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Influence of melon processing technology on social dynamism and well-being of melon processors in the provincial territories of Nigeria

Oyediran Wasiu Oyeleke

Deparment of Agricultural Extension and Rural Development, Federal University of Agriculture, Abeokuta, Nigeria

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Abstract

This study investigated melon processors in Nigeria with respect to their social characteristics and their knowledge and perceptions on melon processing technology. The study also explored the influence of melon processing technology on social dynamism and well-being of melon processors. A sample of 795 melon processors was selected using a three-stage sampling approach. Results show that 68.7% were cosmopolite while 49.8% were members of cooperative societies. The major disadvantages of the technology indicated by the respondents were operational cost and the purchase of the machine. The coefficient of intensity on extension recommendations was very high, as melon processors generally followed recommendations related to proper operations, except for the wearing of gloves. Moreover, 93.2% of the respondents indicated that the technology did not impede access to cooperative credits, 77.4% believed the technology did not cause apprehension, and 66.4% stated that the technology did not affect women interaction and socialization. Principal component analysis showed that 62.9% of the overall variance in well-being was explained by three principal components. namely, aspects related to domains associated with economic prosperity, life satisfaction, and engagement. The study concludes that improved technology influences the well-being of melon processors in northern Nigeria. This study suggests the need for mechanisms that facilitate access to funds of melon processors to reduce the operational and purchasing costs of melon processing technology. Training on safety measures and improved processing techniques are also recommended.

Keywords - households, innovation, melon processing technology, production, social dynamism, value addition

Introduction

Agriculture is a crucial factor in efforts to boost well-being because it increases food supply and income, supports livelihoods and contributes to the overall economy (World Bank, 2008). It provides basic subsistence occupation for millions of people and permits people to supply themselves with the three fundamental human needs—food, clothing, and shelter; thereby sustaining their well-being. The growth of the agricultural sector is particularly important in alleviating poverty in developing countries. Around 75% of people living on less than $1 a day—the globally accepted concept of total poverty living in rural areas—rely on agriculture as a major source of income (International Fund for Agricultural Development [IFAD], 2001). Thirtle et al. (2003) used empirical observations to investigate the relationship between agricultural production and poverty in 48 non-industrial nations during the years 1985 and 1993, and found that a 1% increase in agricultural output decreased the proportion of people living on less than $1 per day by 0.6 to 1.2%. Consequently, Lipton (2001) contended that agribusiness has the highest potential for decreasing destitution and lifting individuals out of neediness.

Nigeria has invested heavily in agricultural science and the advancement of new technologies over the last two decades. Many agricultural sectors have seen major improvements in food production, Public Private Partnership (PPP), and youth and women empowerment, among others (Akinsuyi, 2013; IFAD, 2013). Some research institutes have

Corresponding author email: Oyediran Wasiu Oyeleke, oyediran_wasiu@yahoo.com

begun to develop small-scale agro-processing technologies such as melon depodder, washer, sheller, oil extractor, and impulse sealer (Akinsuyi, 2013). Increased production performance, higher wages, and a higher standard of living are all benefits of improved technology in agricultural growth (Hart et al., 2005). In general, increases in agricultural productivity are critical for rural Africa's development, income distribution, and food security (Grabowski & Self, 2006).

The Melon Sheller as an Agro-Processing Technology

The melon sheller (Figure 1) is an innovation for shelling melon seeds to obtain melon kernels. This technology was launched by National Centre for Agricultural Mechanization (NCAM) in 2010 to reduce the burden of extracting melon oil and cake and to enhance the productivity of melon processors.

The melon shelling machine is made up of three sections—the hopper, the shelling chamber consisting of the shelling disc and the shaft, and the gear system (Adekunle et al., 2009). The hopper has two openings that can hold 37.8 kg of unshelled melon seeds. The inlet throat connects the hopper to the shelling drum. The technical design of sheller varies (extrusive, frictional, and impact force). Energy sources may vary as well. Melon shellers may be powered by gas, electricity or internal combustion (petrol and diesel). The working principle of the melon sheller is based on the energy absorbed by a seed as a result of its impact (collision) with a stationary wall. This energy is sufficient to cause the cracking and removal of the seed coat, with a technology efficiency of 800 $kghr^{-1}$.

