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Impact of Tomato Processing and Wastages in Kano Nigeria

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Abstract

Tomato processing typically involves activities such as mincing and macerating, liquefaction, emulsification, and cooking (such as boiling, broiling, frying, or grilling); pickling, pasteurization, and many other kinds of preservation, and canning or other packaging thereby reducing waste. The study examines the impact of tomatoes processing and wastages in Nigeria, with a particular reference to Kano state. Tomato wastages in Nigeria is high with annual 1.5 million metric tonnes of tomatoes loss at an alarming rate of 40 -50% because of weak processing and preservation culture every year. The main objective of this study was to examine the impact of tomatoes processing and wastages in Nigeria. Survey research design was conducted and primary data using questionnaire was employed using e-view statistical tools of analysis to regress the data and the finding reveals that there is a positive significant impact of tomato processing on reduction of tomatoes wastages in Kano State of Nigeria. The study therefore recommends that tomatoes processing industries could strategically locate their factories near the harvesting point so that transporting the harvested tomatoes to the point of processing will not be a huge burden and result to waste of tomato products in event of breakdown of transported vehicle.

Keywords: Tomatoes Processing, Wastages, Dehydration and Wet Milling

Introduction

Raw materials are the backbone of agro-industrial organizations (UNIDO, 2007). It accounts for about 10% of the total cost of production depending on the enterprise. Two major processing methods of tomato, which yield a variety of products, are the drying (dehydration) and wet milling. Products of drying include dried tomato slices and powdered tomato whereas

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wet milling results in Tomato Paste, Tomato jam, juice etc. Fruits and vegetable wastages in Nigeria is high with annual tomatoes loss at an alarming rate of 40 -50% due to poor processing and preservation culture (Okunoya, 1996). One of the major perishable vegetables is tomato. Its nature does not last long because of its shelf life. During the short production season, it creates glut in the market and this makes it to be scarce in supply and very difficult to access during off season. Also, poor production and preservation makes farmers to lose a lot of money during this period.

Currently in Nigeria, about 1.8 Million tonnes of fresh tomato are produced per year, but over 50% of these are lost due to poor storage system, poor transportation and lack of processing enterprises. Also, fruits and vegetable wastages in Nigeria is high with annual tomatoes loss at an alarming rate of 40 -50% due to bad culture of preservation and processing (Okunoya, 1996).

Interestingly, Nigeria is the world's 13th world's largest producer of tomato, unfortunately, she is the importer of the world's largest tomato paste. It is estimated that 200,000 farmers in Nigeria especially in the Northern part of the country, grow around 1.5 tonnes of tomatoes yearly, more than half of this produce gets perish before reaching the consumers and the other half takes a huge fall in price due to the gluts attributed to the vegetable. It is the farmers in Kano, Nigeria that the financial burden is on and the population as well who are vulnerable of the uncertainty of the prices. There is no consistency for smallholder farmers of tomato to expand to large market, this therefore renders the farmers unable to increase or make better profit and also change their farming methods. The effect of this makes fresh domestic tomato supply which is over 2million to 2.5billion metric tonnes yearly unable to meet the demands of the consumers.

Previous studies such as Frank (2006) carried out analyze processing, marketing and demand for processed fruits and vegetables in Tanzania. Data for the study were collected from a sample of 320 households, 77 traders and 59 processors using structured questionnaire. Both qualitative and quantitative methods were used to analyze the data. The results of the study show that fruit and vegetable processing firms were not able to utilize their capacities almost throughout the year with very low capacity utilization during off-season. Also, Mayer, Butkevicius and Pizarro (2003) looked at how processed food can be exported and they identified a set of dynamic products in world exports, namely those products characterized by the highest trend growth rates for the period 1980-2000. They found out that export values of all product started to grow rapidly in the mid-1980s. They also show that export value growth of high-technology intensive products was strongest, with the growth difference compared to

the other product categories strongly increasing after 1993. This study did not state the type of analytical tools that was used and if it was a primary or secondary data work. Lastly, Abay (2007) emphasized the core significance which hampers vegetables supply (onion and tomato) at Fogera District. During this work, it showed that family size, distance from development agent, experience and owned oxen number has hindered the market supply of tomato and onions. This study also has exact lapses as the study of Mayer et.al (2001). But this study looks at the impact of tomatoes processing and wastages in Nigeria as this form a research gap for our present research, using survey research design and e-view statistical package to uncover if there is a significant relationship between the two variables.

