3.832	617813770.662
	rev	-.002	.040	.003	1	.954	.998	.922	1.079
	Constant	-18.551	11208.029	.000	1	.999	.000		

a. Variable(s) entered on step 1: age, ed, exp, FS, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

From Table 6.16 above, farm size of the farmer was significantly and positively correlated with the choice of consumers as farmers’ immediate customers at (5%) significance level. The same explanations as given on part c) above apply here. However, in this case, the farmer eliminates all the middlemen including retailers and sells directly to consumers such as household consumers and institutional consumers such as hotels, restaurants and processors. As the results, the farmer gets a better return than selling through the middlemen or retailers. These findings correspond with that of Edoge (2014) and Amaya and Alwang (2011). They also recognized a positive relationship between farm size and choice of marketing channel.

Table 6. 17: Immediate Customer: Farmer to Broker

		Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 ^a	age	.032	.019	2.775	1	.096*	1.033	.994	1.072
	edn	.169	.104	2.632	1	.105	1.184	.966	1.451
	exp	-.211	.326	.419	1	.518	.810	.428	1.534
	FS	-.281	.334	.709	1	.400	.755	.393	1.452
	rev	-.005	.009	.269	1	.604	.995	.977	1.014
	Constant	-1.333	1.727	.595	1	.440	.264		

a. Variable(s) entered on step 1: age, ed, exp, FS, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

From Table 6.17 above, age of the farmer was significantly and positively correlated with the choice of broker as immediate customers at 10% significance level. This means that, as the age of the farmer increases, the farmer’s choice to direct sales become skewed to the brokers.

Table 6. 18: Immediate Customer: Wholesaler Broker

		Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 ^a	age	.276	.106	6.765	1	.009**	1.318	1.070	1.624
	edn	.460	.271	2.866	1	.090*	1.583	.930	2.695
	exp	-8.365	4544.104	.000	1	.999	.000	.000	.
	rev	-.003	.001	6.290	1	.012**	.997	.995	.999
	Constant	30.568	22720.521	.000	1	.999	188533416337 86.445		

a. Variable(s) entered on step 1: age, ed, exp, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

From Table 6.18 above, age of the wholesalers was significantly and positively correlated with the choice of brokers as wholesalers’ immediate customers at (5%) significance level. This means, as the age of the wholesaler increases, the chances for wholesaler selling tomatoes to brokers increases as well. Many reasons attributed to this decision including the following: wholesaler’s mature age increases negotiation capability with brokers, hence better return. Also, wholesale business involves a lot of travelling to different places to search for tomatoes and to take the tomatoes to the markets. However, as the age of the wholesaler increases, he becomes less mobile. However, given all the contacts the wholesaler gained in the past, he may continue working as a wholesaler by making use of mobile phones and other means of communications. This finding corresponds with that of Edoge (2014) and Amaya and Alwang (2011). They also realized a positive correlation between age and choice of distribution and marketing channels respectively.

Further, revenue of the wholesaler was significantly and negatively correlated with the choice of a broker as immediate customer at (5%) significance level. This means as the wholesaler’s revenue increases, the wholesaler’s choice of immediate customer shifts from other middlemen in this case brokers, instead, the wholesaler wishes to sell directly to end

users or more formalized markets. Also, education of the wholesaler was significantly and positively correlated with the choice of the broker as immediate customer at 10% significance level. This means, as the level of education of the wholesaler increases, the choice of immediate customer favours the brokers most.

Table 6. 19: Immediate Customer: Wholesaler to Consumer

		Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 ^a	age	-.018	.077	.056	1	.813	.982	.845	1.142
	edn	-.216	.317	.464	1	.496	.806	.433	1.500
	exp	1.037	.519	3.989	1	.046**	2.822	1.019	7.811
	rev	.002	.002	.581	1	.446	1.002	.997	1.006
	Constant	.667	4.507	.022	1	.882	1.948		

a. Variable(s) entered on step 1: age, ed, exp, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

From Table 6.19 above, experience of the wholesalers was significantly and positively correlated with the choice of consumers as wholesalers' immediate customers at (5%) significance level. As we have seen before, direct sales to consumers by any of the TSC actors is beneficial to such actors. It follows therefore that, with more experience, wholesalers prefer selling tomatoes to consumers such as household consumers and institutional consumers such as hotels, restaurants and processors in order to maximize their returns. This is made possible because of the fact that; an experienced wholesaler tends to have more contacts of the consumers and many past practical interactions with final consumers that create trust by final consumers.

Table 6. 20: Immediate Customer: Broker to Retailer

		Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 ^a	age	-.214	.099	4.637	1	.031**	.807	.664	.981
	edn	.363	.286	1.605	1	.205	1.437	.820	2.518
	rev	-.001	.005	.033	1	.857	.999	.989	1.009
	Constant	4.512	4.313	1.094	1	.296	91.075		

a. Variable(s) entered on step 1: age, ed, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

From Table 6.20 above, age of the brokers was significantly and negatively correlated with the choice of retailers as brokers' immediate customers at (5%) significance level. Although it is generally recognized that brokers' main immediate customers are the retailers, however, as the age of the broker increases, the chances of a broker selling through retailers decreases. Brokerage business requires a lot of travelling by the brokers to get to know efficient sources of materials and profitable destinations of materials. When brokers' age increases, their ability to travel to different places decreases and most of them they would rather become collectors based at one destination in the villages or at the urban markets. These findings are in agreement with those of Xaba and Masuku (2013b) who established that younger cabbage growers owing to being adventurous and risk averse are more unlikely to sell to wholesale or middlemen channels but rather directly to consumers.

Table 6. 21: Immediate Customer: Broker to Wholesaler

		Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 ^a	age	.156	.069	5.077	1	.024**	1.169	1.020	1.338
	edn	-.178	.294	.365	1	.546	.837	.470	1.490
	rev	-.006	.006	.985	1	.321	.994	.983	1.006
	Constant	-4.982	4.102	1.476	1	.224	.007		

a. Variable(s) entered on step 1: age, ed, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

From Table 6.22 above, age of the brokers was significantly and positively correlated with the choice of wholesalers as brokers' immediate customers at (5%) significance level. As the age of brokers increases, most of them would prefer to perform as collectors centred at one place rather than travelling to distant markets to search for retailers who are scattered all over the country. In this case, brokers' immediate customers at old age are wholesalers and not retailers as customarily known. This finding corresponds with that of Edoge (2014) and Amaya and Alwang (2011).

Table 6. 22: Immediate Customer: Retailer to Broker

		Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 ^a	age	.117	.068	2.983	1	.084*	1.124	.984	1.283
	edn	.109	.536	.041	1	.839	1.115	.390	3.189
	exp	-12.081	3041.107	.000	1	.997	.000	.000	.
	revenue	.024	.052	.212	1	.645	1.024	.924	1.135
	Constant	58.108	15205.536	.000	1	.997	172215504951 396370000000 00.000		

a. Variable(s) entered on step 1: age, ed, exp, revenue.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

From Table 6.22 above, age of the broker was significantly and positively correlated with the choice of the broker as immediate customer at 10% significance level. This is to say, as the age of the retailer increases, his role changes to becoming more of a middleman who sells through other middlemen. This can be associated with many contacts as well as trustworthiness gained.

Table 6. 23: Immediate Customer: Retailer to Retailer

		Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 ^a	age	.048	.022	4.658	1	.031**	1.049	1.004	1.097
	edn	-.288	.139	4.301	1	.038**	.750	.572	.984
	exp	-.173	.223	.603	1	.438	.841	.543	1.302
	rev	-.015	.016	.901	1	.343	.985	.954	1.017
	Constant	1.544	1.492	1.071	1	.301	4.684		

a. Variable(s) entered on step 1: age, ed, exp, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

From table 6.23 above, age of the retailers was significantly and positively correlated with the choice of fellow retailers as retailers' immediate customers at (5%) significance level. Although it is customarily known that retailers' main customers are the final consumers, however, as retailers' age increases, most of them prefer selling to their fellow retailers rather than to the consumers who are widely distributed throughout the country and abroad. Selling to individual consumers is too demanding for old age and requires too much sitting

at the marketplaces as well as movements from street to street for the case of tomato hawkers. This follows therefore that, aged retailers wish to act as agents to their fellow retailers and it is made possible due to possession of many contacts of farmers, wholesalers and brokers whom they used to work together in the past. These findings are consistent with those of Xaba and Masuku (2013b) who realized that aged cabbage farmers are reluctant to adopt new market channels with different market requirements.

It was further found out that “education of the retailers was significantly and negatively correlated with the choice of fellow retailers as retailers’ immediate customers at (5%) significance level”. This is to say, as retailers’ education increases, their choice to sell through fellow retailers decreases. This is because, educated retailers can fetch more lucrative businesses with final consumers like hotels, restaurants and supermarkets. After all, we saw from retailers’ biodata that most of the retailers from the three surveyed regions were primary school leavers. Thus, we would expect the few available educated retailers to perform differently from their fellow majority retailers. These findings are in agreement with Edoge’s (2014) findings that is, education positively improves decisions about selection of marketing channel and design.

From the results above, Table 6.13 to Table 6.23, farmers’ experience, farm size, education, revenue and age; wholesalers’ age, revenue, education and experience; brokers’ age; and retailers’ age and education were significant factors in determining TSC actors’ choice of immediate customers (SC channel) in the study area.

Table 6.24 below shows the summarised results of Discrete-Logistic Model in three columns of dependent variable, independent variable and the corresponding translation/meaning. It can generally be concluded that, farm size of the tomato farmer has a positive influence in selling direct to the market rather than selling through the middlemen.

Table 6. 24: Summarised results of Discrete-Logistic Model

S/N.	Dependent variables (Farmer's immediate customer)	Independent Variable (Choice Predictor)	Meaning	Direction of a Relationship
1	Wholesaler	Experience	This shows that 'experience' of the farmer has a negative influence on the choice of a wholesaler as an immediate customer.	Negative
		Farm Size	This shows that 'farm size' of the farmer has a positive influence on the choice of wholesalers as an immediate customer.	Positive
2	Seed Company	Education	This shows that 'education' of the farmer has a negative influence on the choice of Seed Companies as an immediate customer.	Negative
3	Retailer	Farm Size	This shows that 'farm size' of the farmer has a positive influence on the choice of the retailer as an immediate customer.	Positive
		Revenue	This shows that 'revenue' of the farmer has a positive influence on the choice of retailer as an immediate customer.	Positive
4	Consumer	Farm Size	This shows that 'farm size' of the farmer has a positive influence on the choice of the consumer as an immediate customer.	Positive
5	Broker	Age	This shows that 'age' of the farmer has a positive influence on the choice of the broker as an immediate customer.	Positive
S/N.	Dependent variables (Wholesaler's immediate customer)	Independent Variable (Choice Predictor)	Meaning	Direction of a Relationship
6	Brokers	Age	This shows that 'age' of the wholesaler has a positive influence on the choice of the broker as an immediate customer.	Positive
		Revenue	This shows that 'revenue' of the wholesaler has a negative influence on the choice of the broker as an immediate customer.	Negative
		Education	This shows that 'education' of the wholesaler has a positive influence on the choice of the broker as an immediate customer.	Positive
7	Consumer	Experience	This shows that 'experience' of the wholesaler has a positive influence on the choice of the consumer as an immediate customer.	Positive
S/N.	Dependent variables (Broker's immediate customer)	Independent Variable (Choice Predictor)	Meaning	Direction of a Relationship
8	Retailer	Age	This shows that 'age' of the broker has a negative influence on the choice of the retailer as an immediate customer.	Negative

9	Wholesaler	Age	This shows that 'age' of the broker has a positive influence on the choice of a wholesaler as an immediate customer.	Positive
S/N.	Dependent variables (Retailer's immediate customer)	Independent Variable (Choice Predictor)	Meaning	Direction of a Relationship
10	Broker	Age	This shows that 'age' of the retailer has a positive influence on the choice of the broker as an immediate customer.	Positive
11	Retailer	Age	This shows that 'age' of the retailer has a positive influence on the choice of the fellow retailer as an immediate customer.	Positive
		Education	This shows that 'education' of the retailer has a negative influence on the choice of the fellow retailer as an immediate customer.	Negative

On the other hand, there were no any independent factors which were found to be significant in determining TSC actors' choice of immediate customers in the following discrete logistic empirical models: Farmer-Processor, Wholesaler-Processor, Wholesaler to Retailer, Wholesaler to Wholesaler, Broker to Broker, Broker to Consumer, Broker to Processor, Retailer to Consumer, Retailer to Processor and Retailer to Wholesaler. The tables below (Table 6.25 to Table 6.34) refers.

