



Investigating Problems and Challenges Software Application Development Industry is facing

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Abstract- *This paper presents findings of study done in Tanzania. The study focused on discovering the problems and challenges software services industry is facing in Tanzania. The author used qualitative approach and convenience sampling technique where the subjects or samples were chosen based on their relevance and where information can likely be found to answer the research questions thoroughly. The researcher selected three areas to concentrate upon. However, there are many other areas that contribute to the problems facing Tanzania software services industry.*

These areas of major concern which also determined the places where survey was conducted are; a) University Curriculum, b) Research and Development and c) Software Patents. These areas have major significance in the topic studied, and also have substantial contribution to the challenges and problems software services industry is facing.

The findings of this studies was therefore limited to higher education institutions offering computing subjects, software development companies and institutions in charge of creation and administration of software patents, policy and copyrights in Tanzania. Data collection techniques such as questionnaires, study of documents and interviews were used to obtain answers to the research questions.

The results of the study found that, most of the higher education institutions do not put much emphasis on programs that specialized in areas such as software engineering, and this is because of poor industrial development and the need to make students take advantage of diverse opportunities currently available with the industry by adapting to any field of computer science through practice. On the other hand, software patents cannot be administered in Tanzania simply because our country lacks skilled personnel for substantive examination of patentable rights in the technology products. And to the other area of major significance, that is, research and development; Tanzania does not have in place a research policy to support research initiatives effectively and mostly the software services companies do not have or put any significance in research and development.

This contributes much to the failure of Tanzania software services industry to flourish and reach the international market, and to compete with other big players in the market such as IBM. To rectify the situation, the government should take upper hand from the bottom level. That is, to introduce software patents, improve university curriculum using its accreditation bodies and support research projects more effectively than before.

This paper gives a reader an exposure to the current situation Tanzania software industry is facing by highlighting major problems and challenges being faced. Taking into consideration the results of this research, will allow major shift or change in the software services industry in Tanzania. This research can also be used by other researchers in the field to further explore the area. Despite the study done in Tanzania, it can be adapted to other developing countries, as areas investigated are common amongst the developing nations across the world.

Keywords- *Software Services Industry, Software Engineering, Software Patents, Research and Development, Curricula.*

I. INTRODUCTION

Tanzania ICT Statistics done in 2003 postulates that, few local companies are developing computer application packages. Most of the software used by both public and private sectors are imported at considerable cost. The use of open-source software is on the lower side. Overall, Tanzania has a small emerging skilled capacity to support the ICT industry in terms of developing, selling or supporting hardware and software[1]. In addition to this, all hardware and software are imported, when compared to the average income of people in Dar Es Salaam, few can afford it, and costs to small business is high [2]. These reasons, together with what is stated in the beginning, are the major grounds for this thesis.

Compared to other countries, most of locally produced software remains local, unprogressive and goes unsupported overtime. Google, Nintendo, SAP, Microsoft and Oracle are increasingly developing new versions to win clients globally. To build capacity requires funding and the right resources to put in place the "environment" in which an ICT community can utilize and explore its talents.

Software engineering as a discipline is still immature in Tanzania. Students are not trained enough to get into a software-development careers. Tanzania universities curricula ignores software engineering in favor of science subjects.

Software piracy is at the peak and yet the software business has just gained momentum. Big companies like Microsoft started small, in fact, with two most ambitious programmers – Paul Allen and Bill Gates. Today, Microsoft is a leading organization having thousands of employees across the globe.

Software engineering is not like computer science, it is a very specialized discipline that makes use of principles, concepts, mathematics, methods and frameworks for designing and developing software applications fit for use in a commercial or an industrial scale. The difference being the application of science or knowledge to solve complex practical problems and that by using science or scientific methods to extend science knowledge by testing hypothesis and theories to create new models. Tanzania universities should therefore develop curriculums with an industry focus to generate a skilled labor force to take software engineering positions in the software industry and market [3-5].

Conclusively, software market has become the most lucrative market in the world, as in all business and everyday life software applications have penetrated extensively and dominate other technologies. Each technology out there needs intelligence and dynamism given by a software application. For example, smart phones, nowadays can be used to start a car, trigger alarms, monitor movements, communications and other more intelligent and beneficial applications. All software engineers of this time need to have at least good knowledge in software development to survive and compete in the market, and therefore for them, it should be intensive research and continuous improvement efforts to keep ahead in the changing environment.

