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EVALUATION OF COST-BENEFITS OF OYSTER MUSHROOM PRODUCTION USING INNOVATIVE WATER HYACINTH SUBSTRATE FOR SUSTAINABLE DEVELOPMENT OF SME, KENYA

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ABSTRACT

Purpose: The study did an evaluation of cost-benefits of oyster mushroom production using innovative water hyacinth substrate for sustainable development of Sme, Kenya.

Methodology: The study employed the Benefit-Cost Analysis (BCA) technique for the evaluation

Findings: Oyster mushroom is edible and belongs to fungi Kingdom and can play a key role in economic development of a country. It can also contribute immensely to human wellness through enhancement of body immune system when consumed regularly.

Unique contribution to theory, practice and policy: There is need to evaluate the Cost-Benefits of Oyster Mushroom Production Using Innovative Water Hyacinth Substrate for Sustainable Development of SMEs in Kenya. Objectives include determination of economic Net present Value (ENPV) and determination of Economic Benefit-Cost Ratio (EBCR). The significance of this study include control of Corona Virus (COVID-19) pandemic disease, poverty reduction, reduction of unemployment crisis and enhancement of sustainable business opportunity for SMEs.

Key Words: *Cost-benefits, oyster mushroom, production, innovative, water hyacinth, substrate, sustainable development, Sme, Kenya*

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INTRODUCTION

Kenyan population that was in the labour market was 23,738,918 in 2020 .as given by data from World Bank. According to a report release by the Kenyan Bureau of statistics on Sept 2020, the unemployment rate increased from 5.2% to 10.4 in March, showing that more than 1.million Kenyans had lost jobs during the COVID pandemic Kenyan population that is eligible for jobs is about. , and that means that getting a lucrative job at a big company in the capital cities of Kenya is not easy. COVID 19 is threatening the livelihood of Kenyan citizenry. Many firms have laid off their employees, literally reversing the gains we have had over the years. The pandemic has exposed us to the true realities of unpreparedness at individual and level and governments levels. According to World Bank 2020 Edition 22 report, the unemployment has increased by 4 percent. The sectors most affected are the health sector and the agriculture or food sector. So question to ask are what can we do to get people to stop relying on white color jobs and venture into farming as a business.

Most African farmers were involved in mushroom production either for home consumption and on rare occasion have surpluses to sell in the market Oyster mushroom is edible and belongs to fungi Kingdom and can play a key role in economic development of a country. It can also contribute immensely to human wellness through enhancement of body immune system when consumed regularly. Most farmers have turned to mushroom farming as an entrepreneur venture. Quimio (2002) found that Oyster mushrooms are suited throughout the third world in areas that are rich in plant wastes such as sawdust, sugarcane bagasse and others which can be used as substrates. Study by Gibriel et al. (1996) indicated that oyster mushroom has a high colonizing ability and can grow on virtually any agricultural waste than other mushrooms. This gives reason why oyster mushroom is often preferred for cultivation by majority of mushroom growers especially the starters.

Mushroom industry can take advantage of the issues which have been raised during COVID-19. There is has been increase of awareness of the people on the need to follow healthy diet to boast immunity, (Rodriguez-Perez et al, 2020).Secondly Governments have realized the need for food Safety in fact it is one of the Kenyan governments big four Agenda. The strives to ensure access of affordable, adequate, safe and nutritious food in sufficient quantity and quality. This can indeed can be achieved through improved and innovative production and marketing of Oyster mushrooms. This will not only ensure food security but also food sustainability during this future lockdown and restrictions such as evidenced during the Corona virus pandemic, (Galanakis, 2020).

