GRADUATES PERCEIVED INNOVATION INTENTIONS: AN EVIDENCE OF MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY, TANZANIA

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Abstract

Innovation starts with the detection of performance gaps-mismatches between actual and potential performance (De Jong, 2007). However, little information is available on how Mbeya University of Science and Technology [MUST] have nurtured the innovative potentials of students on their innovative intentions attitudes. Therefore, this study assessed the perceptions of innovative intentions of graduates at MUST in their differential fields of study. This research used experimental research design and stratified and purposive sampling techniques were used. Closed questionnaire based on three points Likert scale was used to assess students' perceptions in which a sample of 352 cross sectional data was collected and descriptive analysis was done using SPPSS. Results showed that 69.1%, 71.1%, 71.4% of respondents perceived that lack of finance, team work, and project management skills were most related to economic factors and management skills about project management that could affect innovation process in their specializations. These findings, therefore was concluded that innovation intentions of graduates could be affected by entrepreneur, lack of finance, teamwork and project management skills. Therefore, it is recommended that MUST should optimize students' skills on entrepreneur, finance, teamwork, and project management skills so as to enhance graduates innovation intentions for self employment.

Key words: University graduates, innovation, innovation intentions, self employment, Mbeya University of Science and Technology

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1.0 Introduction

New jobs in developing countries and Tanzania in particular are being created in the informal sector where self-employment is the only option for many university graduates. Innovation and economic growth depend on being able to produce future leaders with skills and attitudes to be entrepreneurial in their professional lives (Volkman *et al.*, 2009). Innovation activities are all those scientific, technological, organizational, financial and commercial steps which actually, or are intended to, lead to the implementation of technologically new or improved products or processes (Oslo Manual, 2005). Innovation therefore, starts with the detection of performance gaps - mismatches between actual and potential performance (De Jong, 2007). The start of innovation process is often determined by chance: the discovery of an opportunity, a problem arising such as unemployment among graduates or a puzzle that needs to be solved. The trigger to opportunity identification may be a chance to improve conditions, or a threat requiring immediate response (De Jong, 2007). Though, entrepreneurship education is the first and arguably the most important step for embedding an innovative culture and preparing the new wave of entrepreneurs, entrepreneurial graduates and organizations at large (Volkman *et al.*, 2009). Thus, entrepreneurship involves individual attitudes to risk, opportunities that reduce risk, receptiveness to new ideas, access to sources of new ideas with commercial potential and access to capital (Buligescu, *et al.*, 2012). The public sector, private sector, academia and non-profit sectors all have roles to play in facilitating the development of effective ecosystems that encourage and support the creation of innovative new ventures (Volkman *et al.*, 2009).

Furthermore, Turton and Herrington (2012) report that self employment opportunities can be created by activities outside markets. Its creation perspectives emphasizes opportunities that are a result of the efforts of particular individuals/organizations who are focused on finding ways to bridge personal experiences and knowledge with the marketplace through innovation (Turton and Herrington, 2012). However, the National employment policy (2008) aims at stimulating national productivity, to attain full, gainful and freely chosen productive employment, in order to reduce unemployment, underemployment rates and enhance labour productivity, yet, its achievement is meager. This study therefore, examined the perceived innovation intentions of graduates from Mbeya University of Science and Technology [MUST] as it is concerned with

optimizing and nurturing the creative potential of students (the creative view model) (Reichert, 2006) under competence based education and training (CBET) system.

2.0 Statement of the problem

Tanzania Development Vision 2025 envisages the country being a nation whose people have a positive mindset and a culture which cherishes human development through professionalism, entrepreneurship, creativity and innovativeness (United Republic of Tanzania (URT), 2000). Also, the National Science and Technology policy (1996) calls for creation of conducive environment for creative and innovative potential to solve problems in key economic, productive and social welfare sectors through commercialization of research results and technologies generated from tertiary institutions and the society at large. As a result, supportive policy and legal frameworks have been developed and reviewed for enhancing employment creation (National Employment Policy, 2008).