After this chapter (Part I) which introduces the paper. The chapter after this is the literature review section (Part II). After the literature assessment, the benchmark procedure follows next. This is the foundation (Part I) thereupon the next major components are outlined - the surveys. Three areas are evaluated; when these domains have been evaluated, one of the cornerstones of this thesis is presented. This is a fairly all-inclusive survey; however, it has been carried out deeply.

After this part, discussions on the findings (Part III) will be introduced, which was done to unfold the Tanzania software services industry with emphasis on university curriculum, research and development, and software intellectual property right. Finally (Part IV), research outcomes are synthesized followed by conclusions.

When this is reached, the final part is presented: The compendium (Part V) starts with some brief general suggestions followed by recommendations that are more factual. Their curriculum recommendations, alternatives, and proposals, followed by answers to the research questions and some final conclusions follows. Furthermore, some words put forth regarding future work.

It is time to get into the software application development arena: the next chapter explains the different perspectives on software application development.

II. LITERATURE REVIEW

A. Software Services Industry

There are number of scholars recently researched on software industries in developing countries and those which have made substantial progress in the world such as India, Mexico, Ireland, Philippines, China, Ukraine, Chile, Brazil, Romania, Vietnam and Sri Lanka.

Software services industry progress is subject to many factors including cost, labor pool, educational system, political and economic environment, research and development, and global and legal maturity.

This paper looked at the criteria's that have remarkable input to the software services industry to come up with the list, scrutinized those criteria, and modified the criteria to ensure they were useful for evaluating challenges and problems software services industry is facing in Tanzania. Therefore, literature review is focused on the following areas, i) University Curricula, ii) Research and Development iii) Software Intellectual Property Laws. To clearly present the literature review, each area is analyzed separately:

1) University Curricula:

The curriculum is a written form of text or guide that states the objectives, learning outcomes, defines contents, methods of assessments, learning environment, etc., to which an institution formally observes in the transfer of knowledge to the scholars. Speaking from the definition, the curriculum covers everything, including communication language, assessments, and class sizes, quality of delivery, resources, lectures, students, syllabus, policies, and standards that contributes to learning.[6]. A school might have a well-defined and good curriculum, but its implementation is a challenge for the instructors based on different reasons, including resources, teaching load, and class size. The most common mistake for practical subjects is to put more emphasis on theory or concepts rather than that of experience, in this case finding student having all the required theoretical concepts without practical experience of the subject, we can call this a “null curriculum” [7].

In Tanzania based on the ministry of education report, 80% of the population is living in rural areas where there is limited resources including electricity, network and access to computer facilities. Most of the colleges and universities have limited ICT resources and in this case you'll find a single computer shared by 2-3 pupils. A university curriculum contributes much to the breeding of professionals (human capital) for software industries.

Most of the universities in Tanzania and globally teach computer courses with some programming languages using the concepts of software engineering; however, computer science students or programs are not focused on systematic development of industry software application using software-development principles and standards, and yet they assume that the graduates will get a job in a software application development market and become successful [3].

There is a distinction between students who take programming with other science degrees such as computer science or information technology and software engineers. Software engineering (SE) is defined by the IEEE as: The application of

a systematic, disciplined, quantitative approach to the development, operation and maintenance of software in large scale [8].

Most of the universities in Tanzania except only two (2), Dodoma and Ruaha University recently started; have a software engineering degree admitting a class of merely 90 and 100 students per annum, which implies that Tanzania has a shortage of professionals in software development. The country lacks enough human capital to support the software-development industry to compete in the global market[9].

Universities should balance the needs of the pupils, employers and lectures with respect to the course to ensure that they produce a learning that is required for every student [10].

2) Research and Development

The primary function of an R&D is to discover and create fresh knowledge about scientific and technological topics for uncovering and enabling the development of valuable new products, processes, and services. According to studies, research and development is an investment in a company's future - companies that do not spend sufficient in R&D are often said to be eating the seed corn. That is, when their current product lines become outdated and overwhelmed by their competitors, they will not have viable successors in the pipeline[11].