Table 6. 25: Immediate Customer: Farmer to Processor

Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
age	.035	.041	.732	1	.392	1.036	.956	1.122
edn	4.272	1651.890	.000	1	.998	71.646	.000	.
exp	-12.755	4484.074	.000	1	.998	.000	.000	.
Step 1 ^a FS	.765	.598	1.636	1	.201	2.149	.665	6.939
rev	-.022	.018	1.416	1	.234	.979	.944	1.014
Constant	33.945	25226.592	.000	1	.999	552102343749 133.600		

a. Variable(s) entered on step 1: age, ed, exp, FS, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

Table 6. 26: Immediate Customer: Wholesaler to Processor

		Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 ^a	age	.022	.039	.315	1	.574	1.022	.948	1.102
	edn	-.270	.170	2.535	1	.111	.763	.547	1.064
	exp	-7.805	4838.820	.000	1	.999	.000	.000	.
	rev	.001	.001	1.597	1	.206	1.001	.999	1.004
	Constant	41.809	24194.100	.000	1	.999	143675829464 9169410.000		

a. Variable(s) entered on step 1: age, ed, exp, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

Table 6. 27: Immediate Customer: Wholesaler to Retailer

		Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 ^a	age	-4.928	258.079	.000	1	.985	.007	.000	3.440E+217
	edn	-6.779	1982.436	.000	1	.997	.001	.000	.
	exp	10.382	3757.737	.000	1	.998	32279.869	.000	.
	rev	-1.090	25.852	.002	1	.966	.336	.000	34036564692 06030400000. 000
	Constant	204.008	32804.609	.000	1	.995	3.978E+088		

a. Variable(s) entered on step 1: age, ed, exp, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

Table 6. 28: Immediate Customer: Wholesaler to Wholesaler

Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
age	.003	.029	.010	1	.921	1.003	.948	1.061
edn	-.168	.125	1.812	1	.178	.845	.662	1.080
Step 1 ^a exp	-.029	.292	.010	1	.922	.972	.549	1.722
rev	.000	.001	.292	1	.589	1.000	.999	1.001
Constant	1.807	2.006	.811	1	.368	6.091		

a. Variable(s) entered on step 1: age, ed, exp, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

Table 6. 29: Immediate Customer: Broker to Broker

Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
age	.025	.088	.078	1	.780	1.025	.863	1.218
Step 1 ^a edn	-.354	.350	1.024	1	.312	.702	.354	1.393
revenue	-.007	.007	.999	1	.318	.993	.979	1.007
Constant	4.913	6.380	.593	1	.441	136.030		

a. Variable(s) entered on step 1: age, ed, revenue.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

Table 6. 30: Immediate Customer: Broker to Consumer

Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
age	.058	.076	.579	1	.447	1.060	.912	1.231
Step 1 ^a edn	4.820	3506.103	.000	1	.999	123.936	.000	.
rev	.010	.011	.937	1	.333	1.010	.990	1.031
Constant	-35.173	24542.724	.000	1	.999	.000		

a. Variable(s) entered on step 1: age, ed, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

Table 6. 31: Immediate Customer: Broker to Processor

Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
age	-7.667	1227.831	.000	1	.995	.000	.000	.
edn	-43.433	5285.326	.000	1	.993	.000	.000	.
rev	-.342	149.443	.000	1	.998	.710	.000	1.141E+127
Constant	812.149	118578.830	.000	1	.995	.		

a. Variable(s) entered on step 1: age, ed, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

Table 6. 32: Immediate Customer: Retailer to Consumer

Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
age	.000	.091	.000	1	1.000	1.000	.837	1.195
edn	-.241	.479	.253	1	.615	.786	.307	2.010
exp	-.931	.861	1.168	1	.280	.394	.073	2.132
rev	.006	.066	.008	1	.927	1.006	.884	1.144
Constant	1.041	5.241	.039	1	.843	2.831		

a. Variable(s) entered on step 1: age, ed, exp, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

Table 6. 33: Immediate Customer: Retailer to Processor

Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
age	-.126	.083	2.300	1	.129	.881	.749	1.038
edn	-.037	.616	.004	1	.952	.964	.288	3.224
exp	-10.443	3028.126	.000	1	.997	.000	.000	.
rev	-.010	.070	.020	1	.887	.990	.863	1.136
Constant	61.898	15140.630	.000	1	.997	761650313444 217200000000 000.000		

a. Variable(s) entered on step 1: age, ed, exp, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

Table 6. 34: Immediate Customer: Retailer to Wholesaler

		Variables in the Equation						95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1 ^a	age	.038	.053	.517	1	.472	1.039	.936	1.154
	edn	-.362	.241	2.260	1	.133	.696	.434	1.116
	exp	.119	.522	.052	1	.820	1.126	.405	3.136
	rev	-.040	.034	1.387	1	.239	.961	.900	1.027
	Constant	4.824	3.354	2.069	1	.150	124.508		

a. Variable(s) entered on step 1: age, ed, exp, rev.

Key: *** is significant at 1% level; ** is significant at 5% level; * is significant at 10%

6.8 Hypotheses Testing

- **H₀1: Understanding of customer requirements and expectations strongly impact the structure of TSC.**

The following four sub hypotheses to H₀1 were formulated and tested:

H₀1a: Farmers don't understand the requirements and expectations of their customers.

H₀1b: Wholesalers don't understand the requirements and expectations of their customers.

H₀1c: Brokers don't understand the requirements and expectations of their customers.

H₀1d: Retailers don't understand the requirements and expectations of their customers.

Test Results

H₀1a: Farmers understand the requirements and expectations of their customers.

Table 6. 35: Farmers understand the requirements and expectations of their customers

Farmers' Test Statistica							
	Customer requirements and expectations						
	Fast delivery: farmer-customer	Price (& discounts): farmer-customer	Delivery reliability: farmer-customer	Quality: farmer-customer	Customer care: farmer-customer	location: farmer-customer	others: farmer-customer
Z	-3.266 ^b	-2.449 ^c	-.894 ^c	-2.683 ^b	-6.000 ^b	.000 ^d	.000 ^d
Asymp. Sig. (2-tailed)	.001	.014	.371	.007	.000	1.000	1.000
Significance	significant	Significant	Not significant	Significant	significant	Not significant	Not significant
Decision	Reject	Reject	Fail to reject	Reject	Reject	Fail to reject	Fail to reject

- a. Wilcoxon Signed Ranks Test
- b. Based on positive ranks.
- c. Based on negative ranks.
- d. The sum of negative ranks equals the sum of positive ranks.

Table 6.35 above shows results from Wilcoxon signed-ranks test. For H_{01a}: A Wilcoxon signed test-ranks test is significant at the following customer requirements and expectations: fast delivery, price (& discounts) and quality where p-value is less than the 0.05 significance level; and customer care where p-value is less than the 0.001 significance level, hence, we reject the null hypothesis. However, the same test is not significant at the following customer requirements and expectations: delivery reliability, location and others, hence, we fail to reject the hypothesis.

H_{01b}: Wholesalers understand the requirements and expectations of their customers.

Table 6. 36: Wholesalers understand the requirements and expectations of their customers

Wholesalers Test Statisticsa							
	Customer requirements and expectations						
	Fast delivery: W/saler-customer	Price (& discounts): W/saler - customer	Delivery reliability: W/saler - customer	Quality: W/saler-customer	Customer care: W/saler-customer	location: W/saler-customer	others: W/saler-customer
Z	-.816 ^b	-1.279 ^b	.000 ^c	-2.000 ^d	-2.683 ^d	-2.000 ^b	.000 ^c
Asymp. Sig. (2-tailed)	.414	.201	1.000	.046	.007	.046	1.000
Significance	Not significant	Not Significant	Not Significant	Significant	Significant	Significant	Not Significant
Decision	Fail to reject	Fail to Reject	Fail to Reject	Reject	Reject	Reject	Fail to Reject

- a. Wilcoxon Signed Ranks Test
- b. Based on negative ranks.
- c. The sum of negative ranks equals the sum of positive ranks.
- d. Based on positive ranks.

Table 6.36 above shows results from Wilcoxon signed-ranks test. For H₀1b: A Wilcoxon signed test-ranks test is significant at the following customer requirements and expectations: quality, and location where p-value is less than the 0.05 significance level; and customer care where p-value is less than the 0.01 significance level, hence, we reject the null hypothesis. However, the same test is not significant at the following customer requirements and expectations: fast delivery, Price (& discounts), delivery reliability and others, hence, we fail to reject the hypothesis.

H₀1c: Brokers understand the requirements and expectations of their customers.

Table 6. 37: Brokers understand the requirements and expectations of their customers

Table 6.37: Brokers Test Statistics^a

	Customer requirements and expectations						
	Fast delivery: Broker-customer	Price (& discounts): Broker - customer	Delivery reliability: Broker - customer	Quality: Broker-customer	Customer care: Broker-customer	location: Broker-customer	others: Broker-customer
Z	-2.000 ^b	-1.414 ^c	-.816 ^c	-1.414 ^c	-1.414 ^c	.000 ^d	.000 ^d
Asymp. Sig. (2-tailed)	.046	.157	.414	.157	.157	1.000	1.000
Significance	Significant	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
Decision	Reject	Fail to reject	Fail to reject	Fail to reject	Fail to reject	Fail to Reject	Fail to Reject

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

c. Based on positive ranks.

d. The sum of negative ranks equals the sum of positive ranks.

Table 6.37 above shows results from Wilcoxon signed-ranks test. For H₀1c: A Wilcoxon signed test-ranks test is significant at the following customer requirement and expectations: fast delivery where p-value is less than the 0.05 significance level, hence, we reject the null hypothesis. However, the same test is not significant at the following customer requirements and expectations: Price (& discounts), delivery reliability, quality, customer care, location and others where p-value is greater than 0.05 significance level, hence, we fail to reject the hypothesis.

H₀1d: Retailers understand the requirements and expectations of their customers.

Table 6. 38: Retailers understand the requirements and expectations of their customers

Table 6.38: Retailers Test Statistics^a

	Customer requirements and expectations						
	Fast delivery: Retailer-customer	Price (& discounts): Retailer - customer	Delivery reliability: Retailer - customer	Quality: Retailer-customer	Customer care: Retailer-customer	location: Retailer-customer	others: Retailer-customer
Z	-2.309 ^b	-1.732 ^c	-.632 ^c	-1.897 ^b	-4.243 ^b	.000 ^d	.000 ^d
Asymp. Sig. (2-tailed)	.021	.083	.527	.058	.000	1.000	1.000
	Significant	Significant	Not significant	Significant	Significant	Not Significant	Not Significant
	Reject	Reject	Fail to reject	Reject	Reject	Fail to Reject	Fail to Reject

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

c. Based on positive ranks.

d. The sum of negative ranks equals the sum of positive ranks.

Table 6.38 above shows results from Wilcoxon signed-ranks test. For H_01d : A Wilcoxon signed test-ranks test is significant at the following customer requirements and expectations: fast delivery where p-value is less than the 0.05 significance level; Price (& discounts), and quality where p-value is less than the 0.01 significance level; and customer care where p-value is less than the 0.001 significance level, hence, we reject the null hypothesis. However, the same test is not significant at the following customer requirements and expectations: fast delivery, Price (& discounts), delivery reliability, quality, location and others, hence, we fail to reject the hypothesis.

Discussion:

H_01 : Understanding of customer requirements and expectations strongly impact the structure of the TSC.

Customer requirements and expectations:

Each TSC actors is a supplier and customer to other actors. For instance, a tomato retailer is a supplier of tomato to the final consumers whereas, at the same time, the retailer is a customer to those who supply him/her with tomato, for example farmers, wholesalers or brokers. In order to be a preferred seller to a particular customer, you need to clearly understand, meet and if possible, exceed your customers’ requirements and expectations.

As a supplier, in order to be in a position to meet and exceed your customers’ requirements, you need to create capacity –capacity within your organization, but also capacity as you related to your suppliers. Gaining capacity through interaction with your suppliers is made possible if you will demand the same requirements as your customers demand from you.

Structure of the TSC

We have seen from section 6.5.1.2.7 “Summary of immediate customers and suppliers” above that, structure of the TSC can be short, medium or long depending on whether goods are delivered directly to consumers or are allowed to go through middlemen.

For an actor to sell or not to sell, sell much or sell less to a particular customer, it all depends on the extent to which customer requirements and expectations are aligned.

To enable testing of H₀₁, four sub-hypotheses were formulated as follows:

H_{01a}: Farmers don’t understand the requirements and expectations of their customers.

H_{01b}: Wholesalers don’t understand the requirements and expectations of their customers.

H_{01c}: Brokers don’t understand the requirements and expectations of their customers.

H_{01d}: Retailers don’t understand the requirements and expectations of their customers.

Table 6.39 below gives a summary of hypothesis testing for H₀₁ and its sub hypotheses (H_{01a}-H_{01d}).

Table 6. 39: Summary of hypotheses testing for H_{01a-d}

S/N.	Customer requirements and expectations	Actors				
		Farmer	Wholesaler	Broker	Retailer	Final Customer/consumer
1	Fast delivery	√	x	√	√	
2	Price (& discount)	√	x	x	√	
3	Delivery reliability	x	x	x	x	x
4	Quality	√	√	x	√	
5	Location	x	√	x	x	x
6	Others	x	x	x	x	x
7	Customer care	√	√	x	√	

From table 6.39 above, final customers/consumers’ requirements are four, namely: fast delivery, price (& discount), quality and customer care. Out of these four requirements, the

farmers and the retailers understand and meet them all. This can be translated that; the farmers and the retailers are best positioned to be the preferred final customers/consumers' immediate suppliers; hence, more orders are expected from the final customers/consumers and more sales by the farmers and retailers. As Horte and Ylinenpaa (1997) said a competitive firm wins orders on the market, which has a positive impact on its sales performance. Similarly, Ketchen et al., (2008) add that, organizations that build best value will enhance their performance. However, this conclusion does not exclusively restrict other actors from selling to final customers/consumers. This is because, at least each of them fulfils some of the final customers/consumers requirements. For instance, the wholesalers understand and meet two of the final customers' requirements namely: quality and customer care whereas the brokers understand and meet only one of the final customers' requirement which is fast delivery. Given the location of the famers - in remote area far from urban markets, they are mostly positioned to sell through the middlemen.

Conclusion of H₀₁ Testing:

Understanding of customer requirements and expectations strongly impact the structure of the TSC.