Role of Women

Efforts of women in economic transformation and development in terms of food produced, processed, and distributed to end-users cannot be over-emphasized (Fapohunda, 2012). IFAD (2012) described women as the principal if not the sole economic support for themselves and for their children. In Nigeria, as in many parts of Africa, it is estimated that women contribute about 70% of the labor in food processing and preservation (Olawoye et al., 2002). Women do most of the work in the subsistence agricultural sector in most localities in Nigeria and are responsible for fetching water, gathering firewood, transporting harvested produce to the homestead, marketing, and carrying crops to the mill for processing.

Figure 1. Internal combustion melon sheller (promoted by NCAM)

This study investigated the influence of melon processing technology on women's social dynamism in the provincial territories of Nigeria. Although melon cultivation is predominantly assigned to men, women are liable for the additional and tedious work involved in melon processing such as gathering, moving, shelling, cleaning, arranging, and sacking harvested melons to generate income. This implies that the socio-economic well-being and welfare of melon processors and their families can be investigated through women's participation in melon processing technology. Women spend their incomes on their children's education, feeding, and health care. They plough back their profit to melon processing activities, household assets, and social relationships. The study assessed the influence of melon processing technology on social dynamism and the well-being of melon processors in northern Nigeria. Specifically, this study examined the extent of cosmopolitanism of the melon processors, assessed their membership status in trade and cooperative associations, evaluated disadvantages or limitations of the improved melon processing technology, assessed extension intensity on melon sheller maintenance and safety recommendations, ascertained the influence of the technology on melon processors social dynamism, identified well-being domains where the impact of melon shelling technology is most felt by melon processors, determined if there is a significant association between social variables and the well-being of melon processors, and determined if there is a significant relationship between constraints and the well-being of melon processors.

Research Methodology

Locale

This study was conducted in Niger State, which is one of the 19 states in Northern Nigeria. As of 2016, the population of Niger is 5,556,247 (National Bureau of Statistics, n.d.). Agriculture is the primary means of livelihood (Omoare & Oyediran, 2020).

Sampling Techniques

Simple random sampling (balloting method) was used to select the melon processors to serve as respondents of the study. In Nigeria, men do not process melons so the respondents of this study consisted entirely of women. The sample selection adopted a three-stage sampling approach-selection of (i) local government areas (LGAs), (ii) villages, and (iii) melon processors. The first stage is the random selection of 5 out of 25 LGAs. The second stage is a random selection of 10 out of 30 wards that constitute well-defined Data Delineation Areas (DDAs). Two villages per ward were randomly selected to arrive at 20 villages. The third stage followed a simple random selection of 30% of the registered melon processors from each of the selected villages. The number of registered melon processors was based on the data collated by the Federal Ministry of Agriculture and Rural Development (FMARD) and Niger State Agricultural Development Project (NADP) during the national farmers' registration exercise in 2012-2013. The melon processors were reached through the *maigari* (community leaders) and contacts of their association leaders. Table 1 shows the sample selection for this study.

Research Instrument

This section describes the interview guide designed to gather the data needed for the study.

Social Variables

Social variables included cosmopolitanism, membership in an association or social organization, and contact with extension agents. Cosmopolitanism refers to the frequency of visits outside the native community, whether it was twice in a week, every five days, once in a week, once in a month, or once a year. Membership in an association/social organization was measured at a nominal level. A melon processor may be an ordinary member (1), committee member (2), executive member (3), or not a member (0). Contact with extension agents was measured at ordinal level as over 4 years ago (1), one to three years ago (2), yearly (3), quarterly (4), monthly (5), fortnightly (6), weekly (7), or daily (8).

Disadvantages of Improved Melon Shelling

Seven items related to disadvantages or limitations of the melon shelling technology were presented. Respondents indicated whether they perceived each disadvantage as true (1) or false (0). The score was computed as the sum of all item scores; that is, the maximum score is 7 and the minimum score is 0.