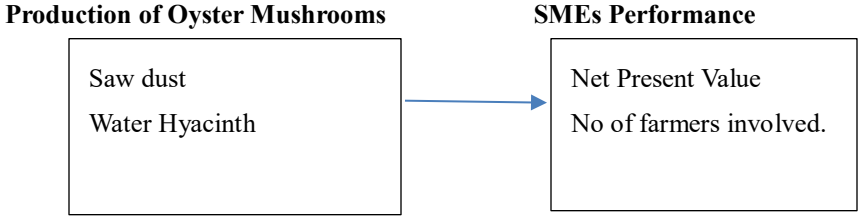

Figure 1: Conceptual Framework

Statement of the problem

The biggest challenge most counties have had to deal with since the COVID outbreak is food insecurity. The problem has been more evident in the less developed Countries. Kenya is no exception .Food production systems are still grappling with ineffective technology and as such the population suffers from serious malnitution and high levels of poverty. It is even more worrying with increase infection rates of the Corona Virus. Countries must find ways of improving food production so as to feed the increased population and ensure a healthy populace. Mushroom cultivation on large scale for consumption and selling is the option to alleviate poverty and develop the life style of the vulnerable people (Imtiaj and Rahman, 2008).Mushrooms cultivation offers benefit to market gardens when it is integrated into the existing production system by producing nutritious food at a profit, while using materials that would otherwise be considered "waste" (Beetz and Kustudia, 2004). From the studies reviewed, it's noted that most of them have dwelled on production and the methods of improving the quantity and quality of oysters. However studies have not been done on how innovative mushroom, production could get the farmers engage in long term entrepreneurial production for sustainable economic development growth.

The purpose of this study was to provide information on 1) determination of economic Net present Value (ENPV) and its Economic Benefits by using The Benefit-Cost Analysis (BCA) technique for the evaluation. The Oyster Mushroom produced by alternative substrate of water hyacinth and saw dust be brought into the value chain system marketed to create jobs and be made into a business venture

LITERATURE REVIEW

Theories

The Discovery Theory: Individual-Opportunity Nexus Theory

The Discovery Theory, also called Individual-Opportunity Nexus Theory (Shane&Eckhardt, 2003),finds its intellectual roots in Kirzner (1973),and has recently been reviewed and summarized by Shane (Shane,2003).The theory has been widely studied and applied, spurring an impressive amount of research in the field of entrepreneurship and assisting to recognize business and marketing opportunities (Shane&Venkataraman, 2003).

The Theory assumes that opportunities are objective (objective opportunity), that entrepreneurs differ from non-entrepreneurs in important ways, and that the decision making context within which entrepreneurs operate is risky (Alvarez&Barney, 2005).

Discovery Entrepreneurs (Unique individuals)

The Variation in people's abilities to perceive opportunities is also a central assumption in the Discover Theory. Since opportunities are objective, in principle, they should be observable by everyone in an economy. If everyone in an economy could observe an opportunity, then all could try to exploit it, thus such opportunities would never be a source of real economic wealth to anyone (Barney, 1991).All people cannot perceive opportunities equally, some will be

predisposed to see them due to interest, whereas others will be blind to them because they don't care or lack training to recognize opportunities.

In order to explain why some people exploit objective opportunities while others do not, the Discovery perspective must assume that people differ in their abilities to either see opportunities or once they are seen, to exploit these opportunities. This brings about the difference between entrepreneur and non-entrepreneur in opportunity exploitation. The difference is rooted on the level of alertness (Shane&Venkataram, 2000; Kirzner, 1973), seen between them which is linked to differential ability of individuals to recognize information about opportunities and undertake to exploit them. This is what makes Vihiga Mushroom Project (Vimpro) growers unique from the rest of the people in Vihiga County

The Creation Theory

The Creation Theory finds its intellectual roots in Schumpeter (1934) and has been extended by a variety of authors (Gartner, 1985; Loasby, 2002).The Creation Theory assumes that opportunities are created by entrepreneurs through an emergent and iterative search process, that differences between entrepreneurs and non-entrepreneurs are created through by this search process, and that the decision making context within which entrepreneurs operate is either ambiguous or uncertain.

Relevance of the theories to the study

In the study of water hyacinth and sawdust is seen as a new area, discovery of new business opportunity is emphasized. However, this comes with some level of risks which can be exploited by entrepreneurs to create wealth. Opportunities are known to fleet and time should not be wasted when they appear. Therefore water hyacinth and sawdust substrate anchors in these theories

The theories emphasize the development of business plans within the business context. The fundamental objective of an entrepreneur is to create economic wealth which this study intends to by developing the product and evaluating economics (Benefit-cost analysis).