From Table 6.39 above, if the red (x) and green (√) blocks are to represent routes of the tomatoes from farmers through middlemen to final customers/consumer, it is then evident that, from understanding the customers' requirements and expectations, long, medium and short routes of the product, in our case tomato are created. Examples of the routes and their influencing customers' requirements and expectations (in brackets) include: Farmer-Broker-Retailer-Consumer (fast delivery); Farmer-Wholesaler-Retailer-Consumer (quality); and Farmer-Wholesaler-Retailer-Consumer (customer care). Examples of the medium routes and their influencing customers' requirements and expectations (in brackets) include: Farmer-Broker-Consumer (fast delivery); Farmer-Retailer-Consumer (fast delivery; price (& discount); quality and customer care). On the other hand, examples of the short routes include: Farmer-Consumer (fast delivery; price (& discount); quality and customer care); Wholesaler-Consumer (quality and customer care); Broker-Consumer (fast delivery) and Retailer to Consumer (fast delivery; price (& discount); quality and customer care). Thus, from these evidences, it is hereby concluded true that "understanding

of customers' requirements and expectations strongly impact the structure of the TSC" (H₀₁). However, chances for improvement are there for the farmers and the wholesalers if they wish to also sell more to final consumers. What matters is, to what extent are you prepared to understand and meet the requirements and expectations of the customer. In the results of Banchuen et al. (2017) it was concluded that "firms that focus on flexibility, quality, and delivery should develop strategic collaboration with suppliers to achieve market and innovation improvement, whereas, cost-and quality-focused firms should develop operational collaboration to achieve resource efficiency". Strategic collaboration and operational collaboration are two different SC structures. Thus, the null hypothesis: H₀₁: Understanding of customer requirements and expectations strongly impact the structure of the TSC is accepted.

- **H₀₂: There is no significant difference between total costs and total revenue in tomato farming or trading.**

The following sub hypotheses to H₀₂ were formulated and test:

H_{02a}: There is no significant difference between total costs and total revenue in farming

H_{02b}: There is no significant difference between total costs and total revenue in tomato wholesale

H_{02c}: There is no significant difference between total costs and total revenue in tomato brokerage

H_{02d}: There is no significant difference between total costs and total revenue in tomato retail

Results: T-Test for Farmers, Wholesalers, Brokers and Retailers

Note: Intention of sample T-test is to compare mean of two samples in this case: mean for Total revenue and Total farming cost for farmers and mean for Total costs and total revenue for the case of wholesalers, brokers and retailers of tomatoes.

Table 6. 40: Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
FARMERS					
Pair 1	Total revenue	221.76	120.00	239.999	21.909
	Total farming cost	83.97	120.00	110.730	10.108
WHOLESALEERS					
Pair 1	Total revenue	334.91	82.00	382.165	42.203
	Total cost	23.89	82.00	30.459	3.364
BROKERS					
Pair 1	Total revenue	137.02	26.00	109.603	21.495
	Total cost	7.55	26.00	7.961	1.561
RETAILERS					
Pair 1	Total revenue	16.23	140.00	11.434	.966
	Total Cost	.29	140.00	.579	.049

Table 6.40 above shows a summary for the four pairs of samples which were tested in the analysis of farmers, wholesalers, brokers and retailers as described below:

a) Farmers:

The Total revenue mean is (221.76) and Std. Deviation is (239.999) while Total farming cost mean is (83.97) and Std. Deviation is (110.730). The Std. Deviation is large for both items meaning that there is big difference in Total revenue and Total farming cost from individual farmers. This reveals that the cost of farming differs/varies from small to large farmers.

b) Wholesalers

For the case of wholesalers, findings are as follows: Total revenue mean (334.91) and Std. Deviation (382.165) while Total cost mean (23.89) and Std. Deviation (30.459).

The Std. Deviation is large for both items meaning that there is big difference in Total costs and total revenue from individual wholesalers.

c) Brokers

For the case of brokers, findings are as follows: Total revenue mean is (137.02) and Std. Deviation is (109.603) while Total cost mean is (7.55) and Std. Deviation is (7.961). The Std. Deviation is large for total costs meaning that there is big difference in Total cost from individual brokers that it is with total revenues.

d) Retailers

For the case of retailers, findings are as follows: The Total revenue mean is (16.23) and Std. Deviation is (11.434) while Total cost mean is (.29) and Std. Deviation is (.579). The Std. Deviation is large for total costs meaning that there is big difference in Total cost from individual retailers. This is not the case with total revenue.

Table 6. 41: Paired Samples Correlations

		N	Correlation (r)	Sig.
FARMERS				
Pair 1	Total revenue & Total farming cost	120	.343	.000
WHOLESALERS				
Pair 1	Total revenue & Total cost	82	.857	.000
BROKERS				
Pair 1	Total revenue & Total cost	26	.751	.000
RETAILERS				
Pair 1	Total revenue & Total Cost	140	.297	.000

From table 6.41 above, the correlation between Total revenue and Total farming cost for farmers is weak-positive (0.343) and highly significant at 0.000 (Sig is less than 0.001). This tells us that regardless of the costs incurred by the farmer in tomatoes farming in such aspects like labor, machinery, farm size, and input (seeds, fertilizers and chemicals) costs, the chance to realize profit after selling the tomatoes is guaranteed. However, other factors like adverse weather condition, outbreak of pests and diseases may impact the net harvest quantity. Moreover, fluctuation of market price and the issue of PHL may still impact the profit earned by farmers. Similarly, the correlation between Total revenue and Total trading costs for retailers is weak-positive (0.297) and highly significant at 0.000 (Sig is less than 0.001).

For the case of middlemen that is the wholesalers and brokers, there is a strong-positive relationship between Total revenue and the total costs directly incurred in their tomato business. The correlation coefficients (r) for the middlemen (wholesalers and brokers) as shown on Table 6.41 above are: 0.857 and 0.751 respectively and they are all highly significant at 0.000 (Sig is less than 0.001). This implies that the wholesalers and brokers have a better chance than farmers and retailers of earning profit in tomato business. This is because, as they increase the amount used to purchase tomatoes, the profit also increases.

Table 6. 42: Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)	conclusion
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
					Lower	Upper				
FARMERS										
Pair 1	Total revenue - Total farming cost	137.791	222.203	20.741	96.723	178.860	6.644	119	.000	significant
WHOLESALEERS										
Pair 1	Total revenue - Total cost	311.022	356.403	39.358	232.712	389.333	7.902	81	.000	significant
BROKERS										
Pair 1	Total revenue - Total cost	129.462	20.349	87.553	171.371	6.371	6.362	25	.000	significant
RETAILERS										
Pair 1	Total revenue - Total Cost	15.937	11.275	.953	14.052	17.821	16.723	139	.000	significant

According to Table 6.42 above-paired samples test, since the p-value for farmers denoted by Sig 0.000 (2-tailed test) is less than or equal to 0.001 the result is statistically highly significant, that is, there is statistically significant difference between the Total revenue in Tanzanian shillings by farmers and total farming cost. This is to say, the difference between Total revenue and total farming costs are not likely due to chance. Thus, our H₀2a: There is no significant difference between total costs and total revenue in farming is rejected and the alternative hypothesis: H₁2a: There is significant difference between total costs and total revenue in farming is accepted for farmers.

Same results were found for wholesalers, brokers and retailers whose p-value denoted by Sig 0.000 (2-tailed test) is less than or equal to 0.001, thus the results are statistically highly

significant at wholesalers, brokers and retailers. In other words, the difference between Total costs and total revenue by wholesalers, brokers and retailers are not likely due to chance. Thus, our H_{02b} , H_{02c} and H_{02d} are rejected instead, the alternative hypotheses H_{12b} , H_{12c} and H_{12d} namely: There is significant difference between total costs and total revenue in tomato wholesale; There is significant difference between total costs and total revenue in tomato brokerage; and There is significant difference between total costs and total revenue in tomato retail respectively are accepted.

- **H_{03} : There is no significant relationship between various actors in TSC.**

The following testable sub hypotheses to H_{03} were formulated and tested:

H_{03a} : There is no significant relationship between farmer and wholesaler in TSC.

H_{03b} : There is no significant relationship between farmer and retailer in TSC.

H_{03c} : There is no significant relationship between farmer and broker in TSC.

H_{03d} : There is no significant relationship between farmer and consumer in TSC.

H_{03e} : There is no significant relationship between wholesaler and broker in TSC.

H_{03f} : There is no significant relationship between wholesaler and fellow wholesaler in TSC.

H_{03g} : There is no significant relationship between wholesaler and retailer in TSC.

H_{03h} : There is no significant relationship between wholesaler and consumer in TSC.

H_{03i} : There is no significant relationship between broker and retailer in TSC.

H_{03j} : There is no significant relationship between broker and fellow broker in TSC.

H_{03k} : There is no significant relationship between broker and wholesaler in TSC.

H_{03l} : There is no significant relationship between broker and consumer in TSC.

H_{03m} : There is no significant relationship between retailer and consumer in TSC.

H_{03n} : There is no significant relationship between retailer and fellow retailer in TSC.

Test Results

The above sub hypotheses to H₀₃ were tested by using Wilcoxon Signed-ranks test. The following tables (Table 6.43, 6.44, 6.45 and 6.46) show the respective results for farmers', brokers', wholesalers' and retailers' relationships with other actors in the TSC.

a) Relationship between farmer and various actors in TSC

Table 6. 43: Relationship between farmer and various actors in TSC

<i>Farmers' Test Statistics^a</i>				
	Relationship (Degree of Collaboration) between:			
	farmers and wholesalers	farmers and retailers	farmers and brokers/agents	farmers and final customers
Z	-6.056 ^b	-4.482 ^b	-5.783 ^b	-.591 ^b
Asymp. Sig. (2-tailed)	.000	.000	.000	.554
	Significant	Significant	Significant	Not Significant
	Reject	Reject	Reject	Fail to reject

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

As the first three p-values in Table 6.43 above turned to be 0.000 and are less than 0.001 significance level, we therefore reject the three null hypotheses. On the other hand, as the last p-value in Table 6.43 above turned to be 0.554 and is larger than 0.05 significance level, we fail to reject the null hypothesis. Table 6.47 below summarizes these results.

b) Relationship between broker and various actors in TSC

Table 6. 44: Relationship between broker and various actors in TSC

<i>Brokers' Test Statistics^a</i>				
	Relationship (Degree of Collaboration) between:			
	brokers/agents and retailers	brokers/agents and their fellow brokers/agents	brokers/agents and wholesalers	brokers/agents and consumers
Z	-2.853 ^b	-3.274 ^b	-3.236 ^b	-1.069 ^b
Asymp. Sig. (2-tailed)	.004	.001	.001	.285
	Significant	Significant	Significant	Not significant
	Reject	Reject	Reject	Fail to reject

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

As the first three p-values in Table 6.44 above turned to be 0.004, 0.001, and 0.001 and are less than 0.01 significance level, we reject the three null hypotheses. On the other hand, as

the last p-value in Table 6.44 above turned to be 0.285 and is larger than 0.05 significance level, we fail to reject the null hypothesis. Table 6.47 below summarizes these results.

c) Relationship between retailer and various actors in TSC

Table 6. 45: Relationship between retailer and various actors in TSC

Retailers' Test Statisticsa

	Relationship (Degree of Collaboration) between:	
	retailers and consumers	retailers and other retailers
Z	-7.229 ^b	-7.280 ^b
Asymp. Sig. (2-tailed)	.000	.000
	Significant	Significant
	Reject	Reject

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

As both p-values in table 6.45 above turned to be 0.000 and are less than 0.001 significance level, we reject the two null hypotheses. Table 6.47 below summarizes these results.

d) Relationship between wholesaler and various actors in TSC

Table 6. 46: Relationship between wholesaler and various actors in TSC

Wholesalers' Test Statisticsa

	Relationship (Degree of Collaboration) between:			
	wholesalers and brokers/agents	wholesalers and retailers	wholesalers and consumers	wholesalers and other wholesalers
Z	-5.588 ^b	-4.446 ^b	-5.797 ^c	-4.388 ^b
Asymp. Sig. (2-tailed)	.000	.000	.000	.000
	Significant	Significant	Significant	Significant
	Reject	Reject	Reject	Reject

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

c. Based on negative ranks.

As all the four p-values in Table 6.46 above turned to be 0.000 and are less than 0.001 significance level, we reject the four null hypotheses. Table 6.47 below summarizes these results.

Discussion

Farmers' relationship (Degree of collaboration) with their immediate customers

When the wholesaler is an immediate customer to a farmer, then, the relationship (degree of collaboration) between the two parties is significant. This means that the level of collaboration between farmers and wholesalers is strong when one-party buys from and sells to the other party directly respectively. Similarly, the relationship (degree of collaboration) between farmer and broker/agent or retailer is strong when the broker and retailer buys from farmers. However, there is no significant relationship between farmer and final consumer, this is because, the farmer hardly sells to the final consumer directly.

Brokers' relationship (Degree of collaboration) with their immediate customers

When the retailers, fellow brokers and wholesalers are immediate customers to brokers, then, the relationship (degree of collaboration) between the respective two parties (retailer & broker, fellow broker & broker, wholesaler & broker) is significant. This means that the level of collaboration between retailer and broker, fellow broker and broker and wholesaler and broker is strong when the retailer, fellow broker and wholesaler buy directly from broker. However, there is no significant relationship between broker and final consumer, this is because the broker hardly sells to final consumers directly.

Retailers' relationship (Degree of collaboration) with their immediate customers

When the consumers and other retailers are immediate customers to retailers, then, the relationship (degree of collaboration) between the two respective parties (customer & retailer, other retailers and retailer) is significant. This means that collaboration between customers and retailers, and retailer and other retailers is strong when the consumers and other retailers buy from retailers.

