Factors Affecting Mushroom Value Chain and Income Generation among Smallholder Farmersin Mbarara District

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Abstract

The study was about the factors affecting mushroom value chain and income generation among smallholder farmers in Mbarara district. The specific objectives included to; analyze the mushroom value chain actors in Mbarara; find out the actors perceptions on local and oyster mushroom production and value addition, assess the effect of mushroom value added products on the income of smallholder farmers in the area, and identify the socio-economic and institutional factors limiting farmers participation in mushroom production and value chain. The study wasdescriptive cross-sectional surveyin nature using quantitative and qualitative approaches for data collection and analysis. Information was captured from a sample of 206 respondents using questionnaire and interviews. SPSS was used for analysis and generationof descriptive and inferential statistics.The study identifiedthe mushroom value chain actors as; input suppliers, producers, traders, processors and consumers. Actors had varying perceptions on local and oyster mushroom production and value addition in Mbarara District. Theyalleged Mushroom production was laborious, required less small space, associated with many technical problems, needed relative input investment and had limited cultivation information.Mushroom valued added products had a significantcontribution towards smallholder farmer's income.Income status of the households, lack of knowledge on value addition technologies, lack of storage facilities, lack of dryers, lack of credit services/financing, and electricity shortages were the significant socio-economic and institutional factors limiting farmer's participation in mushroom production and value addition. The study concluded that there were factors affecting mushroom value chain and income generation among smallholder farmers in Mbarara District and recommended that value chain actors be encouraged to form groups rather than operating as individuals. This could simplify the process of accessing inputs, services like credit as well negotiate prices for both un-processed and processed mushroom products. More education and awareness are needed to change the mindset and perceptions of actor's farmers towards mushroom production and value addition. This can be achieved through periodical workshops and seminars with farmers.

Key words: Mushroom, value addition, value chain, smallholder farmers, income

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Introduction

A mushroom is the fleshy, spore-bearing fruiting body of a fungus, typically produced above the ground on soil or on its food source, mostly in forests (Abdullah *et al.,* 2015). Mushrooms have been recognized by Food and Agriculture Organization (FAO) of United Nations as food item contributing to the protein nutrition of developed and developing countries, where there is a heavy dependence on cereal diets (Akata&Ergonul, 2012).

Globally, the artificial cultivation of mushroom in the organized and unorganized sectors started only about two decades back and with respect to developed countries like USA and Europe, it is still regarded to be in the state of development (Mabuzaand Wale, 2013). The small-scale growers continue to operate under the primitive conditions for making compost, mixing of spawn arid controlling the temperature and humidity conditions with the use of crude evaporative cooling system (Cogorni*et al.,* 2014). The present world production of mushroom is 7 million tons with annual growth rate of.7 per cent and it may touch 12 million tons by 2025 (Uddin *et al.,* 2010).

In Africa and mainly sub-Saharan African countries, focus on mushroom industry is predominantly on trade of the fresh produce thoughfarmers are increasingly adopting value-addition (Singh and Singh, 2012). As an emerging market in developing countries, mushroom production continues to grow as promising agribusiness trend though still highly constrained by short shelf life and uncoordinated markets which not only affects quality but farmers income as well(Phan and Sabaratnam, 2012). Luck of coordinated markets has seen and continues to see the sale of fresh mushroom products without value addition, standard packaging and measurement and unspecified quantities (Zhu *et al.,* 2012). The market of raw mushrooms in Africa is still not well defined. This affects prices and market opportunities given the insufficient value added to the crop. Addressing this loopholerequires an integrated approach that can empower farmers to add value through access to technology(Yang *et al.,* 2013).

In Uganda, mushroom farming is an emerging sector adding to other agricultural sub-sectors in achieving economic development. The increase in purchasing power and demand for mushroom products are some of the factor influencing consumption trends (Kumar *et al.,* 2014). Mushroom is taken as a very high value niche product with great potential to contribute to enterprise diversification and poverty reduction (Nshereirwe, 2004). Mushroom farmers mainly sell their produce to major customers like hotels, super markets and other retail traders(Katongole*et al.,* 2012). Marketing of both fresh and processed mushroom have become very critical factors in the sectors development(Katongole*et al.,* 2012). This is slowly beingachieved by improving the value of the crop through value addition. Although various species of mushrooms have different levels of marketability, marketing of mushrooms is largely influenced by quality produced and level of value added.Though farmers in Uganda largely depend onsmall scale value addition technologiesto enhance market and consumption trends, they are still constrained by quite a number of socio-economic, technical and institutional factorswhich not only affect marketability but equally affect the would be income generated (MAAIF, 2010).