The main objective of this study was to examine the impact of tomatoes processing and wastages in Nigeria with a particular reference to Northern Nigeria Kano. Other specific objectives include: to evaluate the impact of tomatoes drying (dehydration) and wastages in Kano, Nigeria and to determine the impact of tomatoes wet milling and wastages in Kano, Nigeria

In line with the objectives, the following hypotheses are formulated in a null form, they are:

H_{01}: Drying (dehydration) has no significant impact on tomato wastages in Kano, Nigeria

H_{02}: Wet Milling has no significant impact on tomato wastages in Kano, Nigeria

The study scope covers a 5-year period from 2011 to 2015 and this period is chosen because it assesses the period when the then former president of Nigeria, Goodluck Jonathan laid more emphasis on agricultural product development especially the agro allied industry, with the then minister for agriculture, Mr. Akinwumi stressing the importance of agricultural produce to the development of the nation. Also, how the present government is trying to make agricultural produces its main economic base again as in the 1960s.

Concept of Tomatoes Processing

The change of formation of raw ingredient by chemical or physical ways into tomato or of tomatoes into other forms is known as tomato processing. It combines raw tomatoes ingredients to produce marketable tomatoes products that can be easily served, kept and prepared by the consumer. On the whole, tomato processing involves activities such as macerating and mincing, cooking, emulsification and liquefaction; pasteurization, pickling and

other preservation like drying and freezing when leading to secondary products are included as well (Laudan, 2010)

Tomato product quality depends on its processing at the beginning. On that note, it is absolutely necessary to know how the state at harvest methods of harvesting and the handling of procedures during postharvest after quality and process of preserving along the harvest initiation process. Information as these, with the right system for handling and harvesting each kind of tomatoes will be separated and used in instance with a good quality control programme to enhance the best quality possible for fresh tomatoes when processed. Quality forms of fresh tomatoes include nutritive value, texture, appearance and flavor. Factors of appearance could include decay, shape, freedom from decay and defects. size and colour. Then juiciness, firmness and crispiness forms the texture parts.

Nigeria is second largest producer of tomato in Africa second only to Egypt and 13th in the world. Accordingly, Nigeria produces tomato annually to a tune of 6 million tonnes before 1990 as state by Erinle (1989). Notwithstanding, between 1 to 2million tonnes of the scale of tomatoes was estimated in 2008- 2009 (UNCTAD, 2012). In line with this, importation of processed tomato was necessitated.

Rodriguez-Mateoset (2014) also observed a heat-induced anthocyanin's reduction in tomatoes but no significant changes in the procyanidins content. Furthermore, processed tomatoes will be milled and size classified to determine the influence of the length of the fiber on its techno-functional properties.

Concept of Wastages

Food waste or food loss is food that is discarded or lost uneaten. According to Galanakis (2015) food waste occurs in numerous ways beginning from processing, consumption, production and retailing. In low-income economies, wastages of food occurs during production, while in advanced countries much food – about 100 kilograms (220 lb) per person per year – is wasted at the consumption stage (Gustavsson, Cederberg, & Sonesson, 2011)

Waste occurs at every level of the food value chain and there are many causes. The website www.lovefoodhatewaste.com (2010) used cheese as an example of how waste impacts us financially and environmentally. It is not just the products themselves that are lost; it is the packaging, human resources used in production, retailing, energy, serving of the food water etc. from feeding and milking the cows, cooling and transporting the milk, processing it into cheese, packing it, getting it to the shops, keeping it at the right temperature. If it then gets

thrown away, it may end up in a landfill site, where rather than harmlessly decomposing as many people think, it rots and actually releases methane, a powerful greenhouse gas.

Food losses and waste along the food supply chain, a definition of food loss given by FAO includes all agri-food products intended for human consumption that are instead discarded, lost, degraded or consumed by pests at any stage of the food chain (FAO, 1981). In a more recent study FAO proposes a distinction between food losses and food waste: "food losses take place during agricultural production, post-harvest, and processing stages in the food supply chain", while "food waste occurs at the end of the food chain (distribution, sale and final consumption)" the former is due mainly to logistical and infrastructural limitations, while the latter is primarily related to behavioural factors (FAO, 2011a: 2)

Empirical Study

Abay (2007) identified the major factors that affect the supply of vegetables (onion and tomato) at Fogera District. His study revealed that owned oxen number, family size, and distance from development agent and experience has affected marketable supply of onion and tomato. In similar way, Adugna (2009) identified major factors that affect marketable supply of papaya in Alamata District. Adugna's study revealed that papaya quantity produced influenced marketable supply positively.