Wholesalers' relationship (Degree of collaboration) with their immediate customers

When the brokers/agents, retailers, consumers and other fellow wholesalers are immediate customers to wholesalers, then, the relationship (degree of collaboration) between the two respective parties (brokers & wholesalers, retailers & wholesalers, consumers and wholesalers and other fellow wholesalers and wholesalers) is significant. This means that collaboration between brokers and wholesalers, retailers and wholesalers, consumers and wholesalers and other fellow wholesalers and wholesalers is strong when the brokers, retailers, consumers, and other fellow wholesalers buy directly from wholesalers.

Table 6. 47: Hypotheses Testing Summary results

Sub-Hyp.	Hypotheses
H _{13a}	There is significant relationship between farmer and wholesaler in TSC
H _{13b}	There is significant relationship between farmer and retailer in TSC.
H _{13c}	There is significant relationship between farmer and broker in TSC.
H _{03d}	There is no significant relationship between farmer and consumer in TSC.
H _{13e}	There is significant relationship between wholesaler and broker in TSC.
H _{13f}	There is significant relationship between wholesaler and fellow wholesaler in TSC.
H _{13g}	There is significant relationship between wholesaler and retailer in TSC.
H _{13h}	There is significant relationship between wholesaler and consumer in TSC.
H _{13i}	There is significant relationship between broker and retailer in TSC.
H _{13j}	There is significant relationship between broker and fellow broker in TSC.
H _{13k}	There is significant relationship between broker and wholesaler in TSC.
H _{03l}	There is no significant relationship between broker and consumer in TSC.
H _{13m}	There is significant relationship between retailer and consumer in TSC.
H _{13n}	There is significant relationship between retailer and fellow retailer in TSC.

Conclusions of H₀₃ Testing

As we have seen from the results of hypothesis testing above, the null hypothesis “H₀₃: There is no significant relationship between various actors in TSC” has been rejected in 12 out of 14 cases. In these 12 cases, the alternative hypothesis “There is significant relationship between various actors in TSC structure” is proved right in the following pairs: farmer and (wholesalers, retailers and brokers); broker and (fellow brokers, wholesalers and consumers); retailer and (consumers and fellow retailers); wholesaler and (brokers, retailers, consumers and fellow wholesalers).

However, in very few (2 out of 14) cases, the null hypothesis “There is no significant relationship between various actors in TSC structure” was proved right. These include relationship between farmer and consumers; and broker and consumers.

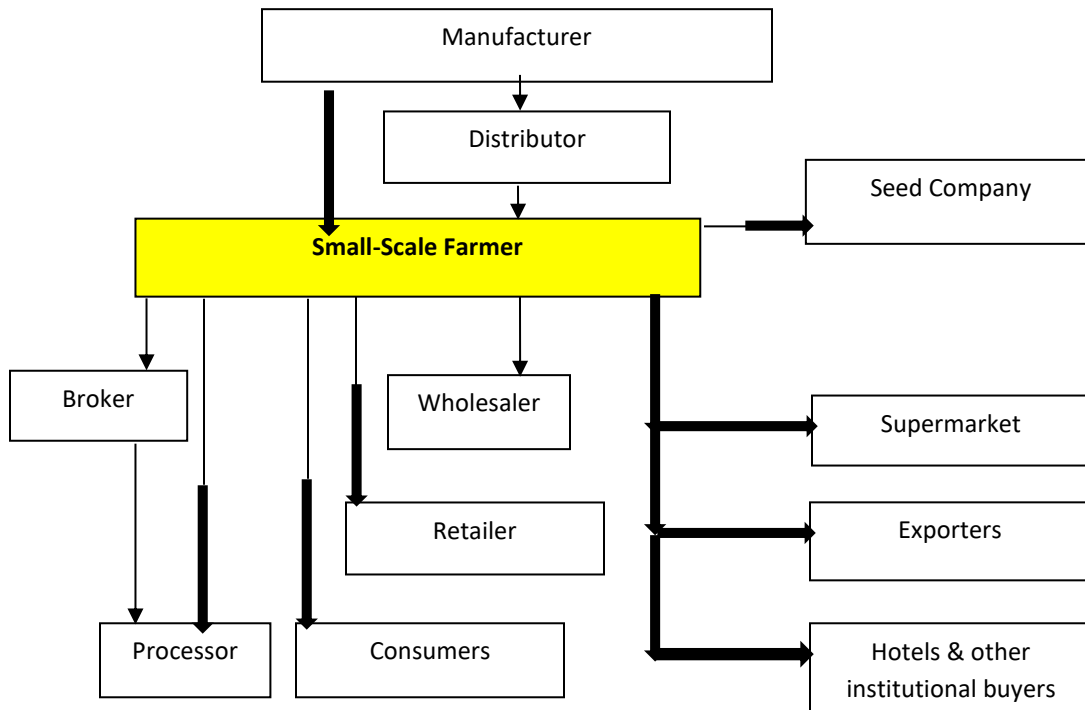
6.9 Suggestion for an SC Performance Model

6.9.1 Wished TSC Map (Design) by Small-Scale Tomato Farmers

Figure 6.74 below depicts the wished TSC map (design) by the small-scale tomato farmers. The new wishes/requirements of the small-scale farmers have arisen after realizing that the existing arrangement is not on their favour but rather on the favour of other actors mainly middlemen. In the existing configuration, about (90%) of the farmers’ tomatoes go through the longest route; that is, through middlemen who normally purchase tomatoes from farmer’s fields or village collection centres at low price and then transport them and sell to consumers normally in urban markets at high prices hence, earning the large share of consumer’s price. In the wished TSC map (design), a large share of the small-scale farmers’ tomatoes will be sold directly to consumers and more formalized market segments such as supermarkets, exporters, hotels and other institutional buyers such as schools and hospitals inter alia. The wished design is in fact in favour of the small-scale farmers. However, its implementation cannot be absolutely fruitful as expected. This is because, the farmers will still be fragmented hence, remain an unattractive to work with the wished formalized markets. It’s very difficult for instance supermarkets, processors, seed companies and exporters to engage into say CF with individual farmers because of their number (too many) and unmanageable. Failure to implement CF for instance and/or any other prior agreement can be translated to lack of cost advantages in overcoming quality control and investment issues associated with spot market. Moreover, a complete elimination of the middlemen from the TSC is also not absolutely feasible. Middlemen are very important actors who ensure that there is a seamless flow of goods in the market by matching supply and demand. The current problem with farmers-middlemen interaction is imbalance in bargaining power whereby the middlemen are more powerful, hence, dictate in everything such as price, quality and payment terms. From upstream point of view, the current TSC as well as the wished one both do not show how well farm inputs information and money will flow to and from farmers and suppliers respectively. Similarly, the issue of power

imbalance is also thought to exist in the upstream SC whereby, input suppliers have more power hence, able to influence price, quality, delivery and other sourcing objectives. This power imbalance is because each farmer places small-several-orders which cannot influence the suppliers to give any preferential treatments or recognition such as price discount, home delivery, quality improvements schemes and lead time reduction.

Figure 6. 74: The Existing and the ‘wished’ TSC Map (design) for small-scale farmers



Key:

- The Existing TSC map (design)
- The wished TSC map (design)
- The Current TSC map (design) and is wished to continue

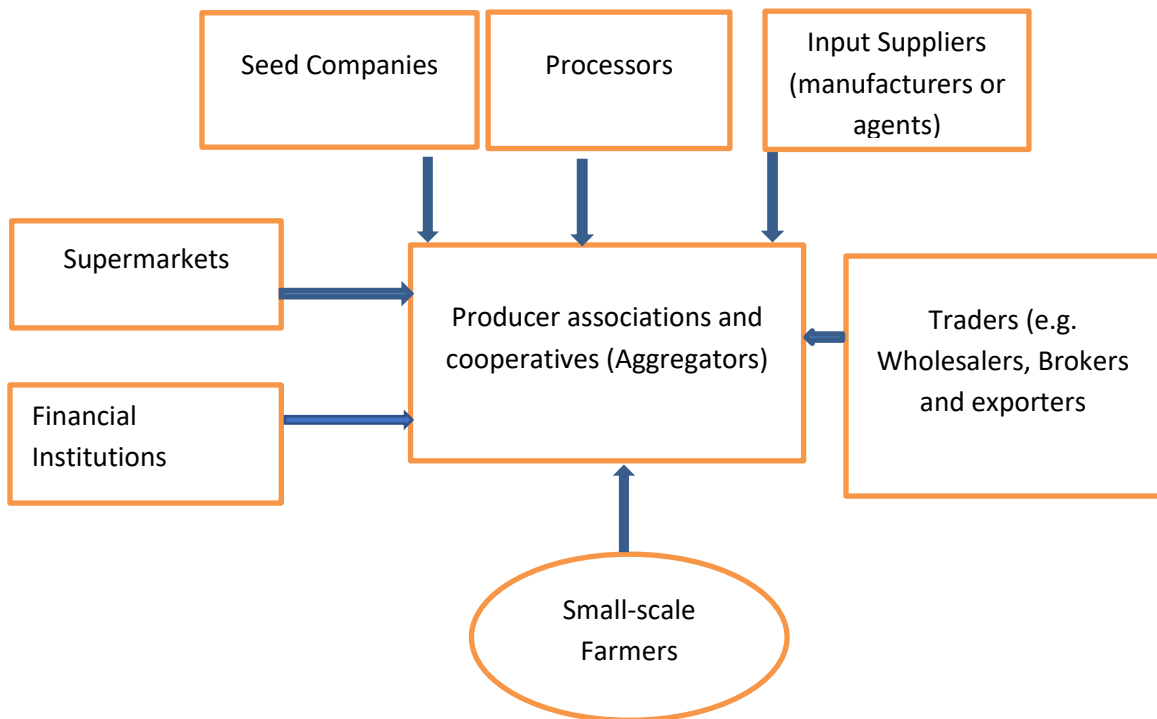
(Source: Field observation by researcher, 2016)

Notes on Figure 6.74 above: a) the small-scale farmers wish that they could be selling to supermarkets, exporters and hotels as they consider them reliable customers. b) the successful move of more small-scale farmers be selling to supermarkets, exporters and hotels will imply the move towards formalization of TSC in Tanzania.

6.9.2 A suggest SC performance model for small-scale tomato farmers using well-established performance indicators

After considering the drawbacks to the small-scale farmers' wished supply design, this researcher has suggested a workable design presented in Figure 6.75 below that builds on the aforementioned deficiencies.

Figure 6. 75: The Suggested TSC Map (Design)



6.9.2.1 Explanations of the Suggested SC Map (Design)

This model map (design) is designed to bring and develop small-scale tomato farmers together by establishing farmers' associations within farmers' localities. A minimum of 50 progressive farmers or farmers of good track records will form one association. The individual farmer to constitute an association shall be as follows: have grown tomatoes in the recent past years or seasons and has shown noticeable efforts and results, should have a great belief or trust in building shared values with fellow-farmers and other actors in the TSC (togetherness is power) and should be ready to pay an entrance fee of TZS. fifty thousand only. Moreover, leaders for the association will be selected from amongst the

farmers. At least four leaders including chairperson, secretary, treasurer and materials officer/storekeeper will be selected from among the members. These leaders should have very good track records related to tomato farming and/or marketing as well as visible management and organizational skills. The leaders will facilitate registration of the association with government authorities, opening of bank account in such banks committed to assist farmers, acquiring an office space and organizing all the association matters including introducing the association to other important stakeholders such as the potential tomato buyers like supermarkets, processors, traders (including exporters, wholesalers and brokers), seed companies as well as input suppliers and financial institutions. The leaders will be also responsible for calling meetings. Regular meetings will be organized once in a month whereas ad hoc meetings will be convened whenever thought important, for instance when there is an outbreak of a disease affecting tomatoes that need an immediate attention. During regular meetings, information will be shared to all members for the issues such as demand, supply and price trends. Moreover, in house training sessions will be organized as well as field visits in relation to GAP. Facilitators of these training sessions will be the leaders as well as different business partners especially those with vested interest like supermarkets, processors, financial institutions, input suppliers, traders, seed companies and government officials such as extension officers. These direct interactions between farmers and other stakeholders including customers and suppliers will be a good platform of sharing the likes and dislikes in products and produces type, quality, quantity, price, delivery and payment terms inter alia. Consequently, the quantity, quality, price, and other general delivery and payment terms will be improved accordingly.

After establishing the associations, the farmers will continue to work in their tomato fields independently as before and together in association depending on the nature of the activity. The activities to be performed jointly will include for instance, digging water holes for irrigation, sharing working equipment like sprayers, harvesting, shipping together to collection centres and selling together to customers or consumers. On the other hand, procurement of farming inputs from suppliers will be consolidated and a single order will be placed from the suppliers, mostly manufacturers and agents for particular inputs at a particular time. Moreover, the act of small-scale farmers working together in associations will give the financial institutions more confidence than if the farmers were working

independently. In this case therefore, loans to finance agricultural activities will be given to the farmers through their associations. Likewise, the potential customers such as supermarkets, processors, traders and seed companies will also be more confident in signing CF agreements with farmers through their association. CF has cost advantages in overcoming quality control and farmers' investment issues.

Owing to the above, the current TSC configuration (from small-scale farmers perspective) will be transformed from traditional, production-driven dominated with spot markets to value-based consumer-cantered focus characterized by shared information, shared commitment to control produce quality and consistence, shared values and vision, shared decision-making among the strategic partners and shared risks and rewards. Consequently, the prices to the consumer will be lower and those to the small-scale farmers higher than is traditionally anticipated whereas those within the chain will benefit from enhanced commissions or margins. In other words, it will be a "win-win" situation for all the actors involved. However, despite how good this model will be, it is open for challenges. This is due to the fact that, there is no one best configuration in place; as even the Dell model where intermediaries are bypassed is still not a panacea for all SC configuration problems (Lien et al. (2011).