The software has a life cycle that is never ending unless the owner disowns it. One must therefore advance beyond a restricted focus on software development, and provide better and more support for software adaptation and evolution [12].

In April 2004 during a demonstration of different technologies for wireless and broadband by U.S. department of commerce from the White House press, President George W. Bush called for the government to encourage private-sector companies to do the same, i.e. to invest in research [13].

The Tanzania government efforts to support software engineering is almost null or neglected, the government through the ministry of science and technology and its commission for science and technology, started an incubation program in dare salaam supporting only (10) entrepreneurs per two (2) years . With 1,000 ICT graduates per year, the government only supports 0.0005% of Total graduates, almost 0%. Taking into consideration the number of ICT jobs in Tanzania , which was only 1.2% (18,000) of 1,550,018.00 jobs in 2012, and only 93 (i.e. 0.0016% of total new positions advertized) newly advertised ICT jobs positions in 2012, more than 800 graduates went unemployed and unsupported. It is obvious that ICT Industry is not well developed. Empirical research and surveys of business activities shows that innovation leads to new and improved products and services, higher productivity, and lower costs. As a result, economies that have consistently high levels of innovation also tend to experience high levels of growth and hence more jobs are created[14].

In an interview with Tanzania national ICT coordinator, it was noted that, the National Research Policy, Technology and Innovation Policy, and Guideline for Innovators and Inventors is under preparation is going to provide guidance for national research management, undertaking of research and research performance evaluation, and capacity building in order to exploit the national and other resources efficiently for socioeconomic advancement. In this case, Tanzania level of innovativeness, knowledge and dedication to research and development issues is very immature. The government after coming up with the policy should therefore encourage investment in research by the private corporations and not only public sectors [1].

3) Software Intellectual Property Laws

This is the area of law that deals with and oversees the creation of intellectual property patents, copyrights, trademarks and trade secret laws; the protection of intellectual property rights; and the legal pursuit of those who infringe on another's rights to his or her intellectual property. These are laws that help to protect investments and sunk costs' software industries has sacrificed to come up with the new software. Software piracy is everywhere, but these laws help investments worth [15]. Microsoft founder, Bill Gates accused the hobbyists of stealing software, the ALTAIR BASIC1.1. He noted that among the people using the software in the market, just 10% of them had bought a literal copy of the software price making his attempt to develop BASIC equivalent to only 2\$ dollars a day. He openly told hobbyist that, he would be pleased to see the hobbyist market is supplied with a very quality and good software from being able to hire more programmers for production [16].

The certainty provided by intellectual property rights protection is a key component in creating a strong business environment, and can stimulate domestic innovation and creativity in the economy. Intellectual property rights protection helps to create a more attractive environment for capital investment and for companies to engage in technology transfer [17]. Intellectual property rights if duly managed and used can extensively contribute to economic growth, innovation and poverty alleviation.

The challenge for developing countries is to convert what comes out of basic research into tangible outcomes, to which real value can be added, or which would benefit indigenous knowledge and packaged in a way that would generate value. In Tanzania, neither there is software patent laws nor skilled labor to patent software, all software is copyrighted by a copyright of office of Tanzania as literal work making it very vulnerable, its technology components unprotected and very cheap to support industrial growth [18].

Among the Tanzania researchers, only 12% of them are fully aware and can exercise their rights to bring benefits that come from the outcome of their studies, i.e. selling and protecting their ideas [19]. Governments in developing countries are frequently encouraged to focus upon educating their people to understand well intellectual property rights and make

their role in economic development more understandable, especially in research institutions and private sector to support growth [13, 18].

III. METHODOLOGY

The general approach of this research was explanatory and qualitative as it involved collection of data that came from experience, explanations, decisions, cases, opinions and other situational and qualitative variables. Qualitative methods are typically more flexible; that is, they allow greater spontaneity and adaptation of the interaction between the researcher and the study participant. Participants have the opportunity to respond more elaborately and in greater detail than is typically the case with quantitative methods. In turn, researchers have the opportunity to respond immediately to what participants say by tailoring subsequent questions to information/answers that participant has provided [20].