Extension Intensity

Extension intensity was used as an index of the transfer of information from extension agents to melon processors. The extension intensity (EI) index was based on Otunaiya and Akinleye (2008), and can be computed as follows.

$$EI = N/R$$

where
N = number of melon processors aware of a particular recommendation;
R = number of recommendations

There were six recommendations (R=6) regarding the use of melon processors. Some recommendations were cleaning of the machine parts after use, removing visible stones before feeding the melon to the machine, and working in a dry area. The EI was computed for each recommendation. For instance, if all the sampled 795 melon processors indicated 'Yes', the EI would be 795/6 = 132.5.

Influence of Improved Technology on Social Dynamics

The influence of improved technology on social dynamics was measured at a nominal level as true (1) or false (0). The score was computed as the sum of all the nine item scores.

Well-being

Although the concept of well-being has multi-dimensional aspects, the most commonly used proxy has been an economic indicator (income). However, income measurements present several limitations as measures of well-being (Anindita, 2014; Stiglitz et al., 2009). The Personal Well-being Index Adult (PWI-A) is a multi-dimensional scale

Table 1. Selection sample representatives

Selected LGAs	Selected wards	Selected villages	Selected melon processors	30% of registered melon processors
Agaei	Etsuagaei	Chata	174	52
		Mayaki-Agaie	135	42
	Tagagi	Egunkpa	153	45
		Gbimingi	138	42
Lapai	Masa/tashibo	Mawogi	132	39
		Saminaka	156	48
	Gupa	Emiko	147	45
		Dagbaje	138	14
Katcha	Bakeko	Majahidu	162	48
		Tswagulu	123	36
	Edotsu	Fuyaka	156	48
		Tsadoyagi	141	42
Lavun	Batai	Chatafu	117	36
		Lanle	150	45
	Doko	Kopa	126	39
		Mambwari	90	27
Gbako	Lemu	Lemu	99	30
		Tako Zuko	105	33
	Gbadafu	Evungi	96	30
		Biramafu	90	27
		Total	**2,628**	**768**

measuring both objective and subjective well-being, and focuses on 7 domains (International Well-being Group (IWbG), 2013). The scale is used in tandem with the compendium of the Organization for Economic Co-operation and Development (OECD) Well-being indicators (Better Life Initiative) (OECD, 2011), Canadian Index of Well-being (Canadian Institute for Theatre Technology, 2011), and Australian Unity Well-being Index (Australian Unity, 2001). In this study, a few modifications were made to PWI-A, to include food and nutrition, leisure, and life satisfaction. This is in line with Nigeria's Core Welfare Indicator Questionnaire (CWIQ) (National Bureau of Statistics, 2006) and Better Life Initiative (OECD, 2011). With this modification, the items used increased from 7 to 10 for the well-being of melon processors in Niger State, Nigeria. The items were measured on an eleven-point scale ranging from 0 to 10, where 0 means not at all worthwhile/ dissatisfied and 10 means extremely worthwhile/ satisfied.

Scores were obtained and aggregated based on the number of items answered. The maximum score was 100 and the minimum score was 0. Mean scores below 50 were interpreted to be "is not worthwhile/poor well-being" while mean scores greater than or equal to 50 were interpreted to be "worthwhile/good well-being".

Validity and Reliability

Validity and reliability tests were conducted on the instrument prior to the research.

Validity Test

Face validity is the extent to which an instrument is subjectively viewed as covering the concepts it purports to measure (Holden, 2010). Three agricultural engineers and five extension officers in the Ministry of Agriculture were requested to read the instrument and provide their assessment and input. Content validity was carried out by two rural development experts to ensure that all the constructs in this study were considered. The corrected copies of the interview guide from the evaluators were compared for internal consistency. Their suggestions and views were utilized to produce the final instrument. Content validity ratio (CVR) was calculated following Lawshe (in Wilson et al., 2012):

CVR = (E – N/2)/(N/2) where:
E = number of evaluators indicating 'essential'
N = Total number of judges

Realiability Test

A reliability test was conducted in Kogi State using a test re-test approach at an interval of two weeks on a sample of 30 melon processors. The reliability coefficients (r_{xx}) are above minimum value (0.7). The results of the reliability test are shown in Table 2.