Frank (2006) carried out analyze processing, marketing and demand for processed fruits and vegetables in Tanzania. Data for the study were collected from a sample of 320 households, 77 traders and 59 processors using structured questionnaire. Both qualitative and quantitative methods were used to analyze the data. The results of the study show that fruit and vegetable processing firms were not able to utilize their capacities almost throughout the year with very low capacity utilization during off-season.

Jabir and Sanjeev (2008) examine farmers' perception on risk fruits and vegetables have been analysed using structured survey method. The study is based on the survey of a total of 634 farmers, comprising 188 fruit farmers and 446 vegetable farmers, covering six districts of Uttar Pradesh, namely, Lucknow, Allahabad, Gorakhpur, Moradabad, Jhansi and Agra. The perceived priorities of farmers about major sources of risks in production of fruits and vegetables have been reported under 'investment risks', 'socio-economic risks', 'environmental risks', 'production risks' and 'market risks'. In general, the price and production risks have been perceived as the most important sources of risk in production of fruits and vegetables in the area. The study has argued that public intervention can facilitate

better risk management through improved information system, development of financial markets and promotion of market-based price and yield insurance schemes, thus ensuring that the marginal farmers are able to benefit from these interventions as well as participate in the emerging systems.

Theoretical Framework

Production Theory

Production activities entail the employment of limited resources - natural, human, financial and technical capital – in alternative uses to produce goods. Considering that an enterprise seeks to maximize its profit (total revenues - total costs), each rational enterprise will evaluate which goods produce by comparing the expected revenues and expected costs of different products feasible. In agriculture labour, assisted by financial and technical capital, utilizes natural resources such as soil and water to transform inputs (e.g. seeds) in outputs (e.g. cereals). This process adds value to the final product. Every enterprise engaged in the agri-food system, tries to maximize their own profit, conducting several value-generating activities that can be modelled as a chain according to economic theory. In order to maximize profit, the levers on which the enterprise can take action to achieve its objective (keeping unchanged the state of technology) are then two, the prices of factors of production and the prices of the goods produced. The market sets both. The market, however, is not unique. There are, in fact, at least two major forms of markets: perfectly competitive markets and markets with imperfect competition. Under perfect competition, enterprises, taken individually, are not able with their own choices to influence the selling price of the good they produce. On the contrary, an individual enterprise has the potential to influence the selling price of the produce under imperfect market conditions (Samuelson, 2009).

Research Methodology

The research design used for this work was the survey research design. In this research work, primary method was used for the collection of data. Also, the use of survey research design is due to the fact that the data are point in time. The study population was made up of all the farmers in Kano state that produces tomatoes in Nigeria, which is 11, 000 according to kalusam.wordpress.com 2013 cutting across the 44 local government areas in Kano State. And the sample size was reduced using the computation below. The sample size of this study was

derive using Taro Yamane formula to estimate it.

$n=N/1+N(e)^2$

Where N is the population size

e is the margin error (assume 5%)

1= constant=

e=0.05

$n = 11000/1+11000(0.05)^2$

$n = 11000/1+11000(0.0025)$

$n = 11000/28.5$

$n = 386$

A questionnaire was design to collect a point in time data from the farmers in Kano state and the questionnaire was administered to all the farmers randomly. The researcher collected the information through the helped of some community members across the 44-local government of Kano State. A five point likert scale was also designed and 386 copies of questionnaire was distributed and the researchers added additional 50 copies of questionnaire to indicate a successful return of 386 copies of questionnaire that was used in the analysis and a multiple statistical model was developed, regression method as well and correlation matrix were adopted for the study. The multiple regression and correlation models are stated below:

$$WA= \alpha +ß_1TD+ ß_2TWM +\mu \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

Where:

WA = Waste, α = Intercept ß = Independent variable, TD= Dried Tomatoes, WEM = Wet Milling and μ = Error Term.

$$r = \frac{n\sum xy - \sum x\sum y}{\sqrt{\{(n\sum x^2) - (\sum x)^2 \ (n\sum y^2) - (\sum y)^2)\}}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2$$

Where:

r = Correlation Coefficient

x = proxies for Independent Variable

y = proxy for Dependent Variable

n = number of observations

Data Analysis

Table 2: Respondents Return Rate

Respondents	**No. of employees that questionnaire was administered to**	**No. of Respondents who returned their questionnaire**	**Response Rate (100%**
Male	232	200	51.81
Female	204	186	48.19
Total	436	386	**100%**

Source: Fieldwork, 2020

From the above table, it indicates that tomato male farmers in Kano state returned their copies of questionnaire at 51.81% and female farmers in Kano state returned their copies of questionnaire at 84.19%. It shows that majority of the tomato farmers in Kano State were male who participated in the exercise.