6.10 Chapter Summary

In this chapter, the researcher's empirical results and discussion are presented. The results related to respondents' profiles, reliability measurements of the questionnaire, general analysis of the TSC actors (primary and secondary) are presented. Results for operationalization of the research model (discrete logistic model) are also presented and discussed. The three formulated hypotheses for this study have also been tested. More importantly, a new SC model (design) aimed at empowering small-scale tomato farmers has been suggested. The chapter concludes by giving this section of chapter summary.

CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

This chapter presents the summary of conclusions, recommendations and limitations of the study. The chapter's contents are based on results and findings of this study.

7.2 Conclusions

The first step in designing agri-SC is the analysis of the existing system and its environment. In this study, an analysis of the nature and status of the TSC that was prevailing in Tanzania using Arusha, Iringa, and Dar es Salaam regions as cases was conducted. This analysis covered the complete TSC structure from input supply through on-farm productivity, processing, to transport and freight to the markets of fresh tomatoes. The product flow, available facilities and the forces affecting the TSC; the current and potential TSC actors, their functions, roles and relationships; identification of the focal firm or the chain leader and assessment of its acceptance, and the performance assessment of the existing TSC were all investigated and identified. The main objective of this study was to contribute to the development of TSC in Tanzania with respect to small-scale farmers. In order to enable achievement of the main object, three specific objectives were formulated. In the subsequent sections, the conclusions of this study are provided following the order of the specific objectives.

7.2.1 Achievement of the first research objective

The first objective of this study was defined in chapter one as:

“To analyse the structure of the current tomato SC in selected regions of Tanzania with respect to small-scale farmers”.

The results to this objective are presented in chapter six.

It is worthwhile to conclude that the TSC in Tanzania in the three surveyed regions of Arusha, Iringa and Dar es salaam is comprised of numerous actors ranging from manufacturers and/or suppliers of farm inputs, through the farmers and from the farmers through the middlemen/traders to the final consumers. Transporters play a crucial role in the TSC. Goods and services are transported from suppliers to consumers using both short

(direct sales to customers), medium (sales through one or two customers) and long routes (sales through many customers) before the goods reach the final customer/consumer. Very few actors in the TSC work together strategically to achieve common objective(s), for example when small-scale farmers grow tomato under special agreement with seed companies and/or processing companies. Mostly, goods and services move through fragmented actors, for example when a farmer sells to middlemen –wholesalers and brokers who again exchange the product into one or two hands before the goods reach the final consumer. Both unidirectional and bidirectional chain configurations/structures are identified. Whereas the farmers are the original source or the Original Equipment Manufacturer (OEM) if it was in manufacturing industry, in between the chain, tomatoes move either through the wholesalers to brokers to retailers to consumers (unidirectional) or the middlemen receive and supply from each other (bidirectional). Thus, the would-be chain leaders (farmers) have failed to lead instead the middlemen have taken up the role for their own interest.

Using Wilcoxon signed-rank test model it was established that the choice of the immediate/first-tier customers depends on understanding of the customer requirements and expectations. Fast delivery, price (& discount), quality and customer care are identified to be the requirements of the final customers in the fresh TSC. The final customers/consumers constitute both household customers and institutional customers like schools, hotels, seed companies (in Arusha region) and processors in both Arusha and Iringa regions. The tomato suppliers sell their tomatoes either directly or through other middlemen. Consequently, short, medium or long routes are created. Examples of these routes with their influencing customer requirements and expectations are as follows: Long route: Farmer-Broker-Retailer-Consumer (fast delivery) and Farmer-Wholesaler-Retailer-Consumer (quality/customer care); Medium routes: Farmer-Broker-Consumer (fast delivery), Farmer-Retailer-Consumer (fast delivery; price (& discount), quality and customer care); Short routes: Farmer-Consumer (fast delivery; price (& discount); quality and customer care); Wholesaler-Consumer (quality and customer care); Broker-Consumer (fast delivery) and Retailer-Consumer (fast delivery; price (& discount); quality and customer care). Thus, from these evidences, it is concluded true that “understanding of customers’ requirements and expectations strongly impact the structure of the TSC” (H₀₁).

Although, selling direct to final customers is associated with earning the large share of consumers' price, hence higher profit and would be of interest of all the actors; however, findings from logistic discrete regression model showed that not every actor can afford selling directly. The farmers for instance, are unable to sell directly to the final customers due to many reasons. Based on the results from the surveyed farmers in Arusha and Iringa regions, one of the reasons is the size of their farms; they are too small. The smallness of the small-scale farmers' farms prevents them from selling directly to final customers such as supermarkets, schools, hotels, export markets and agro-processors unless they increase their farm sizes. There are so many potential benefits that await small-scale farmers from increasing their farm sizes, hence sell directly; they include the following: economies of scale - since a large farm size is translated to more harvest, more bargaining power as well as economies in transportation, hence, good price and more revenue. In order for the wholesalers to afford selling directly to final customers long-time experience is required. Similarly, the need for farmers to increase their farm size is also found significant with selling through retailers and wholesalers henceforth, mandatory for farmers' prosperity. However, middlemen should stop opportunism while dealing with farmers for sustainable long-term relationship based on win-win situation. Selling through middlemen is also a significant practice by most of the actors. A list of trading partners and the influencing factor (in brackets) included the following: Farmer to Broker (age); Farmer to Retailer (revenue); Wholesaler to Broker (age and education); Broker to Wholesaler (age) and Retailer to Fellow-Retailers (age).

Thus, direct selling to customer is not as easy as one might think, it entails many preconditions. For instance, the traders in the urban markets have their own associations and curtails that restrict farmers from selling directly to the urban markets of Dar es salaam (Urafiki, Temeke Stereo and Ilala Markets), Iringa (Mlandege Market) and Arusha (Kilombero market) unless they associate with a registered brokers or wholesalers to facilitate the selling, however by paying a selling commission. Moreover, Delivery of customer orders directly by producers is uncommon in both upstream part when farmers source their inputs and downstream part when tomatoes are shipped to consumers. This is due to distance (and associated transportation costs) since many manufacturers of inputs and tomato customers/consumers are located in urban areas whereas tomato farmers (the

consumers of inputs and producer of tomatoes) are in remote rural areas, hence, the reason for use of middlemen.

Before this study was conducted, it seemed like those farmers in Arusha region who grow tomatoes for seed companies get more benefits than their counterparts who grow tomatoes for the fresh markets. However, findings from this study show that as the education level of the farmer increases, the less the farmer grows tomatoes for the seed companies but rather for other customers such as processors. There are triple benefits for the farmers who grow tomatoes for seeds and sell to processors: the processor separates the seeds from the raw tomatoes and the farmer gets paid for the tomato juice which would have been lost if the farmer would have separated the seed alone, then, the farmer takes the seed and sells to seed companies and the third benefit is disposal of the tomato juice that had become a problem to the farmers when they were growing tomatoes and extracting seed themselves.

7.2.2 Achievement of the second research objective

The second objective of this study was defined in chapter one as:

“To examine tomato SC relationships and their impact to payoff system amongst tomato SC actors”

It has been concluded in section 7.2.1 above that all the TSC actors namely: farmers, wholesalers, brokers and retailers do manage to sell their tomatoes directly, through few or many middlemen. However, the consideration of whether or not each actor gets profit or not was not considered. It follows therefore here that, findings from objective two are meant to answer this question. Further, during the design of this research, the researcher was of the opinion that, the small-scale tomato farmers were less compensated compared to the middlemen (wholesalers and brokers) due to opportunism of the middlemen. This assumption led to the formulation of (H₀₂) which stated, *“There is no significant difference between total revenue and total cost in tomato farming or trading”*.

The t-test results in testing the mean difference of two samples of the total revenue and total farming or trading costs for farmers, wholesalers, brokers and retailers show that, the standard deviation is large for both items in each of the actors meaning that there is big

difference in total revenue and total farming or trading costs for farmers, wholesalers, brokers and retailers. While the correlations between total revenue and total trading costs for wholesalers (0.857) and brokers (0.751) are strong-positive, those for farmers and retailers (0.343) and (0.297) respectively are weak-positive. The weak correlation of total revenue and total farming costs of the farmers for instance means that, regardless of the costs incurred by the farmers in tomato farming in such aspects like labour, machinery, farm size, and inputs (seeds, fertilizer, chemicals) costs, the chance to realize profit after selling is assured to some extent. However, other factors like adverse weather condition, outbreak of pests and diseases may impact the net harvest quantity. Moreover, fluctuation of market price and the issue of PHLs may still impact the revenue. Similarly, the weak-positive correlation between total revenue and total trading cost of the retailers means that despite of being assured to earn profit, the profit is not entirely guaranteed due to some business risks likely in trading perishables such as PHLs. These results are similar to those of Dome and Prusty (2017) who found out that those who traded at the last mile like retailers registered the highest PHLs rate in perishable products due to waiting-for-customers' time. On the contrary, given the strong-positive relationship between total revenue and total cost incurred in tomato trading, the wholesalers and brokers have a better chance of earning profit than farmers and retailer. This is because, as the wholesalers and brokers increase the transaction costs, the revenue increases as well. Based on the above explanations, the null hypothesis "H₀2: there is no significant difference between total revenue and total cost in tomato farming or trading" is rejected and its alternative hypothesis "H₁2: there is significant difference between total revenue and total cost in tomato farming or trading" is accepted.

The relationship dynamics in the development of TSC were also surveyed. This was done following the widely hypothesised fact that, efforts from a single firm in the context of a network are far from enough to cover it from many risks, especially those passed down from other companies, or those risk reactions from a competitor (*de Souza et al., 2013*). Despite of getting assorted similar results in all the TSC actors, however, farmers and retailers on one side and the middlemen (wholesalers and brokers) on the other side showed some few opposing attitudes to a number of the relationship dynamics. While the farmers and retailers prefer going personally to buy instead of sending someone or use mobile

phones the middlemen have no problem with sending someone and highly encourage the use of mobile phones. Other relationship dynamics where the farmers and retailers differ with the middlemen include the following: buying together in consortium and risk sharing (highly disagreed by farmers and retailers); selling together (highly agreed by farmers and retailers); resource sharing (farmers and retailers share less resources); and degree of collaboration with other actors (less than that for the middlemen).

Given the fact that SCM is all about “managing relationships”, hypothesis three “(H₀₃): *There is no significant relationship between various actors in the TSC*” was then tested using Wilcoxon signed-rank test model. The results show that: there is significant relationship between farmers and wholesalers, brokers, and retailers in the TSC; there is significant relationship between wholesalers and fellow wholesalers, brokers, retailers and consumers; there is significant relationship between brokers and fellow brokers, and retailers; and there is significant relationship between retailers and fellow retailers and consumers. However, there is no significant relationship between farmers and consumers on one hand and brokers and consumers on the other hand. This is attributed to the fact that; farmers and brokers rarely sell directly to the final consumers. It follows here that, relationship between two actors depends on whether the two actors are fellow farmers or fellow traders and extend to tier one suppliers and customers only. This is to say as you move from the tier one supplier and customer, upstream and downstream respectively, the less the relationship between the two and vice versa becomes. Accordingly, it can be said that SC relationship between actors determines the structure of the chain. This conclusion led to rejection of (H₀₃) and acceptance of (H₁₃). Conclusively, “There is significant relationship between various actors in TSC”.

7.2.3 Achievement of the third research objective

The third objective of this study was defined in chapter one as:

“To suggest for an SC performance model for small-scale tomato farmers using well-established performance indicators”.

Achievement of objective three is dealt on section 6.9 above and it is directly linked to the successful achievement of objective one and objective two of this study. From the analysis

of the structure of the current TSC with respect to small-scale farmers (objective one) and examination of the TSC relationships and their impact to payoff system amongst TSC actors (objective two); the strengths, weaknesses, opportunities and threats of the current TSC with respect to small-scale farmers were identified. Farmers' identified weaknesses included, inter alia: small size (scale), lack of capital, less market information, unable to sell directly to customers/consumers, weak relationships (limited to fellow farmers and tier one suppliers and customers), lack of trust, inadequate resource sharing, less education, remotely located, inadequate government support and dependency of rainfed agriculture. Thus, a new SC performance model is suggested in section 6.9.2 to match the small-scale tomato farmers' opportunities and threats with their strengths and weaknesses. Examples of the farmers strengths include land ownership and experience in tomato farming, whereas opportunities include untapped regional and international market and presence (and potential to increase) of processing industries. The threats include increasing importation of semi-processed cheap tomato concentrates used by processing industries as raw materials instead of domestic-grown fresh tomatoes by small-scale farmers and other producers.

7.3 Recommendations

7.3.1 Recommendations for future research

This research has paved a way for many potential research directions. Some of these potential issues are given below:

Firstly, this research was conducted in two tomato producing regions of Arusha and Iringa and Dar es Salaam being one of the main urban target markets for fresh tomatoes in Tanzania. Given the specificities of issues for instance, proximity and good road connections to Dar es Salaam and other regional markets, presence of corporate buyers (for example seed companies and fresh processing industries), inter alia, some of the findings might not be necessarily generalizable to apply in all tomato producing regions in Tanzania. Thus, a call for future research that will cover either the whole country or to cover such regions not covered in this study will bring about more insight and motivation in enhancing the TSC in Tanzania.

Secondly, the current study analysed the structure of the current TSC in selected regions of Arusha, Iringa and Dar es Salaam, Tanzania with respect to small-scale farmers. Future studies might explore TSC in the same three regions, though this time with respect to large farmers. Such studies will be able to identify the faced challenges and suggest appropriate remedies with particular attention to large tomato farmers.