Data Collection

Data were obtained with the aid of a Computer Assisted Personalized Interviewing (CAPI) system to interview 795 melon processors. CAPI is software designed for e-data collection, analysis and storage via androids, laptops, and tablets. The questionnaire was designed in English but translated to Nupe and Hausa Languages by the interviewers for convenience.

Data Analysis

Data on social demographics (cosmopolitanism, membership of association, contact with extension agents) and the technology (disadvantages, extension intensity on maintenance and safety recommendations of melon sheller, and influence of improved technology on social dynamics) were analyzed using descriptive statistics. Well-being was analyzed using Principal Component Analysis (PCA) to reduce the dimensionality of interrelated statements and identify well-being domains where the impact of melon shelling technology is most felt by melon processors. Chi-square analysis was used to test the association between social variables and well-being of melon processors.

Results and Discussion

Cosmopolitanism of the Melon processors

Figure 2 shows that more than 80% of the melon processors travelled outside their communities either for trading purposes or to attend social events. Almost all melon processors travelled at least once a month, with majority (68.7%) of the respondents traveling outside their communities every 5 days. This frequent travel affords rural women the opportunity to strengthen marketing connections and getting in contact with improved melon processing technology practices in other communities.

Association Membership

Table 3 indicates that approximately half of the melon processors (49.8%) were associated with thrift and cooperatives, 35.1% with a religious party, and 6.8% with the village council. Similarly, 56.6%, 24.2%, 17.4%, and 14.0% were regular members of the melon processing and marketing association, a

Table 2. Reliabilty coeffecients of research items

Contructs	Items	Reliability coeffecient (r_{xx})
Cosmopolitanism	1	0.84
Association membership	8	0.81
Contact with extension agents	1	0.72
Well-being	10	0.94
Constraints	11	0.79

community development association, a political party, and a social organization, respectively. This indicates that melon processors were socially engaged, which can help to improve technology acceptance and marketing connections. Participation in associations is one of the possible ways of mobilizing women for deliberations, collective action, and progress, which is why it is important in this study. Typically, these organizations act as a gateway for melon processors to gain access to advocacies. These groups are often used as a springboard for melon processors to incorporate creativity into their small-scale agro-processing operations in order to boost productivity. The contributions of community networking to the