Demographic Characteristics of Respondents

Table 2

S/N	**Characteristics**	**Respondents' Category**	**Frequency**	**Percent (%)**
1	Age	18 -30	56	14.51
		31-45	142	36.79
		46-60	188	48.70
		Total	**386**	**100**
2	Marital Status	Married	221	57.25
		Single	120	31.08
		Divorce	45	11.65
		Total	**386**	**100**
3	Educational	PGD/MBA/MSC	67	17.35
	Qualification	BSC/HND	123	31.86
		OND	87	22.53
		SSCE	109	28.24
		Total	**386**	**100**

Source: Survey Data, 2020

Table 2 shows that the ages between 18- 30 constitute, 14.51 percent while ages 31- 45 constitute 36.79 percent which are the economic active group in Nigeria. The remaining 48.70 percent are made up of respondents between the ages 46 – 60. The respondent marital status such as married indicates 57.25% percent respondents participated in the exercise which is slightly more than the single people who were 31.08 that participated in the exercise and divorce people who were 11.65 that participated in the exercise. The table also shows the educational qualification of respondents' 17.35 percent for post graduate respondents, 31.86percent for B.SC/HND holders, 22.53 percent for OND holders and 28.24 percent for SSCE holders. It indicates that the B.Sc/HND respondents had the highest response rate.

Test of Hypotheses

Tomato Processing and Wastages

Table 3: Tomato Drying (Dehydration)

Items- Tomato Drying	**5**	**4**	**3**	**2**	**1**
Farmers in Kano State always process tomato slice	134(34.72)	122(31.61)	3(0.78)	49(12.69)	78(20.21)
Farmers in Kano State process tomato into tomato Powdered	115(29.79)	131(33.94)	4(1.04)	42(10.88)	94(24.35)
There is proper tomato Dehydration in Kano State	127(32.90)	118(30.57)	19(4.92)	44(11.40)	78(20.21)

Source: survey, 2020

Table 4: Mean of Tomato Drying (Dehydration)

Variables	5	4	3	2	1	FX	N	Mean	Remarks	Ranking	Sectoral mean
Tomato Slice	134	122	3	49	78	1343	386	3.47	High	1st	3.42
Tomato Powder	115	131	4	42	94	1289	386	3.34	High	3rd	
Tomato Dehydration	127	118	19	44	78	1330	386	3.45	High	2nd	

Author's Computation, 2020

From the table, it shows that Tomato Drying (Dehydration) is high and this implies that the sectoral mean is more than average and that Kano Farmers involved in Tomato Drying (Dehydration) in the state but the tomato slice is what they do best and tomato dehydration.

Table 5: Tomato Wet Milling

Items- Tomato Wet Milling	**5**	**4**	**3**	**2**	**1**
Farmers in Kano State always process tomato into tomato paste	144(37.31)	121(31.35)	3(0.78)	39(10.10)	79(20.47)
Farmers in Kano State process tomato into tomato Juice	110(28.49)	137(35.49)	10(2.59)	36(9.33)	93(24.09)
Farmers in Kano State process tomato into tomato Jam	109(28.23)	148(38.34)	11(2.85)	37(9.59)	81(20.98)

Source: survey, 2020

Table 6: Mean of Tomato Wet Milling

Variables	5	4	3	2	1	FX	N	Mean	Remarks	Ranking	Sectoral mean
Tomato paste	144	121	3	39	79	1370	386	3.55	Very high	1st	3.44
Tomato Juice	110	137	10	36	93	1293	386	3.35	High	2nd	
Tomato Jam	109	148	11	37	81	1325	386	3.43	High	3rd	

Author's Computation, 2020

From the table, it shows that Tomato Wet Milling is high and this implies that the sectoral mean is more than average and that Kano Farmers involved in Tomato Wet Milling in the state but the tomato paste is what they do best and tomato juice.