Mbarara district is one of the areas in Uganda practicing commercial mushroom production (Nyapendi*et al.,* 2010). Mushroom is produced by small scale farmers who mainly operate as individuals producers and a few organized in groups. Production of the crop is doneto reduce vulnerability to poverty and also sustaining livelihoods through food and income generation(Nyapendi*et al.,* 2010). Given its small space requirement nature, the mushroom sectorin the district has become a viable and attractive activity for both rural farmers and peri-

urban dwellers. However, due to limited capital investment, technology, and other factors, much of the mushroom produced is left un-processed limiting market opportunities and incomes as well.

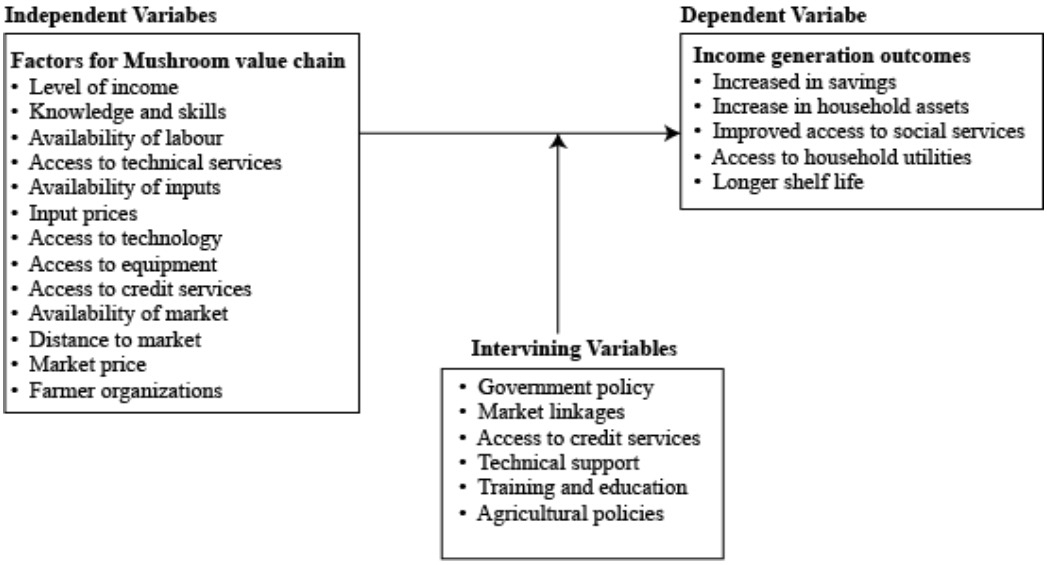
Study problem

Despite the growing demand for mushroom productsfrom both local consumers and pharmaceutical industries, mushroom producers of Mbarara district continue to demonstrate little per capita value-added product (MAAIF, 2010). This has not only affected the market of the productbuthas also limited the income generated by smallholder producers. Government efforts to boost mushroom production and value chain across the district has witnessed the distribution of different high yielding mushroom varieties as well astraining farmers in innovative value addition approaches(Nshereirwe, 2004). However, mushroom value chain among smallholder farmers has greatly remained a challenge hence affecting their incomes. Failure to add value by smallholders in the area could perhaps be explained by unknown factors (UBOS and MAAIF, 2011).Various studies conductedin otherparts of country havelinked farmer's limited participation in mushroom value addition and low income generated from the crop to a wide range of socio-economic, institutional and technical factors. However there is still limited empirical evidence linking these veryfactors to the very situation inMbarara district as no study has been done to approve the subject matter. The study was conducted to assess the factors affecting mushroom production, value addition and income generation among smallholder farmers.

Study objectives

This study aimedat assessing the relationship betweenmushroom value chainand income generation among smallholder farmers of Mbarara, and propose remedial measures to ensure sustainable production of the crop.The specific objectives were to; analyze the mushroom value chain actors, find out the actors' perceptions on local and oyster mushroom production and value addition, assess the effect of mushroom value-added products on the income of smallholder farmers in the area, and identify the socio-economic and institutional factors limiting farmers participation in mushroom production and value chainin Mbarara district.