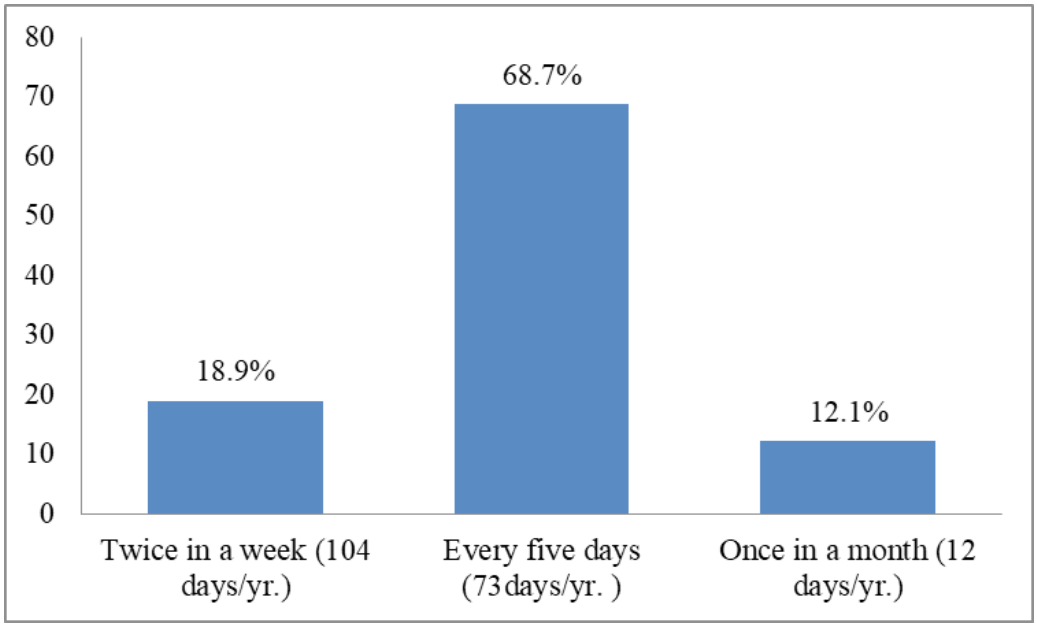

Figure 2. Percentage of cosmopolites among the melon processors

Table 3. Association membership of melon processors in Nigeria State, Nigeria

Association Membership	Ordinary member (%)	Committee member (%)	Executive member (%)	Not a member (%)
Religious group	35.1	1.1	0.0	63.8
Village council	6.8	0.8	0.0	92.5
Cooperative association	49.8	6.8	0.8	42.6
Trade union	8.3	0.0	0.0	91.7
Political group	17.4	14.7	4.5	63.4
Melon processing and marketing association	56.6	4.5	2.3	36.6
Social organization	14.0	0.0	0.0	86.0
Community development association	24.2	1.5	0.0	86.0

* Multiple response recorded

adoption of improved technologies were reiterated by Ezeano (2015).

On the other hand, 63.8% did not belong to religion group. In Niger, Islam is the predominant religion practice, which does not give room for women to attach themselves to any other denominations. Also, 92.5% of the respondents were not members of the village council. Limitations of women to membership in a village council could be attributed to cultural factors in the area. Similarly, 91.7% of the respondents did not join a trade union because they were already in the melon processing and marketing association.

Technology

Disadvantages of Improved Melon Processing Technology

Table 4 shows the identified disadvantages of melon processing technology, as perceived by the melon processors. Respondents perceived operational cost, whether through fuel (94.7%) or electricity (9.5%), as the major disadvantage. The difference in percentages may be attributed to the fact that the melon processors were using shellers powered by different energy sources. Aside from the operational cost, the cost of the machine was also seen as a considerable disadvantage by 39.5% of the respondents. For these women, the purchasing cost of the technology was expensive. For this reason, some women took loans before they could adopt the improved melon processing technology. Thus, the high cost was a major limiting factor for non-adopters who have no alternative financial support to procure the melon sheller. This argument is in line with the innovation diffusion paradigm which largely assumes that technology can be technically and culturally appropriate, but the problem of adoption is one of asymmetric information in addition to high costs (Simtowe et al., 2016). However, the purchase of the melon sheller may be a worthwhile investment. Using budgetary analysis, Sodiya et al. (2019) revealed that the return on investment from the mechanical melon sheller was greater than that from hand shelling method because of the larger output obtained from the melon sheller (300kg/week) compared to the output from the hand shelling method (12kg/week). These outputs corresponded to weekly sales of ₦135,000 ($375) and ₦6,000 ($16.70), or a weekly profit of ₦47,530 ($132.03) and ₦2,230 ($6.19), respectively.

There were no major issues related to the technology asides from cost. The majority (92.6%) of the melon processors reported that the melon sheller was not difficult to operate. They also reported that the spare parts for the machine could be locally sourced (100%), that the machine was appropriate for large and small quantity of melon seeds (94.2%), and that the technology was compatible with existing practices (88.4%). Since appropriate technology conserves resources, and are environmentally friendly, technically appropriate, and economically and socially acceptable (Food and Agriculture Organization of the United Nations, 2017; Sianipar et al., 2013), the simplicity of the technology may encourage melon processors to adopt innovations.