Table 7: Tomato wastages

Items- Tomato wastages	**5**	**4**	**3**	**2**	**1**
The life Span causes tomato waste in Kano State of Nigeria	156(40.41)	111(28.76)	5(1.29)	29(7.51)	85(22.02)
There are poor storage facilities in the state to preserve tomato	137(35.49)	133(34.46)	19(4.92)	55(14.25)	42(10.88)
There is great waste of tomato because poor transportation or road network	188(48.70)	121(31.35)	11(2.49)	31(8.03)	35(9.07)

Source: survey, 2020

Table 6: Mean of Tomato wastages

Variables	5	4	3	2	1	FX	N	Mean	Remarks	Ranking	Sectoral mean
Tomato life Span	156	111	5	29	85	1382	386	3.58	Very high	3rd	3.76
Poor Storage	137	133	19	55	42	1426	386	3.69	High	2nd	
Poor transportation	188	121	11	31	35	1554	386	4.02	Excellence	1st	

Author's Computation, 2020

From the table, it shows that Tomato wastages is very high in Kano State of Nigeria and this implies that the sectoral mean is more than average and that Kano Farmers waste a lot tomato's because its life span, poor storage facilities and poor transportation.

Correlation Matrix

	WA	TD	TWM
WA	1		
TD	0.786912	1	
TWM	0.869555	0.854037	1

Source: Excel output, 2020

The above correlation matrix indicates that there is a positive association between the variables, that is, the independent variables are correlated with the dependent variable.

Regression Result:

Dependent Variable: WA
Method: Least Squares
Date: 06/25/17 Time: 02:19
Sample: 1 386

Included observations: 386

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.486234	0.138374	17.96745	0.0000
TD	0.136005	0.096772	1.405417	0.0007
TWM	0.993779	0.098194	10.12053	0.0000

R-squared	0.928258	Mean dependent var	11.36788
Adjusted R-squared	0.927883	S.D. dependent var	4.065618
S.E. of regression	1.091803	Akaike info criterion	3.021279
Sum squared resid	456.5486	Schwarz criterion	3.052024
Log likelihood	-580.1068	Hannan-Quinn criter.	3.033471
F-statistic	2477.789	Durbin-Watson stat	1.057116
Prob(F-statistic)	0.000000		

Source: Data output from E-view, 2020

The analysis indicates that the coefficient for tomato processing in terms of tomato drying (TD) and tomato wet milling (TWM) are significant in reducing wastages (WA) in Kano State of Nigeria. The p-value and t-statistic values of the independent variables are significant. However, the f-statistic value of 2477.789 is significant at p statistic value of 0.00 and a Durbin Watson value of 1.05 which provides evidence of existence of linear relationship between tomato processing (tomato drying (TD) and tomato wet milling (TWM)) and reduction of wastages in Kano State, Nigeria. The $R^2 = 0.92$ indicates that only 92% of d tomato processing (tomato drying and tomato wet milling) embarked upon by Kano State of Nigeria can be use to reduced wastages but 8% can be explained by other factors not noted in the regression model which is refer to as error term. Therefore, we accept the alternative hypothesis that there is a significant relationship between tomato processing (tomato drying and tomato wet milling) and reduction of wastages in Kano State, Nigeria.

Discussion of Findings

From the analysis, there is positive significant impact of tomato processing on reduction of wastages in Kano State of Nigeria. This shows that tomato processing in terms of tomato drying and tomato wet milling will eventually reduce wastages in Kano State of Nigeria. The finding is in line to the finding of Jabir and Sanjeev (2008) who found a positive significant relationship between fruit processing and wastages. The study is also in line with production theory.

Conclusion and Recommendation

The study was carried out to appraise the impact of tomato processing in order to promote the development of tomato harvesting and processing thereby reducing its wastages in Nigeria. Adopting the blue ocean strategy, which proposes that companies in this case tomatoes processing industries in Nigeria could sustain profitability and reduce wastages by playing in an uncontested market. That is, Nigerian tomatoes processing industries could be on a league of their own, than competing with other foreign tomatoes processing companies. They must be trailblazers and pace setters in creating/processing different types of tomato products that are unique and enhancing their profit by exploiting untapped markets. Generating this kind of processing product environment, especially, at the global stage is the best expansion model to curb wastages. The study therefore, recommends that Nigeria tomatoes processing industries could strategically locate their factories near the harvesting point so that transporting the harvested tomatoes to the point of processing will not be a huge burden and result to waste of tomato products in event of breakdown of transported vehicle of these tomatoes on the way.

References

Abay, A., (2007) Vegetable Market Chain Analysis: The Case of FogeraWoreda in ANRS of Ethiopia. An MSc Thesis Presented to the School of Graduate Studies of Haramaya University. 79p.