However, labor market has been registering an increasing of labor force from schools amounting to more than 700,000 a year while the demand for labour force has been decreasing each year (URT, 1997). The reasons behind the inverse relationship between labor supply and demand include the decline in the national income, retrenchment and cessation of new employment, rapid increase of youths graduating from different training institutions that are tuned to seek for wage employment (URT, 1997). Statistical information show that only 17% of the total labor force is employed in a formal sector and the rest are in informal sector (National Employment Policy, 2008). Despite of policies on professionalism, entrepreneurship, creativity and innovativeness being in place; lack of capital, technology, and management skills among University graduates and non-graduates are reported as a constraint (URT, 1997). This study therefore, assessed the perception of graduates' innovation intentions at MUST so as to promote innovative attitude and hence self employment and job creation.

3.0 Methodology

3.1 Study location

This study was conducted at Mbeya University of Science and Technology. This was chosen because it is the only university in Tanzania that offers science, technology and business

management programs on C-BET for national technical awards (NTA) level 4 to 8. Also, it is the only university in which the course of entrepreneurship is compulsory for those levels with the aim of stimulating the entrepreneurial spirit of graduates and the subjects of interest were available and adequate to fulfill the research objective. To achieve the study objective, stratified proportionate number of students from NTA level 6 and 8 (third year diploma and bachelor) students respectively, were interviewed.

3.2 Research design

The present study employed an experimental research design in which each respondent from different specialization had an equal chance of participation (Newman, 2007). The present study used a sampling frame of NTA level 6 and 8 students from specializations offered: Architecture, Business, Civil engineering, Computer engineering, Electrical engineering, Mechanical engineering, and Laboratory Science.

3.3 Sample size determination

The proportion of target study levels of students with desirable characteristics was 0.33, the z – statistic chosen was 1.96, and the desired accuracy of margin error was at the 0.05 level. The proportion of respondents who were interviewed was denoted by p = 0.33, and those who were not interviewed was denoted by q = 0.67, confidence level = 95%, and margin of error = 5%.

Sample size, n, was given by:

$$n = \left(\frac{Z}{e}\right)^2 .p.q \text{ .... } (1)$$

$$n = \left(\frac{1.96}{0.05}\right)^2 (0.33)(0.67) = 339.7511 = 340$$

Therefore, a minimum sample of 352 students was interviewed (Saunder *et al*., 2009; Mgenda and Mugenda, 2003) in which 12 aimed at compensating for non respondents due to refusal (Krysik and Finn, 2007).

3.4 Sampling plan

Stratified proportionate, systematic random and purposive sampling plans were used because there was a possibility that the outcome of interest could vary among sub groups and to avoid

over or under representation (Fisher, 2010; Saunders *et al.*, 2009; Newman, 2007; Krysik and Finn, 2007; Mugenda and Mugenda, 2003). Also, systematic random sampling was used where the class size of particular strata was large, therefore, the sampling interval was computed to get the required number of students while girls in each strata were purposively included to avoid them being under represented (Fisher, 2010; Saunders *et al.*, 2009; Newman, 2007; Krysik and Finn, 2007; Mugenda and Mugenda, 2003).

3.5 Data collection instruments

Cross- sectional data was collected using closed ended questionnaire based on three point Likert scale (Saunders *et al.*, 2009). Likert scale was aimed at measuring students' perception, attitude, and values towards innovation skills (Mugenda and Mugenda, 2003). Rating scales were designed to rank the subjective and intangible components in innovation skills empowered to students during their study period at the university (Mugenda and Mugenda, 2003). The numerical scale: 1 = Most related, 2 = Related, and 3 = Not related helped to minimize the subjectivity and made it possible to use descriptive analysis (Saunders *et al.*, 2009; Mugenda and Mugenda, 2003). Respondents were asked the way they perceived the given statements on innovation as most related, related or not related (Saunders *et al.*, 2009) in relation to innovation information and management skills. The data collection was done ones and this was the simplest and least costly approach (Newman, 2007). Questions were asked in the same manner for both NTA 6 and 8 students (Mugenda and Mugenda, 2003). Cross sectional data sought to describe the innovation skills possessed by students towards self-employment up on their graduation (Saunders *et al*., 2009).