Table 4. Identified disadvantages of improved melon processing technology according to women melon processors

Disadvantages of Melon Processing machine	True (%)	False (%)
High Fuel Cost	94.7	5.3
Not-afforadable (too expensive to purchase)	39.5	60.5
Incompatible with existing practices	11.6	88.4
Requires electricity	9.5	90.5
Difficult to operate	7.4	92.6
Not appropriate for large and small quantity of melon	5.8	94.2
Spare parts could not be locally sourced	0.0	100.0

Disadvantages of Improved Melon Processing Technology.

Agricultural extension services provided by the Niger State Agricultural Development Project (NADP) are the major sources of agricultural information in the study area. Hence, it is expected that contact with extension workers will increase the likelihood that melon processors will adopt extension recommendations on the melon sheller. The result of extension intensity on recommendations regarding the use of melon sheller is shown in Table 5. The estimated extension index ranged from 39.3 to 132.5 for this study. Results show that all the melon processors (100%; EI = 132.5) strictly adhered to supporting the sheller legs with worn-out car tire to reduce vibration. Further, 98.4% (EI = 130.3) ensured cleaning of the sheller parts after use, 89.0% (EI = 117.8) lubricated the bearing parts regularly, 83.2% (EI = 110.2) removed visible stones before feeding melon to the sheller, and 74.2% (EI = 98.3) avoided the use of electric sheller in a wet or damp area to prevent electrocution or shock. For these recommendations, the coefficient of intensity was very high. It implies that melon processors adopted and practiced most recommendations. The reason for high intensity was because women are the first point of socialization; they interact and exchange information concerning the melon sheller among themselves. However, only 29.5% (EI = 39.3) of the melon processors complied with wearing hand gloves during processing operations. It is an indication that wearing hand gloves was not given priority by the melon processors. The reason for not using the hand gloves according to the melon processors was that it created inconvenience and limited free folding of their hands during melon processing operations.

Influence of Improved Melon Processing Machine on Social Dynamics

Table 6 shows that the use of the promoted technology did not cause disparity (69.8%) among the melon processors nor hinder their collective action towards a common goal (68.7%). Also, sharing of information relating to melon processing activities (78.9%) and visiting other melon processors (78.1%) were not affected by the promoted technology. In the same vein, the technology neither impeded accessing cooperative credits (93.2%) nor caused apprehension (77.4%). The women's interaction and socialization were also not affected (66.4%). However, active participation in other social groups not related to melon processing and marketing activities was affected (75.1%). The reason for the lesser participation of the melon processors in social events could be attributed to the fact that the

Table 5. Respondents' compliance to extension service recommendations on improved melon processing machine

Extension recommendations	Percentage	Extension Intesity (EI) Index
Support the melon sheller legs with wornout motor tire to reduce vibration	100.0	132.5
Cleaning of the melon sheller parts after use	98.4	130.3
Lubricating the bearing parts regularly	89.0	117.8
Remove the visible stones from melon before feeding it to melon sheller	83.2	110.2
Avoid the use of electric-driven sheller in wet or damp area to prevent electrocution or shock	74.2	98.3
Wear hand gloves while operating the melon sheller	29.5	39.3

*Multiple responses recorded

Table 6. Percentage of melon processors who stated each statement related to social dynamics as true or false

Statements	True (%)	False (%)
Engagement in the technology limited the participation of women in social events	75.1	24.9
It reduces reciprocity and the exchange of gifts	44.9	55.1
It reduces interaction with the other women outside the melon trade and socialization	33.6	66.4
It affects helping each other out and working collectively towards a common goal	31.3	68.7
It creates disparity (adopters vs. non-adopters) among the melon processors in the community	30.2	69.8
The noise created by the equipment causes apprehension among the members of the community	22.6	77.4
It reduces exchange of information relating to melon processing activities	21.1	78.9
It discourages visiting other melon processors	18.1	78.1
It impedes networking with cooperative for credit support	6.8	93.2

melon processors are fully occupied with the melon processing activities on a daily basis to reap more money.