Table 1: Income and employment impact after adoption of mushroom production technology

Enterprise	Annual income(Rs)	Income distribution(%)	Annual employment generation (Days)	Employment generation(%)
Agriculture	26816	48	180	55.2
Animal Husbandary	12266	22	119	36.5
Oyster mushroom	1572	3.1	10	3.1
Button mushroom	5404	10.8	13	4.0
Value addition	9321	17.0	4	1.2
Total	5008	100.0	326	100.0

Source: Kharbikar et al., 2011

Table 2: Performance of Strains of Oyster on sawdust Substrate

Strain	Opening to 1st flush(Days)	Yield/Flush(Gm)					
		1st	2nd	3rd	4th	5th	6th
P.Sajor.caja	30	67	30.0	3.8	2.4	0	0
P.quebeca	35	53.4	24.0	7.9	0	0	0
P.burundii	7	18.9	0	0	0	0	0
P.oesteatus	8	67.0	36.0	30.0	19.0	0	0
P.oesteouts	12	70.0	29.0	9.9	1.7	0	0
P.eous Kapak	4	72.0	37.0	40.0	7.3	10.1	6.5
P.eous PD-4	5	72.0	48.0	15.0	1.4	3.0	0

Source: KARI, Report, 2011

Table 3: Estimated Production (Fresh Wt) of Oyster Mushroom in 1997

Country	Production(1000m)	Production(1000lb)	%

China	760.0	1675496	86.8
Japan	13.3	29321	1.5
Rest of Asia	88.4	194887	10.1
North America	1.5	3307	0.2
Latin America	0.2	441	-
European Union(EU)	6.2	13668	0.7
Rest of Europe	5.8	12737	0.7
Africa	0.2	441	-
Total	875.6	1930348	100.0

Source: Chang (1999)

Mushroom Market demand in Vimpro

The survey by Family Concern (2005), found that market demand of mushroom per capita was 1.54kg per adult equivalent, and projected the potential demand at 30800 tons annually (Table 2.2.8).The study also predicted an increase in consumption of at least 10%.The respondents of the study, 83.8% of them indicated that they were willing to consume more mushrooms if the mushrooms are made available at affordable prices. This implies that there is ready market for mushrooms, however, adequate production to meet the demand is an issue.

Table 4: Meat Per Capita Consumption Compared to Mushrooms

Consumers	Beef(Kg)	Mushrooms(Kg)
Lower class	9.0	0.9
Middle class	16.0	1.6
Upper class	21.19	2.12
Average	15.39	1.54

Source: Family Concern, 2005

Table 5: Compared profitability of Maize, Wheat and Oyster Mushroom

	Maize	Wheat	Oyster mushroom
Gross income(ZWD)	1,050,000	2,000,000	2,400,000
Expected yield	3 tons/ha	5 tons/ha	240kg/20m^2
Average price(ZWD)	350,000/Ton	400,000	10,000/Kg
Total costs(ZWD)	531,500	860,000	697,000
Labour	60000	25,000	Labour 50,000
Land preparation	26000	25,000	Firewood 20,000
Seed	35000	10,000	Spawn 180,000

Fertilizer/Lime	285000	580,000	Plastic bags	12,000
Insecticide	40500	45,000	Strawn	120,000
Transport	40000	55,000	Antiseptics	15,000
Levy	12000	10,000	Construction	300,000
Miscellaneous	33000	110,000		
NET INCOME(ZWD)	518,500	1,140,000	1,703,000	

Source: Mushworld, 2004

The study by Kivaisi (2007) on oyster mushroom production from Mbeya District in Tanzania where bean trash was used as substrate for mushroom production showed that growers are making good money from mushroom business (Table 2.4.e). The mushroom producers/growers having been motivated by profits thus have formed an association known as Tanzania Mushroom Growers Association (TMGA), aimed at creating more wealth and taking advantage of economies of scale in their operations. The industry is constrained by economic factors, inadequate knowledge and skills of the growers, diseases and pests. These are the concern areas that need intervention to enhance the development of mushroom industry in Tanzania