3.6 Data analysis

Descriptive statistics was the method for data analysis. These methods aimed at giving detailed picture of frequencies / percentages of innovation skills of students were endowed with (Newman, 2007). SPSS package was employed to analyze data in which descriptive information was obtained (Saunders *et al.*, 2009; Mugenda and Mugenda, 2003).

4.0 Results and discussions

4.1 Students' perception towards innovation and its sources in their specializations

Results (Table 1) showed that students interviewed perceived that 63.7%, followed by 54.6% and 45.1% of innovation was most related to creation of improved products and services, creativity, novelty, new ideas or originality and problem solving. Meaning that, innovation is proportionately related to creation of improved products and creativity, novelty, new ideas, or originality and least most related to process. Oslo manual (2005) and European Commission (2008) and Buligescu *et al.*(2012) argue that entrepreneurship refers to individual's ability to turn ideas into action, including creativity, innovation and risk taking in order to achieve objectives. Entrepreneurship and innovation are therefore fuzzy concepts that are often regarded as overlapping concepts (Stam, 2006). Also, findings (Table 1) showed that 60.6% and 46.6% of interviewed students reported that sources of innovation was most related to educational/research and was also related to external market sources. Meaning that educational/research is the most source of innovation followed by external market sources. Present findings are similar to observations made by Yuel (2006) who found that innovation can be explained by Research and Development (R&D) expenditure, foreign direct investment but not the number of science and technical personnel. Moreover, Oslo Manual (2005) reports that sources of information for innovation include internal sources within the firm (in-house R&D, marketing, and production) and external market/commercial sources.

Table 1: Students'perception towards innovation and its sources in their specializations

Innovation	Most related (%)	Related (%)	Not related (%)	Total (%)
Creation of improved products and services	63.7	28.4	8.1	100.0
Creativity, novelty, new ideas or originality	54.6	34.3	11.1	100.0
Problem solving	45.1	41.0	13.9	100.0
Marketing	39.7	41.8	18.6	100.0
Process	30.7	42.8	26.5	100.0
Organizational	32.2	42.0	25.8	100.0
Sources of innovation	Most related (%)	Related (%)	Not related (%)	Total (%)
In-house R&D	45.4	36.3	18.3	100.0
External market sources	42.0	46.6	11.3	100.0
Educational/research	60.6	29.4	10	100.0
Institutions	38.1	44.8	17	100.0

4.2 Students' perception about the objectives of innovation and how it starts in their disciplines of study

Survey findings (Table 2) showed that 61.6% followed by 57% and 53.6% of interviewed respondents had perception that objectives of innovation were most related to opening up new markets, extension of product range and developing environmental friendly products. Results suggests that opening up new markets is the key objective of innovation while maintaining market share was least most related objective of innovation. Research results (Table 2) showed that 62.4% followed by 45.9% of interviewed respondents had perception that innovation start up in their fields of study was most related to discovery of opportunities followed by detection of performance gaps. Meaning that in Engineering courses, science and business management studies, innovation start up is most related to the discovery of an opportunity that needs to be maximally exploited followed by detection of performance of gaps while problem arising is the least most related to innovations start up. Conversely, Rogers (1995) explains that relative advantage, compatibility, complexity, trialability and observability are potential attributes of innovations which are interrelated.