Principal Component Analysis

Table 7 shows descriptive measurements for each variable related to the well-being of the melon processors. The suitability of the data for PCA analysis was determined and examined across various criteria. The correlation matrix (Table 8) shows a large number of correlations over 0.3, satisfying a requirement for PCA analysis. That the variables were sufficiently correlated was affirmed through Bartlett's Test of Sphericity ($\chi^2(45) = 2907$, $p < 0.001$). Further, Kaiser-Meyer-Olkin's (KMO) proportion of sampling sufficiency (KMO = 0.847) was greater than the recommended value of 0.6 (Coakes & Steed, 1999). The KMO for singular items were greater than 0.845, which was also over the recommended value of 0.5 (Field, 2009).

There are several acceptable methods for determining the number of principal components to retain (Jolliffe, 2002). In this study, the principal components with eigenvalues greater than 1 were retained. Three components had eigenvalues greater than 1, and they consolidated to clarify 62.986% of the variation, as demonstrated in Table 9. Table 10 shows the factor loadings after the rotation. The first principal component showed higher factor loadings on seven of the ten items on the well-being index. These seven items were related to economic prosperity (food and nutrition, income, education, accommodation, physical safety, health, and leisure). Higher income automatically translates to higher profit from the technology which in turn contributes to the savings of melon processors. Ampadu-Ameyaw and Omari (2015) reported that rural women are able to provide the food requirements of the household members and thereby help such households to escape hunger and poverty through agro-processing activities. Further, the general state of health of the respondents improved because the melon processors do not have to sit down in a spot for a long time to shell melon seeds. Likewise, the melon processors can afford to purchase drugs and settle medical bills from their profits. Good health is an important indicator of quality life and overall well-being (Dolan et al., 2008). It therefore implies that the adoption of improved melon processing technology had a significant contribution to the health of the melon processors, economic prosperity, and children's education in the study area.

The second principal component showed high factor loadings on the three items on the well-

Table 7. Descriptive statistics for each domain related to well-being

	Mean	Std. Deviation
Health	5.3522	1.28024
Education	8.2516	2.70499
Income and Savings	8.821	2.78866
Food and Nutrition	8.2579	2.38386
Engagement	8.2830	2.37571
Accommodation	5.9371	1.95248
Physical safety	6.2767	2.59701
Social cohesion and relations	7.2591	2.94377
Leisusre	6.4403	2.26570
Life satisfaction	7.1635	2.49148

being index associated with a sense of satisfaction in one's life and relationships (life satisfaction, social cohesion, and engagement). The third principal component had high loadings for one item (engagement), which related to the general disposition towards one's engagement in melon processing and marketing. In this manner, the items that clustered on similar segments addressed individual components adding to melon processors' well-being.

Association Between the Social Variables and Well-Being of Melon Processors

Table 11 shows the result of the chi-square analysis. There was a significant association between cosmopolitanism (χ^2 = 5.27, df = 1), membership to association (χ^2 = 25.34, df = 3), contact with extension agents (χ^2 = 135.22, df = 5), and well-being. This relationship implies that the three social variables mentioned have influence on the well-being of melon processors. This finding is in consonance with the argument of Taylor (2010) regarding the importance of group living and interpersonal relationships in shaping human evolution and well-being.

Correlation between constraints and well-being

Table 12 shows the relationship between constraints to melon processing and well-being. There was an inverse and significant relationship between well-being and the high cost of transportation (r = –0.92), fuel scarcity and price instability (r = –0.81), inadequate training on improved processing techniques (r = –0.78), poor dissemination of information on improved melon processing technology (r = –0.65), the high cost of melon processing technologies (r = –0.62), ineffective agricultural extension services and coverage on marketing (r = –0.54), and limited information on outlet and market (r = –0.32) at p = 0.05 level of significance. The implication is that high operating cost and inadequate training have the highest negative effect on the well-being of melon processors. Agricultural extension agents have not been effective in disseminating information on packaging, storage, and transportation of processed melon in the study area. Therefore, it can be inferred that the more severe the constraints the lower the economic returns, consequently affecting the melon processors. On the other hand, poor electricity supply to operate the machines (r = –0.10) and an inadequate supply of melon seeds (r = –0.09) did not have a severe effect on the well-being of melon processors. This may be because power supply is stable in the area due to the location of hydro-power station in the state. Further, melon seeds are available all year around.