Table 6: Investment and income from mushroom growing by one farmer in Mbeya

A. Capital Investment	Tshs(Euro)
1. Building of a mushroom house(Grass roof, brick wall)	400,000
2. Pasteurization Container	25,000
3. Tools	26,500
Total	451,500(268)

B. Cost for one growing cycle	
1. Purchase of spawn(One growing cycle)	18,000
2. Transport	5,000
3.Purchase of bags	5,000
4.Firewood	2,500
5.Substrate (from own farm)	-
-	
6. Labour	2,000
Total cost for one growing cycle	32500(19.3)

C. Mushroom Production	
100 bags(2-3kg substrates) each producing 750gm fresh mushrooms=75kg	
D. Income from mushroom sales,1kg sales @Tshs3000 x75kg)	225,000(133.5)
E.Profit on basis of investment of one cycle: D-B	192,500(114)
F. Payback period/Time (Growing Cycles) of capital investment :A/E	=2.3

Source: Kivaisi's Report (2007, P.20)

The literature reviewed above shows that benefit-cost analysis of mushroom production has been conducted in most countries where mushroom production is undertaken as a business. However, these studies have not focused on production of oyster mushroom using water hyacinth alone or water hyacinth mixed with sawdust.Kivaisi (2007) has looked at benefit-cost of oyster mushroom cultivated on bean straw but not mushroom grown on water hyacinth alone and when water hyacinth is combined with sawdust. The other studies (Singh et al., 2001; Quimio, 2002) have dwelt on button mushroom production using rice straw and Prophant (2005) has reported benefit-cost analysis of Coprinus mushroom using rice straw. It is evident that none of these authors attempted to analyze benefits and costs of oyster mushroom grown on water hyacinth and when water hyacinth is combined with water hyacinth. Therefore no study has focused on production of oyster mushroom using water hyacinth alone and when water hyacinth is mixed with sawdust in order to determine profitability of oyster mushroom, thus creating knowledge gap which this study sought to fill.

Discounting of Cost and Benefit flows

Once all relevant impacts that can be expressed in monetary amounts have been so expressed, it is necessary to convert them all into present value (PV) terms. This necessity arises out of the time value of money or time preference. Therefore all cost and benefit flows are discounted, using a discount rate. If the interest rate is, r, then the following formula given by Gerald&Marta (n.d) can be used to find the present value (PV) of an amount (Pt) received at some time,t in future.

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$$PV = \frac{P_t}{(1+r)^t}$$

Where:

PV=The present value of the amount invested

P_t=The dollar or shilling value of the future amount in time,t

r=The discount rate

t=The year,or month in which Pt is realized

The expression in square brackets in the equation is known as discount factors $(1+r)^t$ .The discount factors have the property that they always lie between +1 and 0.The further away in time a cost or benefit occurs,(the higher the value of t),the lower the discount factor(Nick et al.1993).Similarly, the higher the discount rate r for a given t, the lower the discount factor since a higher discount rate means a greater preference for things now rather than later and this has been expressed graphically in figure 3.