Table 2: Students' perception about the objectives of innovation and how it starts in their disciplines of study

Objectives of innovation	Most related (%)	Related (%)	Not related (%)	Total %
Extend product range	57.0	34.0	9.0	100.0
Develop environmental-friendly products	53.6	38.7	7.7	100.0
Maintain market share	47.9	38.4	13.7	100.0
Open up new markets	61.6	26.3	12.2	100.0
Innovation start up	Most related (%)	Related (%)	Not related (%)	Total %
Detection of performance gaps	45.9	42.5	16	100.0
Discovery of an opportunity	62.4	28.9	8.8	100.0
Problems arising	41.5	36.3	22.1	100.0

4.3 Students' perception about the roles in the process of innovation in the area of their specialization and economic factors that hinders it

Survey findings (Table 3) showed that 70.4% and 43.3% of respondents perceived that roles of innovation were most related to entrepreneur and inventor while manager and capitalist were the least most related to the roles of innovation, respectively. Meaning that majority of interviewed students perceived that roles of innovation were most related and related to entrepreneur and inventor, respectively. Stam (2006) as cited in Schumpeter (1934) distinguish four roles in the process of innovation: the inventor, who invents a new idea; the entrepreneur who commercializes this new idea; the capitalist, who provides the financial resources to the

entrepreneur (and bears the risk of the innovation project); the manager, who takes care of the routine day-to-day corporate management. Also, study findings (Table 3) showed that 69.1% followed by 48.2% of interviewed respondents reported that lack of finance and cost being too high respectively were perceived as most related to economic factors that hinders innovation in their areas of specializations. Present findings propose that lack of source of finance is the main barrier for innovation in different disciplines of levels of their studies while perceived risks was reported as the least most related economic factor that could hinder innovation in those disciplines of study. Similarly, Buligescu *et al.* (2012) found that innovation involves individual attitudes to opportunities that reduce risk, receptiveness to new ideas, access to sources of new ideas with commercial potential and access to capital. Similarly, Oslo Manual (2005) reports that innovation activities are hampered by economic and enterprise factors.

Table 3: Students' perception about the roles in the process of innovation in the area of their specialization and economic factors that hinders it

Roles of innovation	Most related (%)	Related (%)	Not related (%)	Total %
Inventor	43.3	42.3	14.4	100.0
Entrepreneur	70.4	24.0	5.6	100.0
Capitalist	28.4	39.4	32.2	100.0
Manager	39.4	39.7	20.8	100.0
Economic factors	Most related (%)	Related (%)	Not related (%)	Total %
Perceived risks	37.9	41.5	20.6	100.0
Cost being too high	48.2	37.9	13.9	100.0
Lack of sources of finance	69.1	20.1	10.8	100.0
Lack of skilled personnel	43.0	30.2	26.8	100.0

4.4 Students' perception about enterprise and other factors those were likely to affect innovation process

Present study findings (Table 4) showed that 57.5% followed by 51% of interviewed students perceived that lack of skilled personnel and information on technology were most related to enterprise factors that were likely to affect innovation process. Furthermore, lack of information on markets and opportunities for co-operation accordingly were also reported as most related to enterprise factors that were likely to affect innovation process. Furthermore, research findings (Table 4) showed that 61.1% followed by 50.5% of interviewed students reported that lack of technological opportunity and infrastructures were other factors that were most related to affect

innovation process in the specialized areas. Contrary, 66.9% of interviewed students reported that there could be no need to innovate due to earlier innovations and was perceived as not related to other factors that were likely to affect innovation process in their specializations. Equally likely, innovation adoption usually emphasizes the benefits of the innovation (Buligescu, *et al.*, 2012).