Conceptual Framework



From the figure above, the study looked at factors for mushroom value chain participation as the independent variable and income as the dependent variable. From the mushroom value chain

participation is influenced by socio-economic factors like price of inputs, Level of income, Knowledge and skills, Access to technical and credit services. Participation in value addition and marketing results in income generation which boosts savings and assets of the actors. However participation in value chain requires streamlined government policies, market linkages, credit service providers, technical support, training and education as well as defined agricultural policies.

Methodology

The study was conducted across the Mbarara district in western Uganda. The district is bordered by Ibanda District to the north, Kiruhura District to the east, Isingiro District to the southeast, Ntungamo District to the southwest, Sheema District to the west and Buhweju District to the northwest. The district headquarters at Mbarara, the largest city in the sub-region, is located approximately 290 kilometers (180 mi), by road, southwest of Kampala, Uganda's capital city, and largest metropolitan area. It lies under coordinates: 00 36S, 30 36E. Agriculture is the mainstay of the district's economy and it involves growing crops and rearing of animals. The cultivation of mushrooms is slowly being adopted as a homestead project. The agro-climatic conditions in Mbarara present conducive environment for mushroom cultivation all the year.

The study adopted a descriptive cross-sectional survey to determine perceived factors affecting mushroom value chain and income generation among smallholder farmers. The design used both quantitative (statistical) and qualitative (attitudes and opinions) approaches for data collection.

The study targeted mushroom farmers and other actors along the chain and other key informants. A sample of 206different actors was drawn using a formula by Kish and Leslie, (1965) at 95% confidence interval and 5% error term.

A combination of purposive, stratified and simple random sampling methods was used in the selection of respondents across the district. Purposive technique was used in the selection of farmers while stratified sampling involved the division of a population into stratum or groups.Value chain actors were divided into groups based on shared characteristics. The formed groups included mushroom producers, processors, and marketers. Systematic probability sampling was used on each group to come up with the target number of respondents. Purposive sampling was applied in the selection of key informants.

A structured questionnaire with both (closed and open-ended questions) was designed, translated to the local language to capture information from farmers. This method captured information socio-demographic characteristics, mushroom value chain actors, perceptions on mushroom production and value addition, effect of mushroom value-added products on the income, and socio-economic and institutional factors limiting farmer's participation in the value chain.The tool was checked for completeness, coded and entered into SPPSS version 16 software package for cleaning and analysis.

Data were analyzed through two principal methods that is qualitative and quantitative. Quantitative data was analyzed through descriptive and inferential measures and thematic analysis for qualitative data.The results of the analysis were presented in tables and pie-charts.

Results

Table 1:Socio-economic characteristics of Mushroom farmers

Household Characteristics	**Total (*n*=206)**
Gender of respondents (%)	
Female	51.9

Male	48.1
Age (mean)	37.03
Marital status (%)	
Never married	25.7
Married	52.9
Separated	9.2
Widow (er)	12.1
Education level in years (mean)	10.80
Household size (mean)	5.02
Total farm size (mean)	5.05
Source of livelihood (%)	
Farming	62.6
Business	24.8
Formal Employment	12.6

From table 1 above, 51.9% of the respondents were female and 48.1% male. Mean average age of the respondents was 37 years with the youngest aged 18 and the oldest 70 years. 52.9% of the respondents were married, 25.7% single, 12.1% widowed and 9.2% separated. Average number of years spent in school was 10 with a minimum of zero and a maximum of 18. An average household was comprised of 5 members with the smallest household having 2 members and the largest household having 12 members. The average land holdings were 5 acres with the smallest holder owning acre and largest holder owning 1 acre. 62.6% of the respondents depended farming for livelihoods, 24.8% small scale petty business while 12.6% depended on salary.