Adugna, G., (2009) Analysis of Fruit and Vegetable Market Chains in Alamata, Southern

Atherton, J. G., & Rudich, J. (1986). The Tomato Crop Chapman and Hall. London, UK

Ayelech, T., (2011) Market Chain Analysis of Fruits and GommaWoreda, Jimma zone,

Oromia National Region State. A Thesis Submitted to School of Graduate Studies Haramaya University

Baran, P. A. (1959) Reflections and under consumption. In: The Allocation of Economic Resources: Essays by Moses Abramovitz and Others: pp. 52.64. Stanford University Press, Stanford.

Biale, J. B., & Young, R. E. (1981) Respiration and ripening in fruits — retrospect and prospect. In: J. Friend and M.J.C. Rhodes (Eds.). Recent Advances in the Biochemistry of Fruits and Vegetables. Academic Press, New York. p. 1–39.

Common Methods Of Processing And Preserving Food*Streetdirectory.com*. (2015)

Dike, A. J., &Atchley, A. A. (1986). Handbook of Proximate Analysis Tables for Higher Plants.CRC Press Inc.Florida.

Erinle, I. D., (1989) Present Status and Prospect for Increased Production of Tomato and Pepper in Northern Nigeria. Procedure of international symposium. Integrated Management Practices. AVRD, Tainan, Taiwan

FAO (1981), Food loss prevention in perishable crops, in Agricultural Service Bulletin, n. 43,

FAO (2011a), Global food losses and food waste, FAO, Rome. FAO Statistics.

Frank G. H. H., (2006) Analysis of Processing, Marketing and Demand for Processed Fruits and Vegetables in Tanzania. Published Thesis Submitted in Fulfillment of The Requirements For the Degree of Doctor of Philosophy of Sokoine University of Agriculture, Morogoro, Tanzania

Food Processing Lesson Plan*Johns Hopkins Bloomberg School of Public Health*. 2015

Galanakis, C. M. (2015)Food Waste Recovery: Processing Technologies and Industrial Techniques. San Diego: Elsevier-Academic Press. p. 4. *ISBN 9780128003510*.

Gould, A. W. (1983). Tomato Processing, Tomato Production, Processing and Quality Evaluation. AviPublico.Inc. Westport, Connecticut. p. 112.

Gustavsson, J, Cederberg, C &Sonesson, U, (2011), Global Food Losses and Food Waste, *Food And Agriculture Organization Of The United Nations*, Gothenburg Sweden, available at: http://large.stanford.edu/courses/2012/ph240/briggs1/docs/mb060e00.pdf

Hayes, W. A., Smith, P. G., & Morris, A. E. J. (1998) The production and quality of tomato concentrates. Crit. Rev in Food Sci. and Nutr, 38, 537-564. http://dx.doi.org/10.1080/10408699891274309

Jabir, A., &Sanjeev, K., (2008) Farmers' Perception on Risks in Fruits and Vegetables Production: Agricultural Economics Research ReviewVol. 21, pp 317-326

Laudan, R., (2010). In Praise of Fast Food. UTNE Reader. *Retrieved 2017-04-01*. Where modern food became available, people grew taller and stronger and lived longer.

Mayer, J., Butkevicius, A., Kadri, A., & Pizarro, J. (2003) Dynamic Products in World Exports, Review of World Economics, 139(4), 762-795.

Okunoya, J. A., (1996) Controlling Post Harvest Losses in Tomato and Pepper. Journal of Post Harvest 2: pp 136-142

Robinson, R. W. (1976). Tomato. Encyclopedia of Food Agriculture and Nutrition. (4th ed.). MC Graw Hill Inc.New York, 650-652.

Rodriguez-Mateos, A., Cifuentes-Gomez, T., George, T. E., & Spencer, J. P. E. (2014) Impact of cooking, proving, and baking on the (poly)phenol content of wild blueberry. *J. Agric. Food Chem.62*, 3979–3986.

UNCTAD (2002). INFOCOMM- COMMODITY PROFILE (TOMATO) United Nations Conference on Trade and Development.www.unctad.info/en/infocomm/AACP-products/commodity-profile.

UNIDO (2007) Food Processing Pilot Centres. An approach to productive capacity–building for trade and poverty alleviation in Africa.United Nations Industrial Development Organization. Vienna Zone of Tigray: The Case of Onion, Tomato and Papaya. An MSc Thesis Presented to the School of Graduate Studies of Alemaya University.