Table 4: Students' perception about enterprise and other factors that are likely to affect innovation in the specialized area

Enterprise factors	Most related (%)	Related (%)	Not related (%)	Total %
Lack of skilled personnel;	57.5	27.8	14.7	100.0
Lack of information on technology;	51.0	36.1	12.9	100.0
lack of information on markets;	46.6	36.6	16.8	100.0
Lack of opportunities for co-operation	45.4	37.1	17.6	100.0
Other factors	Most related (%)	Related (%)	Not related (%)	Total %
Lack of technological opportunity	61.1	31.2	7.8	100.0
Lack of infrastructure	50.5	35.1	14.4	100.0
No need to innovate due to earlier innovations	16.8	26.3	66.9	100.0
Weakness of property rights	30.4	44.8	24.7	100.0
Regulations, standards, and taxation	44.3	39.7	16.0	100.0

4.5 Students' perceptions about training in innovation and entrepreneurship competences

Survey findings (Table 5) showed that 71.1% followed by 59.3% of respondents interviewed perceived that team work, creativity, and organizing skills and task management, respectively were most related to competences about training in innovation and entrepreneurship competences . However, 35.3% of students interviewed had perception that negotiation/conflict was the least most related competences about training in innovation and entrepreneurship competences. Meaning that, the majority of interviewed students perceived that teamwork and creativity were the main most related competences about training in innovation and entrepreneurship competences contrary to negotiation. Conversely, the observation made by Edwards *et al*. (2009) in a comparison study of engineering students found that leadership, negotiation, conflict management resolution, knowledge and abilities of how to begin a business were practically inexistent at Polytechnic University of Valencia. Also, Edwards *et al.* (2012) found that majority of students from two samples of school of design engineering of Polytechnic University of Valencia reported not receiving enough training in innovation and entrepreneurship competences.

Table 5: Students' perceptions about training in innovation and entrepreneurship competences

Competences	Most related (%)	Related (%)	Not related (%)	Total %
Teamwork	71.1	20.4	8.5	100.0
Communication (oral & written)	57.5	34.3	8.2	100.0
Organizing skills and task management	59.3	32.0	8.8	100.0
Creativity	71.1	20.9	8.0	100.0
Problem solving	54.1	34.8	11.1	100.0
Team project management	52.6	35.8	11.6	100.0
Leadership	51.8	35.3	12.9	100.0
Negotiation/conflict	35.3	38.4	26.3	100.0
How to start up a business	56.5	29.5	14.0	100.0

4.6 Students' perception about project management skills

Study observations (Table 6) showed that 71.4%, 68.6% and 69.3% of interviewed students reported that project management skills, project design and analysis and project planning respectively were most related to management skills about project management. However, 51.8% of students interviewed reported that environmental assessment was also most related to project management skills. Meaning that majority of students perceived that those management skills were most related to the project management skills in their disciplines of their studies. Similarly, Project Management Institute (2011) explains that a nations' ability to build and sustain its innovation capability depends on developing and maintaining project management skills.

Table 6: Students' perception about project management skills

Management skills	Most related (%)	Related (%)	Not related (%)	Total %
Project identification	71.4	20.1	8.5	100.0
Project design and analysis	69.3	24.7	6.0	100.0
Economic and financial assessment	57.5	34.5	8.0	100.0
Environmental assessment	51.8	36.9	11.3	100.0
Project planning	68.6	22.9	8.5	100.0
Monitoring and evaluation	59.5	26.3	14.2	100.0

5.0 Conclusions and recommendations

Based on survey findings that 61.6%, 60.6%, 62.4% of interviewed respondents perceived that objectives of innovation, sources of innovation and innovation start up were most related to opening up new markets, educational/research and discovery of opportunities that could affect innovation process, respectively. Also, 70.4%, 69.1%, 71.1%, 71.4% of respondents perceived that entrepreneur, lack of finance, team work, and project management skills were most related

to economic factors and management skills about project management that could affect innovation process in their specializations. These findings, therefore is may be concluded that innovation intentions of graduates could be affected by opening up of new markets, education/research, discovery of opportunities, lack of finance, teamwork and project management skills affects innovation process. From this conclusion therefore, it is recommended that the university should optimize by empowering students with skills on opening up of new markets, education/research, discovery of opportunities, finance, teamwork, and project management skills so as to enhance graduates innovation intentions.

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