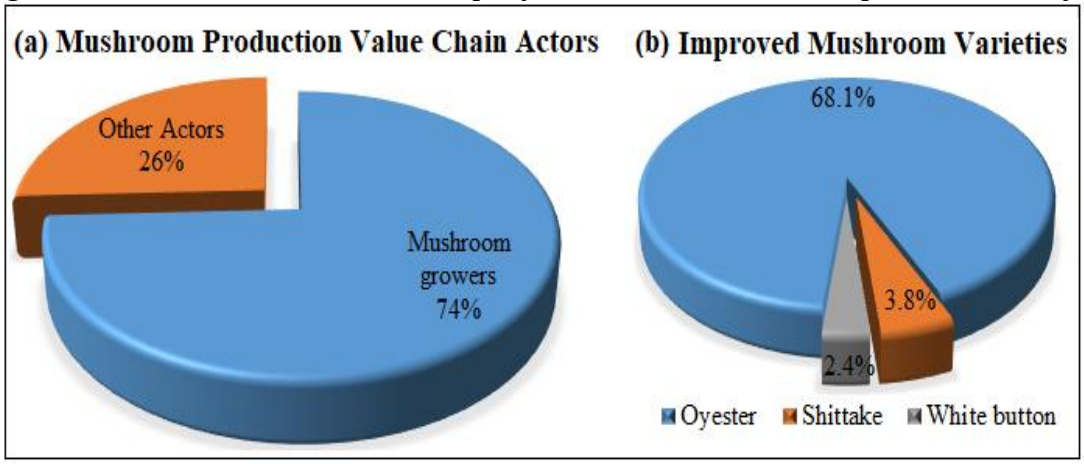


Figure 1:Mushroom Production Information

Seventy-four (74.3%) of the respondents grew mushrooms while 25.7% did not grow mushrooms but rather dealt in local variety other mushroom value chain activities. Majority of the mushrooms growers (68.1%) grew Oyster mushroom varieties, (3.8%) Shiitake and (2.4%) White button mushroom.

Table 2: Sources of seed inputs for planting

Source of seed	Percent (%)
Fellow farmers	51.9
NGOs	18.9
Government	16.5
Local traders	12.6

Most of the mushroom growers (51.9%) obtained mushroom seed inputs through fellow farmers, 18.9% from Non-Government Organizations (NGOs), 16.5% from government agencies, and 12.6% from local traders.

Table 3: Annual Mushroom Production

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Estimated annual harvest in kilograms	206	19	350	157.05	38.279

Results in table 2 above indicate that average annual mushroom production was 157.05 kilograms with a minimum production of 19 kilograms and a maximum of 350 kilograms

Table 4: Key participants in the mushroom sector right from production to the endpoint

Category of participants	Percent
Input suppliers	3.4
Producers	74.3
Traders	4.8
Processors	11.6
Consumers	5.8
Total	100.0

As shown in table 4 above, most (74.3%) of the respondents were producers (mushroom growers) while 25.7% constituted other value chain actors like input suppliers, traders, processors and consumers of both local and improved mushroom varieties.

Table 5: Actors perceptions of local and oyster mushroom production and value addition

	Perceptions	**Frequency**	**Percent**
Production perceptions	Mushroom cultivation is less laborious	50	24.3
	Mushroom production needs more inputs	37	17.9
	Mushroom has medicinal values.	15	7.3
	Cultivation requires less amount of land.	40	19.4
	Information about mushroom cultivation is very limited	20	9.6
	Mushroom cultivation is associated with many technical problems.	34	16.1
	Cultivation is inadequate spawn packets for cultivation.	10	4.4
	Total	206	100.0
Perceptions of mushroom Value addition	Mushroom is vegetable meat for the poor	40	19.4
	Mushroom value addition provides economic solvency to the cultivators.	60	29.1
	The highly perishable product that requires proper value addition	36	17.5
	Mushroom value-added products have avery low market demand	20	9.7

Value addition is associated with many costs	50	24.3
Total	206	100.0

As shown in the table above, 24.3% of the respondent's alleged that mushroom cultivation was less laborious, 19.4% professed it required small land, 17.9% expressed that production need investment in terms of inputs, 16.1% revealed production was associated with many technical problems, 9.6% allegedthat mushroom productionhad limited cultivation information, 7.3% associated the crop with medicinal values while 4.4% reported the crop to have inadequate spawn packets for cultivation.29.1%of the respondents alleged mushroom value addition provided economic solvency to the cultivators, 24.3% claimed value addition was associated with many costs, 19.4% perceived it as a vegetable meat for the poor, 17.5% responded it was a highly perishable product that required immediate and proper value addition, and 9.7% revealed that mushroom value-added products had very low market demand.