Thirdly, future studies may invest to investigate how significant it is tomato import and export in Tanzania. Findings from such studies will act as catalysts to many tomato stakeholders to invest in the subsector or will cause the current stakeholders to degenerate to doing other businesses if tomato export and import will be not significant, hence, leaving few stakeholders to cater for the home market.

Fourthly, while this study has used binary logistic regression model in determining immediate customers, future researches may build on its basic principles and think of how the model can further be developed and include as many variables as possible for the better future of the industry. Moreover, application of linear and multinomial regression models may be thought about to counteract shortfalls with binary logistic regression model.

7.3.2 Recommendations for future practice

Findings of this research provide useful reference materials to the SCM practitioners in agri-food SC in general particularly in the fresh agri-food SC. Specifically, the researcher recommends the following for future practice:

- Farmers should increase their farm size to gain economies of scale as they can afford selling directly to market. A large farm size is translated to more harvest, more bargaining power as well as economies in transportation, hence, good price and more revenue. Also, due to seasonality, farmers should adopt irrigated tomato farming during drought season to ensure year-round availability of tomatoes hence, stable selling price.
- Farmers should buy farming inputs and sell their commodity (tomato) in consortium to influence good lower and higher prices in buying and selling respectively. Moreover, working together in consortium will enable farmers to

sell direct to urban markets through shared transportation hence, good prices as a result of bypassing the middlemen.

- All the actors along the TSC should uphold highest level of integrity and stop cheating in such issues like packing and grading and should charge reasonable price while exchanging products from one actor to another.
- All the actors along the TSC should adopt continuous learning to abreast themselves with new technologies for enhanced product quality including adhering to the GAP requirements. Markets for high quality products are readily available within the country and at export markets.
- Last but not least, implementation of the SC performance model suggested in this study would restore chain-leadership and bargaining power to the small-scale farmers leading to improved decisions that are meant to benefit all the TSC actors in a win-win situation.

7.3.3 Recommendations to policymakers, stakeholders and government leaders

- The government should mobilize many smallholder farmers to join tomato farming associations to increase farmers' bargaining power due to economies of scale gained through working together. However, for sustainability of the sector, the government should also embark on the following issues:
 - allocate enough R&D budget and ensure agricultural researches are conducted and findings (for example new pests and diseases) are promptly communicated to respective stakeholders for further actions to avoid major crop loss as it happened for eruption of tuta-absoluta-tomato leaf miner;
 - provide subsidized inputs to tomato farmers –just like the government does for grain farming, this practice may also assist in restricting farmers' access to counterfeit farming inputs injected in the market by untrustworthy traders;
 - employ enough extension officers to assist small-scale farmers in adoption of GAP in farming high-value foods in order to produce quality produce acceptable to different markets including formalized ones like supermarkets and export markets;

- facilitate establishment of more fresh fruits' and vegetables' processing industries or installation of excess capacity that can absorb most of the grown tomatoes in the country especially during peak season, this will also be in support of the current industrialization agenda under the current political regime of his excellency President Dr John Pombe Joseph Magufuli.
- assist in finding tomato export markets especially during peak season;
- guarantee farmers in getting affordable loans from financial institutions or regulate interest rates for agricultural loans especially loans to small scale farmers;
- supervise and monitor the use of standard weights and measures (especially kilogram) and discourage volume-based measures such as containers of different sizes to facilitate fair compensation in tomato trading;
- assist farmers to construct irrigation facilities for example digging of water reservoirs and supply of irrigation equipment for year-round tomato farming.
- Facilitate construction of more storage facilities and improve market conditions used for perishability agricultural products such as tomato.
- fight (in collaboration with Mobile Phone Companies) against fraud in mobile financial services to enable SC actors use the services especially the small-scale farmers in rural areas where banking networks are scarce. The on-going exercise of biometric SIM registration should be done to all subscribers and non-registered subscribers should be barred from using their SIMs.
- Improve transportation infrastructures like rail suitable to facilitate cheap transportation of heavy and voluminous products like tomatoes.

7.4 Limitations of the Study

The major limitations of this study were as follows:

- This study was conducted to TSC actors in three selected regions of Arusha, Iringa and Dar es Salaam, Tanzania. Generalization of the findings to other regions in

Tanzania or in any other countries should be considered with great care as some of the findings are dependent on the nature and status of the people and their environments in Arusha, Iringa and Dar es Salaam.

- This study did not analyse the structure of the current TSC in the three selected regions of Arusha, Iringa and Dar es Salaam with reference to large tomato farmers but rather with small scale farmers only.
- The study analysed the domestic SC of fresh tomato in the three selected regions in Tanzania but did not extend to cover tomato import's and export's significance in detail.
- This study did not survey the manufacturers of farming inputs, hence, the presented problems with regards to quality and the issue of counterfeiting were not confirmed from the manufacturers.
- This study used binary logistic model. Other models such as linear regression and multinomial logistic regression were not considered.

7.6 Chapter Summary

In this chapter, important conclusions to this research were discussed. Recommendations to various stakeholders and limitations of the study were also presented.

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Appendices

Appendix 1. Set of Questionnaires

COVER NOTE

Dear Respondent,

It is with honour that we present a questionnaire for you to spare some time to fill it in. Please take an important note that the data being collected is purely for academic purposes and has nothing to do with taxation or other mandatory payment to the relevant authorities. However, findings from this research can be valuable to the tomato sub-sector as they can be used to advise the government and other relevant authorities in solving inherent problems including input suppliers, farmers and traders. The researcher's main theme/topic is to assess issues and problems in the tomato subsector as well as design the most optimum subsector's SC model.

Your response to these questions will mean a lot in achieving the objectives of this study and overall prosperity of tomato sub-sector in Tanzania. Kindly answer questions provided based on your experience and knowledge, as approximately correct as possible.

Any enquiry in filling the questionnaire can be communicated as per below;

Mobile: **+255 754 645 912**

Email: mmdome2002@yahoo.com

Name of the researcher: **Martin Mathias Dome**

Thank you for your cooperation

SELF-ADMINISTERED STRUCTURED QUESTIONNAIRE – FOR GROWERS/FARMERS

INSTRUCTIONS TO ALL SECTIONS: PLEASE TICK (✓) OR FILL IN THE SPACE PROVIDED.

SECTION 1: RESPONDENTS' PERSONAL BIO-DATA

VARIABLES	1. Gender	2. Age	3. Education	4. Experience
Male				
Female				
15 to 25				
26 to 30				
31 to 35				
36 to 40				
41 to 45				
46 to 50				
51 to 55				
> 55				
≥ Master's				
Bachelor's				
Diploma				
Certificate				
Standard Seven				
Other				
≤ 2 years				
Between 2 to 4 years				
> 4 years				

5. Permanent geographical location of the respond (**You can confirm**)

SECTION 2: ANSWER ALL QUESTIONS LISTED BELOW.

A: TSC STATUS QUO

	Manufacturers	wholesalers	Retailers	consumers	Fresh Agro-Processors	Brokers	others (Specify)
1. Who are your immediate customers? (tick (√)any one)							
2. Who are your immediate suppliers? (tick (√)any one)							
	Fast delivery	Price (& discounts)	Delivery reliability	Quality	Customer care	Location	others (Specify)
3. Which of the following factors make(s) customers buy from you (tick (√)any two)							
4. Which of the following factors influence you to buy from your input suppliers' suppliers? (Tick (√)any two)							
5. Which of the following factors influence you to buy from input suppliers with broad product categories? (Tick (√)any two)							

B: TSC RELATIONSHIP DYNAMICS

The table below shows the alternative responses and the number assigned to each response. Please evaluate each statement and tick (√)in the box with the number that best suits your response, as provided below;

Strongly disagree	Disagree	Not sure	Agree	Strongly Agree
1	2	3	4	5

TSC Relationships dynamics	1	2	3	4	5
1. How do you prefer buying your farm inputs from your suppliers?					
a) I personally go to buy my consignment from suppliers					
b) I send someone to buy for me					
c) I buy in consortium with my fellow farmers					
e) I use a a mobile phone to place my orders					
d) Others (please specify)					
2. Rank the following methods you commonly use to buy from your suppliers					
a) I use spot purchases to any seller available at the market					

TSC Relationships dynamics	1	2	3	4	5
b) I use long term purchase agreements from the supplier(s) of my choice					
c) I use loan (Govt. subsidies)					
d) I use loan (NGOs' guarantees)					
e) I use loan (Financial institutions for example Banks' guarantees)					
f) I use loan (Contract on own arrangement with suppliers)					
3. What are the main problem(s) do you face in your current arrangement in Qn. 2 (at least 2) 1.2.....					
4. Your supply/value chain competitiveness depends on how you cooperate with other chain partners such as wholesalers. Please rank the following statements					
a) There are benefits to all partners if good relationships with each other is maintained					
b) Good TSC relationships results in high profit margin to producers					
c) Good TSC relationships results in increased sales at each stage					
d) Good TSC relationships generate high-value added products					
e) Other benefits of good relationships (specify)					
5. I do access tomato markets to a more formalised market segment such as supermarkets, exporters, hotels and fresh agro processors. Please rank this statement					
6. Rank the following as major limiting factors to accessing the markets in Qn. 5 above					
a) Quality constraints					
b) Quantity constraints					
c) Seasonality/reliability					
d) Location					
7. Rate the collaboration aspects with your chain partners in the following?					
a) We share risks due to loss occurring as a result of an unforeseen event					
b) We share resources (transport and storage) in our operations					
c) We handle other partners' transactions on their behalf					
8. My suppliers are honest and hence trustworthy. Please rank					
9. My customers are honest and hence trustworthy. Please rank					

10. Use the table below to answer the following questions:

Apart from your primary customers and suppliers, whom do you interact with (Please tick (√) and state reason in brief?

Potential partner	Please tick (√)	Main reason for interaction
NGOs		
Donor agencies		
Banks		
Microfinance actors (for example SACCOS)		
Agricultural Research/training Inst.		
Central government officials		
Local government officials		
Others (specify in remarks column)		

11. Indicate the satisfaction rating of your mutual relationships with the above ticked (√) partners (use 5 – very good, 4 – Good, 3 – Cannot comment/Neutral, 2 – Bad, 1 – Very bad)

Potential partner	Satisfaction rating of the support received					Remarks (if any)
	1	2	3	4	5	
NGOs						
Donor agencies						
Banks						
Microfinance actors (for example SACCOS)						
Agricultural Research/training Inst.						
Central government officials						
Local government officials						
Others (specify in remarks column)						

C: CUSTOMER SATISFACTION AND THE NEED FOR SCM ADOPTION

	wholesalers	Retailers	consumers	Fresh Agro-Processors	Agents/Brokers	others (Specify)
1. Who are your customers' customers? (tick (√) any one)						
2. Who are your suppliers' suppliers? (tick (√) any one)						

D: NATURE OF TSC RELATIONSHIPS AND TSC CONFIGURATION/STRUCTURAL INTERACTIONS (Use the table below to answer the subsequent questions:

1. Rank the degree of collaboration as provided in the table below using 1 – Very low, 2 – Low, 3 – Undecided, 4 – High, 5 – Very High. (Please tick).

Structural patterns	1	2	3	4	5
Degree of collaboration between farmers and input distributor/agent/wholesaler					

Structural patterns	1	2	3	4	5
Degree of collaboration between farmers and retailer of inputs					
Degree of collaboration between farmers and brokers/agents					
Degree of collaboration between farmers and wholesalers					
Degree of collaboration between farmers and retailers					
Degree of collaboration between farmers and final customers					
Degree of collaboration between farmers and fellow farmers					

2. What relationship parameters exist in the following collaborations provided in the table below? (**Please tick**).

Structural patterns	Yes	No	Indifferent
We share information with brokers/agents			
We share resources with brokers/agents			
We trust each other with brokers/agents			
We share information with wholesalers			
We share resources with wholesalers			
We trust each other with wholesalers			
We share information with retailers			
We share resources with retailers			
We trust each other with retailer			
We share information with final customers			
We share resources with final customers			
We trust each other with final customers			
We share information with fellow farmers			
We share resources with fellow farmers			
We trust each other with fellow farmers			
We share information with retailer of inputs			
We share resources with retailer of inputs			
We trust each other with retailer of inputs			

Structural patterns	Yes	No	Indifferent
We share information with input distributor/agent/wholesaler			
We share resources with input distributor/agent/wholesaler			
We trust each other with input distributor/agent/wholesaler			

QUANTITATIVE DATA COLLECTION FORM FOR FARMERS

No	Variable*	Unit	Qty	Unit price	Remarks (including clarifying 'other' in Variable column)
1	Farm inputs (for example seeds, fertilisers, pesticides, herbicides)				
2	Labour (own, hired)				
3	Land (own, hired)				
4	Other farming costs				
5	Amount sold				
6	Cost of Doing Business	Transportation			
7		Handling			
8		Storage			
9		Communication			
10		Security			
11		Taxes/levies			
12		Other costs			

*** Data to be collected from the previous growing season**

SELF-ADMINISTERED STRUCTURED QUESTIONNAIRE FOR TRANSPORTERS

INSTRUCTIONS TO ALL SECTIONS: PLEASE TICK [√] OR FILL IN THE SPACE PROVIDED.

SECTION A: PERSONAL BIO-DATA OF RESPONDENTS (ALL RESPONDENTS)

1. Gender: (Jinsia)

[] Male [] Female

2. Age: (Umri)

15 to 25 [] 26 to 30 [] 31 to 35 [] 36 to 40 []

41 to 45 [] 46 to 50 [] 51 to 55 [] 55 and above []

3. Education level

Master's degree and above [] Bachelor's degree [] Diploma [] Certificate []

Standard seven []

Other [] (please specify)

4. How many years have you been in present role?

Below 2 years [] Between 2 to 4 years [] more than 4 years []

5. What is the summary of your current responsibilities (Kwa ufupi, ni nini majukumu yako katika nafasi yako ya sasa).....