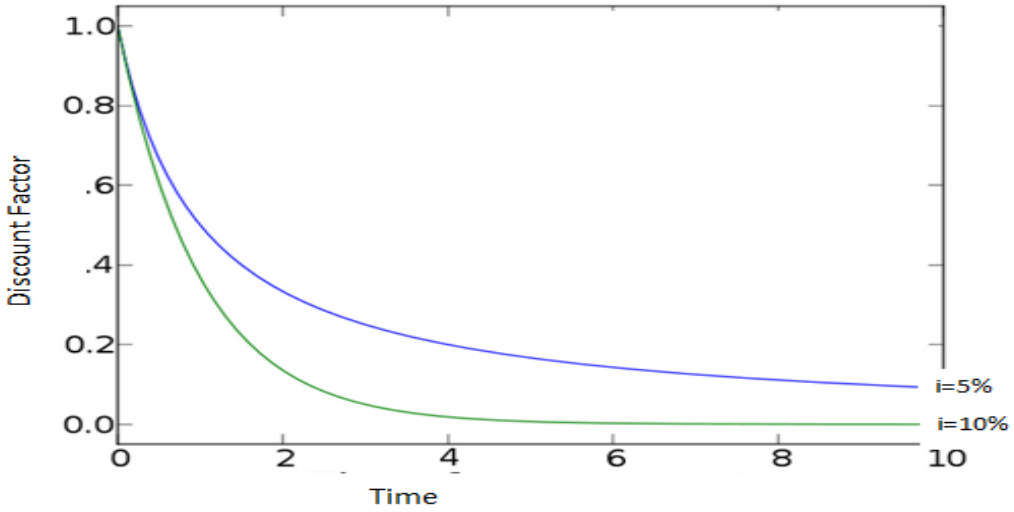

Fig 2.Property of discount factors

Application of the Net Present Value Test

Since NPV depicts more on financial analysis, for economic analysis, the Economic Net Present Value denoted as ENPV shall be used in this thesis. The main purpose of CBA is to help select projects/interventions which are efficient in terms of their use of resources .Therefore the criterion applied is the Economic Present Value (ENPV) test. This is simply asking whether the sum of discounted benefits(gains) exceeds the sum of discounted costs(losses).The Economic Net Present Value(ENPV) formula is similar to Net Present Value(NPV),but the items in the formula are defined differently(Sun,2007;Gerald&Marta,n.d).The social benefit and social cost of the project that

are relevant, uses social discount rate of 10% per year. The formula for calculating NPV is given below:

$$NPV = \sum_{t=1}^{T} \frac{(Benefit_t - Cost_t)}{(1+r)^t}$$

Where:

NPV=Net Present Value

t=Time

r=Discount rate

Sensitivity Analysis

The ENPV described above focuses on the relative efficiency of the project or intervention, given the data input to the calculations. If the data changes, then the result of ENPV test will change too. This happens when values of certain key parameters are changed. The parameters may include:

(i) The discount rate

(ii) Physical quantities and qualities of inputs

(iii) Shadow prices of these inputs

(iv) Project lifespan

The intention is to discover to which parameters the ENPV outcome is most sensitive, for instance, how much do labour costs need to rise before ENPV becomes negative? Once the most sensitive parameters have been identified, then forecasting effort can be directed at these parameters to try to improve them and where possible, more effort can be made while the project is underway to manage them carefully. In mushroom production, key parameters include labour, spawn and growing environmental factors.

Benefit-Cost Measures

The BCA measures have been outlined by Gerald&Marta (n.d), as Net Present Value (NPV) and Benefit-Cost Ratio (BCR).

(i) Net Present Value (NPV)

The Net present Value is the current value of all project net benefits. The net benefits are simply the sum of benefits minus costs as shown in the formula below. If the project or intervention has a NPV greater than zero (NPV>0), then it appears to be a good candidate for implementation. Its recommended that the projects with negative NPVs should be discarded and those with positive NPVs be undertaken.

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$$NPV = \sum_{t=1}^{T} \frac{(Benefit_t - Cost_t)}{(1+r)^t}$$

Where:

NPV=Net Present value

t=time

r=Discount rate

(ii) Benefit-Cost Ratio (BCR)

The Benefit-Cost Ratio (BCR), is calculated as the NPV of benefits divided by the NPV of costs as indicated by the following formula:

$$BCR = \frac{\sum_{t=1}^{T} \frac{B_t}{(1+r)^t}}{\sum_{t=1}^{T} \frac{C_t}{(1+r)^t}}$$

Where:

BCR=Benefit- cost ratio

B=Benefit in time,t

C=Cost in time,t

According to Gerald&Marta(n.d), If the BCR exceeds one (BCR>1), then the project or intervention might be a good candidate for acceptance.