Effect of mushroom value-added products on the income of smallholder farmers

Table 6: Regression model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.452[a]	.204	.155	299429.316

A general correlation of .452 was observed between value-added products and income generated through value addition. The R Square of .204 indicated that value-added products contributed to 20.4% of the total income. An Adjusted R Square of .155 implied that value-added products accounted for 15.5% variation in total income earned from mushroom value addition.

Table 7: Regression output between income and value-added products

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	7977.381	217038.607		6.361	.000
Mushroom soup	-5577.638	2901.520	.141	1.923	.056
Dried mushroom	7963.031	2571.941	.206	3.097	.002*
Mushroom Biscuit	-4592.418	2749.321	-.113	-1.670	.096
Grinded mushroom	1673.124	3143.252	.037	.532	.595
Packed mushroom	6071.260	2651.615	.158	2.290	.023*
Boiled mushroom	9635.799	3075.170	.227	3.133	.002*
Mushroom Ketch-Up	2722.320	2648.326	.069	1.028	.005
Mushroom Chips	-4239.388	2989.105	-.102	-1.418	.158

* Significant at p>0.05

Results in table 7 above indicate that only four (4)out of the eight (8) hypothesized value-added products had a significant effect on income. Value-added dried mushroom had a positive significant effect on smallholder farmer's income at 5% level of significance. The coefficient β = 7963.031 significant at p= .002 implied that a unit increment in value-added dried mushroom, increased farmers income by 7963 shillings.

Similarly valued added mushroom product through packing was a strong predictor of smallholder farmer's income at 5% level of significance. A coefficient β = 6071.26 significant at

p= .023 showed that a unit increase in valued-added packed mushroom, improved farmers income by 6071.3 shillings.

Furthermore, boiled mushroom showed a significant effecton farmer's income at 5% level of significance. A coefficient (β = 9635.799 at p= .002) implied that a unit increase in boiled mushroom affected farmers income by 9635.799.

The study further discovered that value addition through mushroom ketchup was a strong predictor of small hold farmers 5% level of significance. A positive and significant coefficient (β =2722.320 at p= .005) was an indication that a unit increase in value-added mushroom ketch-up affected smallholder income levels.

Table 8: Parameter estimates for socio-economic and institutional factors limiting farmer's participation in mushroom production and value additional

				95% Confidence Interval for Exp (B)	
	B	Sig.	Exp. (B)	Lower Bound	Upper Bound
Intercept	1.186	.383			
Age	-.013	.435	.987	.955	1.020
Educational level	.009	.831	1.009	.932	1.091
Income status of the household	.352	.004*	1.422	1.118	3.807
Lack of knowledge on value addition technologies	-1.061	.041*	1.941	.805	4.099
Transportation issues	.378	.140	1.459	.883	2.412
Lack of storage facilities	3.107	.000*	2.898	.687	4.174
Lack of dryers	1.072	.014*	1.342	.145	2.808
Limited extension coverage	.025	.742	1.025	.885	1.187
Lack of credit services/financing	1.033	.024*	2.808	1.319	5.978
Lack of organized markets	-.714	.339	.489	.113	2.116
Inadequate infrastructure	-.138	.839	.871	.229	3.309
Electricity shortages and load shading	2.114	.004*	1.121	.226	2.566

* Significant at p>0.05.

a. This parameter is set to zero because it is redundant.

Twelve variables were used as socio-economic and institutional factors limiting farmer's participation in mushroom production and value addition. Adjusted odds ratios were calculated to assess the influence of each factor on the dependent variable than the others. Only six (6) factors remained significant and these included; income status of the households (AOR = 1.422, 95% CI: 1.118 - 3.807; p = .004), lack of knowledge on value addition technologies (AOR = 1.941, 95% CI: .805 - 4.099; p = .041), lack of storage facilities (AOR = 2.898, 95% CI: .687 - 4.174; p = .000), lack of dryers (AOR = 1.342, 95% CI: .145 - 2.808; p = .014), lack of credit services/financing (AOR = 2.808, 95% CI: 1.319 - 5.978; p = .024), and electricity shortages and load shading (AOR = 1.121, 95% CI: .226 - 2.566; p = .004).