SECTION B: INTERVIEW QUESTIONS FOR TRANSPORTERS

Generally, the interview will be unstructured and questions shall revolve around the following themes

What vehicles (brand/type) do you use for transportation of tomatoes?

Does any product loss occur during the transportation?

What are the causes of such losses above?

.....
.....

Tomatoes are perishable in nature, as a transporter what efforts do you make to ensure that they remain fresh? Alternatively, how do you solve the problems mentioned in question 3 above?

Who takes responsibility for the loss?

Does your vehicle have a temperature-controlled container?

What is the preferred transportation time-day or night?

Why?

How do you link with tomato traders (information exchange/sharing)?

.....

What do you normally do to ensure tomatoes you haul arrive on time (delivery dependability)?

.....

What makes traders to hire you rather than other transporters (order winners)?

.....

Do you have long term agreement with your customer(s) or it is on a consignment basis?

.....

What challenge(s) do you face with the current arrangement with your tomato customers (in Qn.11)?

.....

On average, what estimated volume of tomatoes (in cartons/tenga) do you haul in the following

Per month in a bumper harvest season.....

Per month in a low harvest season.....

*****END*****

SELF-ADMINISTERED STRUCTURED QUESTIONNAIRE – FOR TOMATO PROCESSORS

INSTRUCTIONS TO ALL SECTIONS: PLEASE TICK (√) OR FILL IN THE SPACE PROVIDED.

SECTION 1: RESPONDENTS’ PERSONAL BIO-DATA

VARIABLES	1. Gender	2. Age	3. Education	4. Experience
Male				
Female				
15 to 25				
26 to 30				
31 to 35				
36 to 40				
41 to 45				
46 to 50				
51 to 55				
> 55				
≥ Master’s				
Bachelor’s				
Diploma				
Certificate				
Standard Seven				
Other				
≤ 2 years				
Between 2 to 4 years				
> 4 years				

5. What is your current position in your organization?

SECTION 2: GENERAL QUESTIONS

Note: For such questions whose answers may be available from brochures or company records, we will be very grateful in receiving these records.

6. When did you start processing tomatoes?.....

7. What are your **sources of raw tomatoes**?.....

i) Do you grow yourself? (Yes/No).....if Yes where?.....how big is your plantation?.....and how much does the company yield (harvest)/year? (tones) how does the company manage its labour? Outsource? (Yes/No).....or company employed? (Yes/No).....

ii) Do you buy from farmers? (Yes/No).....if Yes, from small farmers? (Yes/No)..... Or large farmers? (Yes/No).....Or both? (Yes/No)..... From which villages/wards?.....

iii) Do you do both, such as buying and growing at the same time? (Yes/No).....

8. When you buy tomatoes from customers, what are your buying specifications? in terms of say:

Quantity (for example min. Quantity)?

Quality?

Delivery terms? (Do the farmers deliver themselves or you collect from the fields?.....

Unit of measure used?

Price per unit of measure above?

Payment terms?

9. Do the farmers produce tomatoes on their own (independently-using their own resources)? (Yes/No).....

10. Do you assist farmers in growing tomatoes for you? (Yes/No).....

11. If you assist farmers in growing, what kind of assistance do you provide? (Say: training?(specify); capital (money)?.....(specify); inputs?(specify); transport?(specify); others, specify.....

12. In case of any loss after sharing resources, who is responsible for the loss?.....

13. Do you practice contract farming with your farmers? (Yes/No).....

14. If yes to Contract farming, is your contract written or oral?.....

15. Do you source raw tomatoes from other regions in Tanzania apart from Iringa? (Yes/No)..... If yes, from which regions?.....

16. Do you also source raw tomatoes from abroad? (Yes/No)..... if Yes, from which countries?.....

17. What is your daily capacity per day in processing raw tomatoes per day?

18. Do you process tomatoes seasonally or throughout the year? (Yes/No)..... if 'No' why?

19. Most farmers complain about you that your demand for raw tomatoes is not reliable, is this true?..... Or false?.....

20. If true, what causes fluctuations of your demand?.....
21. In sourcing tomatoes from farmers, who sets the price, is it the farmer?.....or you (the buyer)?.....
22. Generally, what causes fluctuations of tomato price?.....
23. Do you have specialized trucks (with controlled temperature) used to transport fresh tomatoes from the fields to the factory? (Yes/No).....
24. Do you have cold room/s used to store fresh tomatoes as they wait processing? (Yes/No).....If Yes, what is the capacity of this facility?.....
25. To what extent do you concur/agree with the following phrase: “tomato growers are trustworthy and you trust each other”. **tick (√) in the box accordingly**

Strongly disagree	Disagree	Not sure	Agree	Strongly Agree
1	2	3	4	5

26. To what extent do you concur/agree with the following phrase: “customers for your finished products are trustworthy and you trust each other”. **tick (√) in the box accordingly**

Strongly disagree	Disagree	Not sure	Agree	Strongly Agree
1	2	3	4	5

27. Generally, what are the challenges do you face in buying tomatoes from the farmers?.....
28. How do you encounter these problems?.....
29. What are the challenges do you face in growing tomatoes at your own?.....
30. How do you encounter these problems?.....
31. What sorts of finished products do you produce by using fresh tomatoes?.....
32. Are fresh tomatoes your only inputs to produce your finished products? (Yes/No).....If No, what other inputs do you use?.....
33. Are these other inputs, locally sourced (Yes/No).....or imported (Yes/No).....or both? (Yes/No).....
34. Apart from domestic (Tanzania) market, which other countries do you export your products?.....
35. What support from the government do you need the most? For example lab testing of chemical contamination, documentary processing, certification?.....
36. Do you have any suggestions in terms of government policy for agricultural development and exports in Tanzania?

Thank you very much for your time and cooperation.

SELF-ADMINISTERED SEMI-STRUCTURED INTERVIEW -GOVERNMENT OFFICIALS

INSTRUCTIONS TO ALL SECTIONS: PLEASE TICK [] OR FILL IN THE SPACE PROVIDED.

SECTION A: PERSONAL BIO-DATA OF RESPONDENTS (ALL RESPONDENTS)

1. Gender: (Jinsia)

[] Male [] Female

2. Age: (Umri)

15 to 25 [] 26 to 30 [] 31 to 35 [] 36 to 40 []

41 to 45 [] 46 to 50 [] 51 to 55 [] 55 and above []

3. Education level

Master's degree and above [] Bachelor's degree [] Diploma [] Certificate []

Standard seven [] Other [] (please specify)

4. What is your current position/role?

Below 2 years [] Between 2 to 4 years [] more than 4 years []

5. How many years have you been in present role?

Below 2 years [] Between 2 to 4 years [] more than 4 years []

6. What is the summary of your current responsibilities.....

SECTION B: INTERVIEW GUIDE FOR GOVERNMENT OFFICIALS (TRADE, COOPERATIVES, AGRICULTURAL, COMMUNITY DEVELOPMENT OFFICERS AND ANY OTHER RELEVANT OFFICIALS)

A. Process

Welcome and Introductions:

Welcoming the respondent

Introduce the respondent to the interviewer(s).

Share the agenda for the interview.

B. Questions to the Government Officials

Generally, the interview will be unstructured and questions shall revolve around the following themes

What role do you play in facilitating inter-firm/interpersonal collaborations in tomato business?

.....

What obstacles do they face in facilitating collaborations as per Q. 1?

.....
What efforts are in place to ensure tomato stakeholders are structured and become more formalized?

.....
What do you consider as priority (ies) in enhancing increasing value to end users of tomatoes?

.....
How do you contribute towards achieving the priority (ies) in Qn. 4

.....
Do you have any suggestions in terms of government policy for agricultural development and export in Tanzania?

i).....ii).....iii).....
.....

*****END*****

Appendix 2: Research Clearance by employer

Appendix 2a: RAS Arusha



Institute of Accountancy Arusha

P.O. Box 2790, Njiro Hill, Arusha, Tanzania

Telephone: 255 27 254 9605 / 254 9606 / 254 9264/ 254 9265

Fax: 255 027 254 9421 Email: iaa@iaa.ac.tz Website: www.iaa.ac.tz

IAA/PF/394

20th APRIL, 2016

THE CEO

TANZANIA HORTICULTURAL ASSOCIATION (TAHA)

KANISA ROAD, HOUSE NO. 49

P. O. BOX 16520

ARUSHA

RE: INSTITUTE STAFF RESEARCH CLEARANCE

The purpose of this letter is to introduce to you Mr. Martin Mathias Dome who is our employee as Assistant Lecturer of the Institute of Accountancy Arusha (IAA) and who is at the moment conducting research. Our staff members and students undertake research as part of their employment/academic responsibility. The title of his research is 'The Design and Analysis of Tomato Supply Chain: The Case of Selected Regions (Arusha, Iringa and Dar es Salaam) in Tanzania'.

I request your office to grant the above mentioned member of our Institute academic community any help that may facilitate him to achieve research objectives. We request you to accommodate his request by offering necessary support in the data collection through questionnaire, interview and observation and help him with secondary data in connection to his research.

The period for which this permission has been granted is from March 2016 to January 2017. In case of any enquiry, please do not hesitate to contact undersigned through above provided addresses.

Yours sincerely,

INSTITUTE OF ACCOUNTANCY ARUSHA

Faraji Kasidi (Ph.D.)

FOR: RECTOR



Institute of Accountancy Arusha

P.O. Box 2798, Njiro Hill, Arusha, Tanzania

Telephone: 255 27 254 9003 / 254 9000 / 254 9204/ 254 9265

Fax: 255 027 254 9421 Email: iaa@iaa.ac.tz Website: www.iaa.ac.tz

IAA/PF/394

5th APRIL, 2016

Regional Administrative Secretary

Iringa Region

P. O. Box 858

IRINGA

RE: INSTITUTE STAFF RESEARCH CLEARANCE

The purpose of this letter is to introduce to you Mr. Martin Mathias Dome who is our employee as Assistant Lecturer of the Institute of Accountancy Arusha (IAA) and who is at the moment conducting research. Our staff members and students undertake research as part of their employment/academic responsibility. The title of his research is 'The Design and Analysis of Tomato Supply Chain: The Case of Selected Regions in Tanzania' (Iringa inclusive).

We kindly request your good office to grant the above mentioned member of our Institute academic faculty any help that may facilitate him to achieve research objectives. We request you to accommodate his academic endeavour by offering necessary support in the data collection through questionnaire, interview and observation. Also help him to review secondary data available in connection to his research.

We request this permission be granted from April 2016 to January 2017. In case of any enquiry, please do not hesitate to contact undersigned through above provided addresses.

Yours sincerely,

INSTITUTE OF ACCOUNTANCY ARUSHA

Faraji Kasidi (Ph.D)

FOR: RECTOR



Institute of Accountancy Arusha

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IAA/PF/394

5th APRIL, 2016

Regional Administrative Secretary

Dar es salaam Region

P. O. Box 5429

DAR ES SALAAM

RE: INSTITUTE STAFF RESEARCH CLEARANCE

The purpose of this letter is to introduce to you Mr. Martin Mathias Dome who is our employee as Assistant Lecturer of the Institute of Accountancy Arusha (IAA) and who is at the moment conducting research. Our staff members and students undertake research as part of their employment/academic responsibility. The title of his research is 'The Design and Analysis of Tomato Supply Chain: The Case of Selected Regions in Tanzania' (Dar es salaam inclusive).

We kindly request your good office to grant the above mentioned member of our Institute academic faculty any help that may facilitate him to achieve research objectives. We request you to accommodate his academic endeavour by offering necessary support in the data collection through questionnaire, interview and observation. Also help him to review secondary data available in connection to his research.

We request this permission be granted from April 2016 to January 2017. In case of any enquiry, please do not hesitate to contact undersigned through above provided addresses.

Yours sincerely,

INSTITUTE OF ACCOUNTANCY ARUSHA

Faraji Kasidi (Ph.D)

FOR: RECTOR



Institute of Accountancy Arusha

P.O. Box 2798, Njiro Hill, Arusha, Tanzania

Telephone: 255 27 254 9805 / 254 9606 / 254 9264/ 254 9265

Fax: 255 027 254 9421 Email: iaa@iaa.ac.tz Website: www.iaa.ac.tz

IAA/PF/394

20th APRIL, 2016

THE CEO

TANZANIA HORTICULTURAL ASSOCIATION (TAHA)

KANISA ROAD, HOUSE NO. 49

P. O. BOX 16520

ARUSHA

RE: INSTITUTE STAFF RESEARCH CLEARANCE

The purpose of this letter is to introduce to you Mr. Martin Mathias Dome who is our employee as Assistant Lecturer of the Institute of Accountancy Arusha (IAA) and who is at the moment conducting research. Our staff members and students undertake research as part of their employment/academic responsibility. The title of his research is 'The Design and Analysis of Tomato Supply Chain: The Case of Selected Regions (Arusha, Iringa and Dar es Salaam) in Tanzania'.

I request your office to grant the above mentioned member of our Institute academic community any help that may facilitate him to achieve research objectives. We request you to accommodate his request by offering necessary support in the data collection through questionnaire, interview and observation and help him with secondary data in connection to his research.

The period for which this permission has been granted is from March 2016 to January 2017. In case of any enquiry, please do not hesitate to contact undersigned through above provided addresses.

Yours sincerely,

INSTITUTE OF ACCOUNTANCY ARUSHA

Faraji Kasidi (Ph.D.)