RESULTS

Table 7: Analysis of variance of mushroom yields using water hyacinth

Source	DF	SS	MS	F- Cal.	F-tab
Treatment	1	155081.73	155081.73	39.11	4.08
Error	38	223775.19	3965.48		
Total	39	305769.97			

F-cal=Calculated($F_{(1,38)}$),F-tab=Tabulated($F_{(p=0.05)}$)

$LSD._{05}$=257.2

Table 8: Benefits and costs of mushroom production using water hyacinth

Month	Production Costs	Benefits	T/Benefits (Kshs)	T/Costs (Kshs)	Net Benefits (Kshs)

	Detail	Cost	Detail	Value			
	Spawn	750	0	0	0	750	-750
	Transport	1000	0	0	0	1000	-1000
October	Polythene bags	60	0	0	0	60	-60
(2012)	Firewood	400	0	0	0	400	-400
	Substrate	0	0	0	0	0	0
	Labour	400.	0	0	0	400	-400
November			Yield(Kg)	11.74			
(2012)			*(195.6x60)	11.74@300			
	Labour	200	Revenue		3522	200	3322
			SMS(Bags)	60			
December	Labour	200	SMS(Bags)	60@30	0	0	0
(2012)			Revenue		180	200	-20
	Total				3702	3010	692

Source: Generated by the researcher,2013

*195.6gms per bag, no. of bags =60,price kshs300/kg,SMS kshs 30/Bag

NB.T-Total

The table above shows that the benefit was kshs 3707, the cost kshs3010 and net benefit was kshs 692, when not discounted. Since there is consideration of value of money over time, ENPV and BCR have been calculated below.

(i) Determination of Economic Net Present Value (ENPV)

Several steps have been followed as indicated below:

(a) The present Value (PV) formula for both benefits and costs:

$$PV = \frac{P_t}{(1+r)^t}$$

Where:

PV=Present Value

P_t= Amount of money received after sale of mushrooms and SMS

t=Months when activities were undertaken(October,November and December)

r=Discount rate(Social discount rate of 10% used)

(b) The present value of the benefits (PVB) are:

When t=0 (October,2012),t=1 (November,2012) t=2 (December,2012), Discount rate=10%

Applying the formula above:

PVB= $[0/ (1+0.10)^0] + [3522/ (1+0.10)^1]+ [180/ (1+0.10)^2]$

=0+3201.8+148.8

=Kshs 3350.60

(c) The present value of the costs (PVC) are in the same corresponding months:

PVC= $[2610/ (1+0.10)^0] + [200/ (1+0.10)^1]+ [200/ (1+0.10)^2]$

=2610+181.8+165.3

=Kshs 2957.10

(d) The Economic Net Present Value (ENPV)

Applying the ENPV formula:

$$\text{ENPV} = \sum_{t=1}^{T} \frac{(B_t - C_t)}{(1+r)^t}$$

ENPV=Discounted total benefits minus discounted total costs (Nick et al.,1993)

=3350.6-2957.10

=**kshs 393.50**

(ii)Determination of Economic Benefit-Cost Ratio (EBCR)

The benefits and costs for the intervention are discounted, hence the following formula has been used.

$$\text{EBCR} = \frac{\sum_{t=1}^{T} \frac{B_t}{(1+r)^t}}{\sum_{t=1}^{T} \frac{C_t}{(1+r)^t}}$$

Discounted total benefits is kshs3350.6 and discounted total costs is kshs2957.10

Therefore:

EBCR=3350.6/2957.10

=1.13

This implies that for every one shilling invested, returns ksh1.13 shillings.The economic indicators, ENPV and EBCR, showed positive impact meaning if water hyacinth is adopted in producing oyster mushroom, growers are able to produce mushroom and sustain or increase their income as opposed to having no production at all.

Benefits and costs of water hyacinth mixed with sawdust on production of mushroom

The total benefits was kshs 6636.0,total cost,kshs3110 and net benefit at kshs 3526.0.The details are shown in table 9.