Discussion

Mushroom value chain actors in Mbarara district were generally classified to input suppliers, producers, traders, processors, and consumers. All actors along the chain add value in the process of changing product title. Input suppliers (Spawn suppliers)made 7.3% of the total respondents. The major input suppliers in Mbarara district are government and private sector. Private suppliers are organized as individuals who aim at maximizing profits. These provide inputs like spawn, substrates, training services and at times credit services to the farmers. This study finding is comparable to Upadhyay, (2011) who alleged that seed multiplier in this chain is private individual suppliers and Mushroom cooperative Unions. These multipliers mushroom seed and sell them the producers who are members and other interested growers. There are many individual spawn suppliers and own spawn producers found in Uganda. Farmers get the spawn from two major channels. The first channels originate from primary spawn suppliers to the producer whereas the second channel passed through primary and secondary spawn suppliers to reach mushroom producers.

Producers made49.5% of the total respondents. Mushroom producers were the next major actors who perform most of the value chain functions start from mobilizing inputs to post-harvest handling and marketing. Most farmers were producing as an individual with un-exception of a few producer groups that were newly established. The major value chain activities that mushroom producers perform included purchasing inputs, sterilizing substrates, spawning, managing the growing shade, disease and pest controlling, harvesting, post-harvest handling and marketing. There was an observed variation in mushroom production by gender where female were much involved in the production than males. The role of women's in the production and trade of mushroom was higher than that of men. These were mainly involved in the management and postharvest handling processes. This study finding is comparable to findings by Singh and Singh, (2012) who opined that the major value chain activities that mushroom producers perform include purchasing inputs, sterilizing substrates, spawning, managing the growing shade, disease and pest controlling, harvesting, post-harvest handling and marketing.

Traders accounted for 16.5% of the total respondents surveyed. Traders are the major actors in mushroom trade are categorized into retailers and supermarkets. The activities of traders/retailers were collecting, sorting, packing and transporting to the next destination market. Mushroom traders in Mbarara district operate as individuals who buy fresh spawn, stock and later transport it to the next destination. They played a leading role in collecting and distributing fresh and dry mushroom from producers to alternative markets. Their destination markets were consumers, supermarkets, hotels and restaurants, and retailers. Their main alternate markets were supermarkets, consumers and hotels. This study finding is in line with Silva *et al.,* (2012) who argued that retailers get products from mushroom farmers and transformers and then sell the product to the final consumer with or without any modification in the product. They are composed of hotel, open market and the producers themselves: Hotel buys mushrooms from the producers and prepares into different dishes and sells to end users.

Processors made 11.6% of the total respondents studied. Processing is one of the mushroom value chain functions. The most common form of processing was drying and cooking which is done by farmers and traders. There were no special mushroom processing and packaging companies in Mbarara but rather, hotels, restaurants, and cafeterias process locally produced and imported mushroom into different dishes. Hotels and restaurants prepare different types of fasting and non-fasting mushroom dishes per day. The main customers for mushroom dishes are locals and a few foreigners. This study finding concurs with Nyapendi*et al.,* (2010) who argued

that processing is one of the mushroom value chain functions. These are involved in special mushroom processing and packaging company to the local and international market. Rather than hotels, restaurants, and cafeterias, processors further process locally produced and imported mushroom into different dishes.

Consumers made 15.1% of the study participants. Consumers are end users of mushroom in the value chain. Consumers purchase and used mushroom from producers, traders, and processors. Both local and improved types of mushrooms are consumed. This study finding is in line with Nyapendi*et al.,* (2010) who argued that consumers are end users of mushroom in the value chain. Consumers purchase and used mushroom from producers, traders, and processors. They are composed of three groups: The first group buys the mushroom from the producers and made some preparation for final consumption. These include the people who live near to the producers and the workers who are working in the offices. The second group buys the mushrooms from the hotel which is ready to eat. The last group buys the mushrooms from open market for final use after making some preparation.

The study came out with different perceptions of actors on mushroom production and value addition. Actors generally perceived mushroom production as; less laborious, needed relative investment in terms of inputs, associated with medicinal values, required less small land, had limited cultivation information and associated with technical problems. These study findings are comparable to findings by Yang and Wan (2013) who argued that mushroom production can be meaningful to the extent that non-agricultural job and income opportunities. Intensive type of mushroom production could provide good alternative income opportunities for small family enterprises since they do not have adequate land to produce crops and raise animals. Also, mushroom production gives additional/alternative income to farmers looking for a value-added product and a way to supplement farm income while making use of by-products or co-products from other crops. Since mushrooms can be grown on nearly any type of agricultural and forestall residue, they are an ideal crop for rural areas with large amounts of cultivated hectare and residue from field crops.