FOR: RECTOR



Institute of Accountancy Arusha

P.O. Box 2798, Njiro Hill, Arusha, Tanzania

Telephone: 255 27 254 9605 / 254 9606 / 254 9264/ 254 9265

Fax: 255 027 254 9421

Email: iaa@iaa.ac.tz

Website: www.iaa.ac.tz

IAA/PF/394

20th APRIL, 2016

THE DIRECTOR GENERAL

TANZANIA NATIONAL BUREAU OF STATISTICS

18 KIVUKONI ROAD

P. O. BOX 796

DAR ES SALAAM

RE: INSTITUTE STAFF RESEARCH CLEARANCE

The purpose of this letter is to introduce to you Mr. Martin Mathias Dome who is our employee as Assistant Lecturer of the Institute of Accountancy Arusha (IAA) and who is at the moment conducting research. Our staff members and students undertake research as part of their employment/academic responsibility. The title of his research is 'The Design and Analysis of Tomato Supply Chain: The Case of Selected Regions (Arusha, Iringa and Dar es Salaam) in Tanzania'.

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The period for which this permission has been granted is from March 2016 to January 2017. In case of any enquiry, please do not hesitate to contact undersigned through above provided addresses.

Yours sincerely,

INSTITUTE OF ACCOUNTANCY ARUSHA

Faraji Kasidi (Ph.D.)

FOR: RECTOR



Institute of Accountancy Arusha

P.O. Box 2798, Njiru Hill, Arusha, Tanzania

Telephone: 255 27 254 9605 / 254 9606 / 254 9264/ 254 9265

Fax: 255 027 254 9421 Email: iaa@iaa.ac.tz Website: www.iaa.ac.tz

IAA/PF/394

20th APRIL, 2016

PERMANENT SECRETARY

MINISTRY OF AGRICULTURE LIVESTOCK AND FISHERIES

P. O. BOX 9192

DAR ES SALAAM

RE: INSTITUTE STAFF RESEARCH CLEARANCE

The purpose of this letter is to introduce to you Mr. Martin Mathias Dome who is our employee as Assistant Lecturer of the Institute of Accountancy Arusha (IAA) and who is at the moment conducting research. Our staff members and students undertake research as part of their employment/academic responsibility. The title of his research is 'The Design and Analysis of Tomato Supply Chain: The Case of Selected Regions (Arusha, Iringa and Dar es Salaam) in Tanzania'.

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The period for which this permission has been granted is from March 2016 to January 2017. In case of any enquiry, please do not hesitate to contact undersigned through above provided addresses.

Yours sincerely,

INSTITUTE OF ACCOUNTANCY ARUSHA

Faraji Kasidi (Ph.D.)

FOR: RECTOR

Appendix 2g: Dabaga Vegetable and Fruit Canning Co. Ltd



Institute of Accountancy Arusha

P.O. Box 2798, Njoro Hill, Arusha, Tanzania

Telephone: 255 27 254 9605 / 254 9606 / 254 9264/ 254 9265

Fax: 255 027 254 9421 Email: iaa@iaa.ac.tz Website: www.iaa.ac.tz

IAA/PF/394

20th APRIL, 2016

THE MANAGING DIRECTOR

DABAGA VEGETABLE AND FRUIT CANNING LTD

P. O. BOX 83

IRINGA

RE: INSTITUTE STAFF RESEARCH CLEARANCE

The purpose of this letter is to introduce to you Mr. Martin Mathias Dorne who is our employee as Assistant Lecturer of the Institute of Accountancy Arusha (IAA) and who is at the moment conducting research. Our staff members and students undertake research as part of their employment/academic responsibility. The title of his research is 'The Design and Analysis of Tomato Supply Chain: The Case of Selected Regions in Tanzania' (Iringa inclusive).

I request your office to grant the above mentioned member of our Institute academic community any help that may facilitate him to achieve research objectives. We request you to accommodate his request by offering necessary support in the data collection through questionnaire, interview and observation and help him with secondary data in connection to his research.

The period for which this permission has been granted is from March 2016 to January 2017. In case of any enquiry, please do not hesitate to contact undersigned through above provided addresses.

Yours sincerely,

INSTITUTE OF ACCOUNTANCY ARUSHA

Faraji Kasidi (Ph.D.)

FOR: RECTOR

Appendix 2h: Iringa Vegetable Oils and Related Industries



Institute of Accountancy Arusha

P.O. Box 2798, Njiro Hill, Arusha, Tanzania

Telephone: 255 27 254 9605 / 254 9606 / 254 9264/ 254 9265

Fax: 255 027 254 9421 Email: iaa@iaa.ac.tz Website: www.iaa.ac.tz

IAA/PF/394

20th APRIL, 2016

THE MANAGING DIRECTOR

IRINGA VEGETABLE OIL & RELATED INDUSTRIES LTD (IVORI)

P. O. BOX 146

IRINGA

RE: INSTITUTE STAFF RESEARCH CLEARANCE

The purpose of this letter is to introduce to you Mr. Martin Mathias Dome who is our employee as Assistant Lecturer of the Institute of Accountancy Arusha (IAA) and who is at the moment conducting research. Our staff members and students undertake research as part of their employment/academic responsibility. The title of his research is 'The Design and Analysis of Tomato Supply Chain: The Case of Selected Regions in Tanzania' (Iringa inclusive).

I request your office to grant the above mentioned member of our Institute academic community any help that may facilitate him to achieve research objectives. We request you to accommodate his request by offering necessary support in the data collection through questionnaire, interview and observation and help him with secondary data in connection to his research.

The period for which this permission has been granted is from March 2016 to January 2017. In case of any enquiry, please do not hesitate to contact undersigned through above provided addresses.

Yours sincerely,

INSTITUTE OF ACCOUNTANCY ARUSHA

Faraji Kasidi (Ph.D.)

FOR: RECTOR

Appendix 2i: Darsh Industries (Arusha)



Institute of Accountancy Arusha

P.O. Box 2798, Njiro Hill, Arusha, Tanzania

Telephone: 255 27 254 9605 / 254 9606 / 254 9264/ 254 9265

Fax: 255 027 254 9421 Email: iaa@iaa.ac.tz Website: www.iaa.ac.tz

IAA/PF/394

20th APRIL, 2016

THE MANAGING DIRECTOR

DARSH INDUSTRIES LTD

PLOT NO. 16, THEMI INDUSTRIAL AREA

P. O. BOX 2385

ARUSHA

RE: INSTITUTE STAFF RESEARCH CLEARANCE

The purpose of this letter is to introduce to you Mr. Martin Mathias Dome who is our employee as Assistant Lecturer of the Institute of Accountancy Arusha (IAA) and who is at the moment conducting research. Our staff members and students undertake research as part of their employment/academic responsibility. The title of his research is 'The Design and Analysis of Tomato Supply Chain: The Case of Selected Regions in Tanzania' (Arusha inclusive).

I request your office to grant the above mentioned member of our Institute academic community any help that may facilitate him to achieve research objectives. We request you to accommodate his request by offering necessary support in the data collection through questionnaire, interview and observation and help him with secondary data in connection to his research.

The period for which this permission has been granted is from March 2016 to January 2017. In case of any enquiry, please do not hesitate to contact undersigned through above provided addresses.

Yours sincerely,

INSTITUTE OF ACCOUNTANCY ARUSHA

Faraji Kasidi (Ph.D)

FOR: RECTOR

Appendix 3: Research Permit-Arusha Region

**UNITED REPUBLIC OF TANZANIA
PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT**

Telegrams: "REGCOM"
Telephone: 2545608/2545820/2545872
Fax No. 2545239 / 2544386
E-Mail: rasarusha@yahoo.com
E-Mail: rasarusha@gmail.com
In reply please quote:
Ref. No. FA.195/223/01T/62



REGIONAL COMMISSIONER'S OFFICE,
P.O. Box 3050,
ARUSHA.

23rd March, 2015

District Administrative Secretary,
Arusha District,
P. O. Box 1,
ARUSHA.

District Administrative Secretary,
Arumeru District,
P. O. Box 434,
USA RIVER.

District Administrative Secretary,
Karatu District,
P. O. Box 5,
KARATU.

District Administrative Secretary,
Monduli District,
P. O. Box 6,
MONDULI.

RE: RESEARCH PERMIT

Reference is hereby made to the letter with Ref.IAA/PF/394 dated 21st March, 2016 from Rector – Institute of Accountancy Arusha (IAA) concerning the above underlined subject.

I hereby take this opportunity to introduce to you **Mr. Martin Mathias Dome** who is an employee as Assistant Lecturer of IAA, he is at the moment conducting a research titled "*The Design and Analysis of Tomato Supply Chain: The case study in Arusha Region (Arusha, Arumeru, Karatu and Monduli)*".

He has been granted permission to conduct his research in your districts from **24th March, 2016 to 31st January, 2017.**

Due to this, you are requested to render any necessary Administrative assistance to enable him to accomplish the intended objective of his research.

Thank you for your cooperation.


(A.J. Mushashu)

For: **REGIONAL ADMINISTRATIVE SECRETARY
ARUSHA**

Copy to:
Mr. Martin Mathias Dome,
RESEACHER FROM IAA.

Appendix 4: Research Permit-Iringa Region

UNITED REPUBLIC OF TANZANIA
PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

IRINGA REGION:
PHONE No: 026 2702021
026 2702715
Fax No: 026 2702082



REGIONAL COMMISSIONERS OFFICE,
P.O. BOX 858,
IRINGA.

In reply quote:

Kumb.Na: Ref.no FA.255/265/01/VOL D/31
2016

13 April,

District Executive Director
✓ Kilolo District Council
Iringa District Council
Iringa Municipal council.

**RE: PERMIT TO CONDUCT A RESEARCH "THE DESIGN AND ANALYSIS OF TOMATO
SUPPLY CHAIN"**

Reference is made to the heading above.

I am writing to inform you that The Regional Administrative Secretary has granted a permit to Mr. Martin Mathias Dome who is a staff member of the Institute of Accountancy Arusha (IAA). He is intending to undertake a research "Titled the Design and Analysis of Tomato Supply Chain: The case of selected Regions in Tanzania as Iringa is inclusive. The research will be carried out between April, 2016-January, 2017. With this letter I kindly request your office to provide all necessary assistance which will enable the researcher to accomplish work.

Thank you for your cooperation.

A handwritten signature in black ink, appearing to read 'Saida Y. Mgeni'.

Saida Y. Mgeni
For Regional Administrative Secretary
IRINGA

Appendix 5: Research Permit-Dar es salaam Region

Appendix 5a: Kinondoni Municipal Council

THE UNITED REPUBLIC OF TANZANIA
PRESIDENT OFFICE
MINISTRY OF REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

KINONDONI DISTRICT

Telephone No. 2170169 / 2170183

To reply please quote:

Ref. No. AB.320/378/01/236



THE DISTRICT COMMISSIONER'S OFFICE,
P.O BOX 9583,
KINONDONI,
DAR ES SALAAM,
TANZANIA.

18th May, 2016

*KINONDONI MUNICIPAL COUNCIL
P.O. BOX 31902
DAR ES SALAAM.*

RE: RESEARCH PERMIT

Martin Mathias Dome is a Student/researcher from Institute of Accountancy Arusha (IAA). He has been permitted to undertake field work research on **"The Design and Analysis of Tomato Supply Chain"**. - From May, 2016 to January, 2017.

I kindly request your good assistance to enable him to complete his research.

A handwritten signature in black ink, appearing to read 'P. Siara'.

Paulina P. Siara

**District Administrative Secretary
KINONDONI**

Appendix 5b: Ilala Municipal Council

The United Republic of Tanzania
PRIME MINISTER'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

DAR ES SALAAM REGION

Phone Number: 2203156/2203158

In reply please quote:



REGIONAL COMMISSIONER'S OFFICE,
P.O. Box. 5429,
DAR ES SALAAM

Date: 10/05/2016

Reg. No

District Administrative Secretary,

ILALA
DAR ES SALAAM

RE: RESEARCH PERMIT

Pro/Dr/Mr./Mrs/Ms/Miss. MARIX MATHIAS DOME is a
student/researcher from INSTITUTE OF ACCOUNTANCY ARUSHA (IAA)
has been permitted to undertake a field work research on The Design and
Analysis of Tomato Supply chain: The case of
Selected Regions in Tanzania (Dar es-salaam
inclusive)

From May 2016 to January 2017

I kindly request your assistance to enable him/her to complete his/her research.

[Signature]
For: Regional Administrative Secretary
DAR ES SALAAM

Copy to: Municipal Director,
ILALA
DAR ES SALAAM

Principal/Vice Chancellor,
INSTITUTE OF ACCOUNTANCY ARUSHA

Appendix 5c: Temeke Municipal Council

The United Republic of Tanzania
PRIME MINISTER'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

DAR ES SALAAM REGION

Phone Number: 2203156/2203158

In reply please quote:



REGIONAL COMMISSIONER'S OFFICE,
P.O. Box. 5429,
DAR ES SALAAM

Date: 10/05/2016

Reg. No.

District Administrative Secretary,
TEMEKE
DAR ES SALAAM

RE: RESEARCH PERMIT

Pro/Dr/Mr./Mrs/Ms/Miss..... MARTIN MATIAS DOME is a
student/researcher from..... INSTITUTE OF ACCOUNTANCY ARUSHA (IAA)
has been permitted to undertake a field work research on..... The Design &
Analysis of Taroato Supply chain: The case of
Selected Regions in Tanzania (Dar-es-salaam
Inclusively)

From May 2016 to January 2017

kindly request your assistance to enable him/her to complete his/her research.

[Signature]
For: Regional Administrative Secretary
DAR ES SALAAM

Copy to: Municipal Director,
TEMEKE
DAR ES SALAAM

Principal/Vice Chancellor,
INSTITUTE OF ACCOUNTANCY ARUSHA