Table 9.Benefits and costs of mushroom production using water hyacinth and sawdust

Month	Production Costs		Benefits		T/Benefits	T/Costs	Net Benefits
	Details	Cost	Detail	Value	(kshs)	(kshs)	(kshs)

	Spawn	750	0	0	0	750	-750
	Transport	1000	0	0	0	1000	-1000
October	Polythene bags	60	0	0	0	60	-60
(2012)	Firewood	400	0	0	0	400	-400
	Substrate	100	0	0	0	100	-100
	Labour	400.	0	0	0	400	-400
November			Yield(Kg)	21.52	0	0	0
(2012)	Labour	200	*(358.7x60)				
			Revenue	21.52@300	6456.0	200	6256.0
December			SMS(Bags)	60	0	0	0
(2012)	Labour	200	Revenue	60 @30	180	200	-20
	Total				6636.0	3110	3526.0

Source: Generated by the researcher,2013

*358.7gm/bag, no .of bags=60,Price ksh300/kg,SMS kshs30/bag

NB. T=Total

(i)Determination of Economic Net Present Value (ENPV)

(a) The present value of the benefits (PVB) are:

When t=0 (October),t=1 (November) t=2 (December), Discount rate=10%

Applying the formula above:

$PVB= [0/ (1+0.10)^0] + [6456/ (1+0.10)^1]+ [180/ (1+0.10)^2]$

=0+5869.1+148.8

=Kshs 6017.9

(b) The present value of the costs (PVC) in the same corresponding months:

$PVC= [2710/ (1+0.10)^0] + [200/ (1+0.10)^1]+ [200/ (1+0.10)^2]$

=2710+181.8+165.3

=Kshs 3057.10

(c) The Economic Net Present Value (ENPV)

Applying the ENPV formula:

$$\text{ENPV} = \sum_{t=1}^{T} \frac{(B_t - C_t)}{(1+r)^t}$$

ENPV=Discounted total benefits-Discounted total costs

=6017.90-3057.10

=**kshs 2960.8**

(ii)Determination of Economic Benefit-Cost Ratio (EBCR)

The benefits and costs for the intervention are discounted (Nick et al.,1993).Applying the formula:

$$\text{EBCR} = \frac{\sum_{t=1}^{T} \frac{B_t}{(1+r)^t}}{\sum_{t=1}^{T} \frac{C_t}{(1+r)^t}}$$

Discounted total benefits is kshs6018.4 and discounted total is costs kshs3056.9

Therefore

EBCR=6017.9/3057.10

=1.97

For every one shilling invested, returns ksh1.97 shillings.

The results of the study indicated good performance of mushrooms when water hyacinth was mixed with sawdust The mixture outperformed water hyacinth when used alone as substrate on production of oyster mushroom. Therefore the study has recommended the use of water hyacinth mixed with sawdust as the best alternative or a possible replacement for bagasse, which is currently in short supply or unavailable for mushroom cultivation.

The findings on economic profits of mushrooms in using water hyacinth alone and when mixed with sawdust as substrates, provided positive profit margins. However, the best profit margin was obtained from the use of water hyacinth mixed with sawdust. Therefore to spur mushroom business, the study has recommended water hyacinth mixed with sawdust substrate in order to optimize mushroom economics aimed at wealth creation in Vihiga Mushroom Project.

Recommendation government should assist farmers all over Kenya to adopt mushroom project to increase food supply and create sustainable business which will increase employment and reduce poverty and malnutrition in Kenya.Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life. Household food security is the application of this concept to the family level, with individuals within households as the focus of concern.

Conclusion

The Government targets to achieve 100% national food and nutrition security through the Ministry of Agriculture, Livestock, Fisheries and Irrigation. The study found out that that market demand of mushroom per capita was 1.54kg per adult equivalent, and projected the

potential demand at 30800 tons annually. This means that mushroom growing on large scale for consumption and selling is the option to alleviate poverty and develop the life style of the vulnerable people. This will be in line with the big four agenda of the country which aims at alleviating poverty by enhancing food security.

The government could also liase with the local farmers to come up with manufacturing farms whereby mushroom will be canned and exported. This will provide revenue for the government and increase the value for the mushroom. Farmers would also benefit from earned income that they could use to sustain themselves.

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