Mushroomswere perceived as vegetable meat for the poor, value addedproducts were alleged to provide economic solvency to the cultivators.These study findings concur with AnanbehandAlmomany, (2008) who opined that farmers believe value addition provides an alternative growth strategy that gives farmers the opportunity to expand by moving upward in the food chain rather than expanding horizontally. This opportunity is available because the food supply chain is becoming more integrated. By moving aggressively, farmers have the opportunity to play a role in the development of this new integrated system. This opportunity will provide farmers a greater role in the ownership and control of the new system.

Dried mushroom products were a strong predictor of farmer's income at 5% level of significance. A unit increment in the kilograms of dried mushroom was found to increase farmer's income by 7963 shillings. Freshly harvested mushroom varieties were dried whole or dried in slices of about 1/4-inch-thick on tarpaulins and iron sheets. This study finding is in line with Upadhyay, (2011) who argued that value-added agriculture entails changing a raw agricultural product into something new through storage, packaging, processing, cooling, drying, extracting or any other type of process that differentiates the agricultural product from the original primary agricultural products. Adding value to agricultural products is a worthwhile effort because of the higher returns that come with the investment, the opportunity to open new markets and extend the farmer's marketing season as well as the ability to create new recognition for the farm.

Mushroom packaging was a strong predictor of smallholder farmer's income at 5% level of significance. An observation made was that a unit increase in the production of packed mushroom, increased farmer's income by 6071.3 shillings. This study finding concurs with Yang and Wan (2013) who opined that intensive type of mushroom production could provide good alternative income opportunities for small family enterprises since they do not have adequate land to produce crops and raise animal. Also, mushroom production gives additional/alternative income to farmers looking for a value-added product and a way to supplement farm income while making use of by-products or co-products from other crops.

The study further discovered a positive significant relationship boiled mushroom and smallholder farmer's income at 5% level of significance. A unit increase in boiled mushroom increased farmer's income by 9635.799 shillings. This study finding was comparable to Upadhyay, (2011) who argued that value-added agriculture entails changing a raw agricultural product into something new through storage, packaging, processing, cooling, drying, extracting or any other type of process that differentiates the agricultural product from the original primary agricultural products. Adding value to agricultural products is a worthwhile effort because of the higher returns that come with the investment, the opportunity to open new markets and extend the farmer's marketing season as well as the ability to create new recognition for the farm.

The study came out with significant socio-economic and institutional factors limiting farmer's participation in mushroom production and value addition. Income status of the household was a significant factor limiting farmer's participation in mushroom production and value addition at 5% level of significance. Households with a poor income status were 1.4 less likely to participate in production and value addition. This is because production and value addition require a lot of investment in terms of spawn procurement and equipment used in adding value. Therefore, poor households are always limited finances with finances when access inputs and technology. These study findings concur with Silva *et al.,* (2012) who revealed that poverty amongst some group members is also still a constraint as many lack spaces for the mushroom growing structures. However, farmers are encouraged to rent rooms and a revolving fund has been set up to allow them to buy their planting material. The majority paid back at least half the loan within the first production cycle.

Similarly lack of knowledge on value addition technologies was another factor limiting farmer's participation in mushroom production and value addition at 5% level of significance. Farmers with limited knowledge on technologies were 1.9 times less likely to add value on their mushroom products. Value addition technologies are complex, at times to operate them requires that a farmer gets relative knowledge which was not the case in the area given low observed levels of education. This perhaps explained the low uptake rate of technology in the area. This study finding is comparable to Colavolpeand Alberto, (2014) who argued that lack of information to do with mushroom processing has also come out as a challenge. There is also limited knowledge regarding the nutritional traits of mushrooms among the farmers as well as the consumers. Information about mushroom growing may only be known to just a few groups of farmers involved in the growing process. Many are less informed and hence may not be able to obtain the improved seed varieties.