Conclusion

The study found that the melon processors were socially engaged. They demonstrated a high degree of cosmopolitanism and association membership. Extension service recommendations

Table 8. Correlation coefficients between domains of well-bieng

	Health	Education	Income	Feeding	Engagement	Accommodation	Physical safety	Social cohesion	Leisure	Life satisfaction
Health	1									
Education	.308	1								
Income	.291	.545	1							
Feeding	.314	.756	.651	1						
Engagement	.136	.071	.301	.179	1					
Accommodation	.353	.507	.530	.710	.228	1				
Physical safety	.321	.617	.548	.681	.079	.469	1			
Social cohesion	.119	.101	.086	.102	.036	.057	.092	1		
Leisusre	.315	.485	.393	.586	.115	.353	.467	.138	1	
Life satisfaction	-.017	.051	.112	.061	.027	.052	.030	.052	.045	1

Table 9. Principal component analysis: Eigenvalues, proportion and cumulative proportion explained (*n* = 795)

Prinipal component	Eigenvalue	Proportion explained (%)	Cumulative (%)
1	4.226	42.256	42.256
2	1.042	10.424	52.679
3	1.031	10.307	62.986
4	.993	9.929	72.915
5	.773	7.731	80.646
6	.642	6.423	87.069
7	.427	4.273	91.342
8	.391	3.913	95.255
9	.329	3.290	98.545
10	.145	1.455	100.000

Table 10. Factor loadings on the first three principal components

	Principal component		
	1	2	3
Health	.496	–.001	–.054
Education	.825	–.134	–.141
Income and savings	.781	.106	.226
Food and nutrition	.915	–.087	–.019
Civic engagement	.284	.324	.756
Accommodation	.786	–.046	.150
Physical safety	.822	–.118	–.149
Social cohesion and relations	.154	.562	–.541
Leisure	.668	–.015	–.216
Life satisfaction	.096	.754	.001

Table 11. Association between social variables and well-being of melon processors

Social variables	Chi-square	Degrees of freedom	*p*-value
Cosmopolitanism	5.27	1	0.02
Membershio to melon	25.34	3	0.00**
Contact with extension agents	135.22	5	0.00**

**Significant at 1% level

Table 12. Correlation between constraints and well-being of melon processors

Constraints	*r*	*p*
Processing:		
High cost of transportation	–0.92	0.00
Fuel scarcity and price instability	–0.81	0.00
Inadequate training on improved processing techniques	–0.78	0.01
Poor dissemination of information on improved melon processing technology	–0.65	0.01
The high cost of melon processing technologies	–0.62	0.00
Ineffective extension services and coverage on marketing	–0.54	0.02
Limited information on outlet and market	–0.32	0.03
Poor electricity supply to operate the machines	–0.10	0.10
Inadequate supply of melon seeds	–0.09	0.14

related to proper machine operations were largely followed, except for the wearing of gloves. The major disadvantages were operational costs and the cost of the machine. Along with inadequate training on improved processing techniques, these disadvantages had a negative effect on the well-being of melon processors at 1% level of significance. Furthermore, the result of PCA shows that 63.0% of the overall variance in the well-being of melon processors can be explained by three principal components. The first principal component, which accounts for 42.3% of the overall variance in well-being, contains 7 of the 10 items that are associated with economic prosperity. The next two principal components related to a sense of satisfaction in one's life and relationships, and to the general disposition towards engagement in melon processing and marketing. Results further showed that there was a significant relationship between well-being of melon processors and cosmopolitanism, membership in an association, and contact with extension agents at 5% level of significance.

This study suggests cluster marketing strategies and cooperative platforms as a mechanism for melon processors to access more funds from micro-finance banks and the Bank of Agriculture and lessen their perceived disadvantages of melon processing technology. Additionally, the study recommends that non-adopters should key into the innovation system to benefit from the higher productivity, revenue, and good well-being. It is also recommended that agriculture extension agents

provide training on safety measures and improved processing techniques.

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