Furthermore, lack of storage facilities was a significant limitation to farmer's participation in mushroom production and value addition at 5% level of significance. Farmers withoutstorage facilities had 2.898 less chances of participating in production and value addition. This is because mushrooms are perishable products that require proper storage and handling;therefore, lack of storage facilities maylimit participation in value addition. This study finding concurs with Almeida *et al.,* (2015) who argued that storage of produce, processed or unprocessed mushroom

is one of the biggest nightmares faced by those involved in value addition and marketing. All sorts of vermin exist that tend to partake of the produce. In other cases, the products are so sensitive to the environmental conditions that one has to take extra care to ensure that they don't make losses. A poor decision on storage combined with lengthy storage times could easily expose farmers to a total marketing loss in case the store isn't of a good grade. Cooling systems are essential.

Lackof dryers was a positive factor in farmer's participation in mushroom production and value addition. Households that lacked dryers were 1.3 times less likely to participate in value addition. Given the poverty levels and limited knowledge on value addition technologies, drying has remained a value addition option for many farmers. However many farmers largely depend on traditional methods like sun-drying rather than dryers due to financial limitations. This study finding is in line with Almeida*et al.*, (2015) who argued that many farmers have decided to sell fresh mushrooms since they do not have dryers for drying the mushrooms. They may still not have the money to invest in any solar machines for serving the purpose. Mushrooms are well known perishable crops yet farmers still do not own refrigerators since they cannot afford thus risking their products to rot.

Lastly, lack of credit services/financing was a significant predictor of farmer's participation in mushroom production and value addition at 5% level of significance. The odds indicated that farmers who did not access credit services were 2.8 times less likely to add value to their mushroom. Given the rain-fed nature of the agriculture sector in the area, many financial institutions do not normally give out loans to farmers in fear of the risks. Even those willing to give loans to farmers have complicated loan terms that most farmers may not satisfy like security, payback period, etc. Lack of finance, therefore, limits the farmer's capacity to invest in production and technology. This study finding agrees with GebremichaelandRaro, (2014) who argued that while adding value, chances are high that you will pay cash for the raw material and offer credit to the retail. This approach places a big load on the business' cash flow. Borrowing money is one of the most expensive ventures in Uganda with interest rates hardly going below 25% per annum while informal money lenders charge exorbitant rates of not less than 10% per month. Another outlook is the need for large scale purchase of produce during the harvesting season in order to store and process over a longer period of time long after the harvest period ends.

Conclusion

In conclusion mushroom value chain actors in Mbarara include; input suppliers, producers, traders, processors, and consumers. Producers and traders, form the biggest part of the value chain population.

Actors have varying perceptions of local and oyster mushroom production and value addition in Mbarara District. They alleged the enterprise was less laborious, required smaller space, had many technicalproblems, needed relative input investment and had limited cultivation information. Value addition was perceived as an immediate process that needs much investment given the perishable nature of the crop.

Mushroom value-added products like dried mushroom, packed mushroom, boiled mushroom, and mushroom Ketch-Up significantly contributed to smallholder farmer's income in the area.

Farmer's participation in mushroom production and value addition is affected by factors like income status, lack of knowledge, poor storage facilities, lack of dryers, lack of credit services/financing, and electricity shortages.

Recommendations

Value chain actors should be encouraged to form groups rather than operating as individuals. This can simplify the process of accessing inputs, services like credit as well negotiate prices for both unprocessed and processed mushroom products.

More education and awareness are needed to change the mindset and perceptions of actor's farmers towards mushroom production and value addition. This can be achieved through periodical workshops and seminars with farmers.

The key to developing mushroom farming is the production of good quality mushroom spawn. Business incubation programs should be initiated to encourage the development of high-quality mushroom spawn-production enterprises. The programs should aim at providing participants with access to processing equipment and laboratories.

There is also a need for business skills training for potential entrepreneurs, particularly in developing viable business plans to facilitate access to finance. Small businesses (especially women farmers) find accessing loans difficult and interest rates are generally high. Government support for the business incubationprogram and for access to low-interest finance would lay the foundation for expanding mushroom production in Uganda.

There is a need for market development. Further support is needed for the development of sustainable and reliable domestic, regional and international mushroom markets, for example, there are potential markets for dried mushrooms, allowing for longer storage and transport to urban centers and for export. This requires, among others, developing sustainable, accessible market information systems, and mobilizing mushroom farmers into associations or cooperatives. Support could be provided by the government in partnership with funding agencies and the private sector.

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