A. Sampling

The sampling technique that was used is deliberate or convenience sampling technique. That is, selection based on the researcher's judgment on their potential to provide worthwhile and comprehensive information. The following institutions were selected for the study:

- University Curricula: University of Dar es Salaam (UDSM), Kampala International University (KIU), Tanzania Commission for Universities (TCU) and St. Joseph University.
- Intellectual Property Laws: Ministry of Industry and Trade, Commission for Science and Technology (COSTECH), Copyright Society of Tanzania (COSOTA), Business Registration and Licensing Agency (BRELA), and Ministry of Science and Communications.
- Research and Development: Techno Brain Company Limited, Data Vision Company Limited, Power Computers Company Limited, Dutex Company Limited, University Computing Center (UCC), Ministry of Science and Communications, Commission for Science and Technology (COSTECH) And Technowise Company Limited.

These establishments have been chosen because of their relevance, purpose, and contribution to the field of study. Reference to [20], it was advised on the need to select a sample from which one can learn most.

B. Data Collection

As earlier explained, the research design was qualitative to help with flexibility of obtaining as much information as possible to the subject area using open-ended questions and references. Semi-structured interviews and documentation study was therefore used to obtain relevant information from samples. Interviews were done to persons highly believed to have a potential of releasing or giving rich information from experience, positions held, office and level interaction with the area being examined. Relevant documentations such as school enrollment statistics, accreditation policy and procedures, curriculums, reports, legal papers, et al., were studied to obtain factual information.

C. Analysis of Data

Because the research is qualitative, then the data collection was done parallel with analysis of data, because it is likely, the information gathered in the field generates more questions, and thus, the researcher moved back to the field until all questions are saturated. In this case coding and reduction of data from the site was an important step towards compiling the facts and ensure quality of the research. The analysis of data was cyclical, following the below procedures:

- Interim Study Analysis where area was repeatedly studies to exhaust all details.
- Recording in form of short notes and voice was done on site.
- Data Entry and Storage Using Computer Aided Qualitative Data Analysis Software –RQDA
- Coding and Categorizing: Deductive and Inductive Coding was used with Apriori to improve efficiency and create better focus on the study.

D. Quality: Validity and Reliability of Research

Validity and reliability of qualitative research centers on whether a different researcher given the same settings and topic could generate or arrive to the same conclusion or come up with similar relationships from the constructs. Results can be affected by changes in the social, economic and political environment over time. Since the nature of qualitative research is to get information from natural settings, then the situation, scenes, audience and recordings cannot be repeatable or replicated that easy. This makes reliability more difficult than the validity of a qualitative research as scenes are not replicable. On the other hand, validity and reliability are two factors which any qualitative researcher should be concerned about while designing a study, analyzing results and judging the quality of the study [21].

Because qualitative research is done in a naturalistic manner, it should be assessed in a different direction based on its nature. To support my argument, [22] asserted that "the quality of a study in each paradigm should be judged by its own paradigm's terms." Because reliability is as a result of validity of the research then validity can be used to demonstrate the quality of the research. To back up my argument, [21, 23] stated that "reliability is a consequence of the validity in a study."

IV. FINDINGS AND ANALYSIS

The study involved three surveys which were university computing curriculum, research and development, and software intellectual property laws. This involved collection of data from five (5) universities offering computing degrees

and study of documentation from Tanzania Commission of Universities where academic registrars, computing degree faculty heads, information technology managers and head of administration office. For research and development, different companies in Tanzania doing software development especially those which is based in dare salaam where interviewed; the data was collected from heads of software development department and general managers in charge of business development. Lastly the survey done for software intellectual property rights was done, the data was collected from head of institutions in charge of administration and implementation of software intellectual property rights, heads of intellectual property rights & technology transfer and study of laws governing intellectual property rights.

A. University Computing Curriculum

The study shows that most of the universities in Tanzania are offering computing degrees that do not aim at breeding software engineers’ rather multidisciplinary computing degrees that gives students ability to adapt to different areas of computing through practice, professional certification and on job training. The type of degree we offer determines which type of skills Tanzania has in the market and whether it supports effectively and sufficiently software services industry. From the data presentation below, it can be seen that, out of a total of 4,632.00 computing students graduating each year, only 190 or 0.04% of the students take software engineering degrees from only two (2) available universities offering the course. That is, Dodoma and Ruaha University taking ninety (90) and a hundred (100) students per class total 190 students.

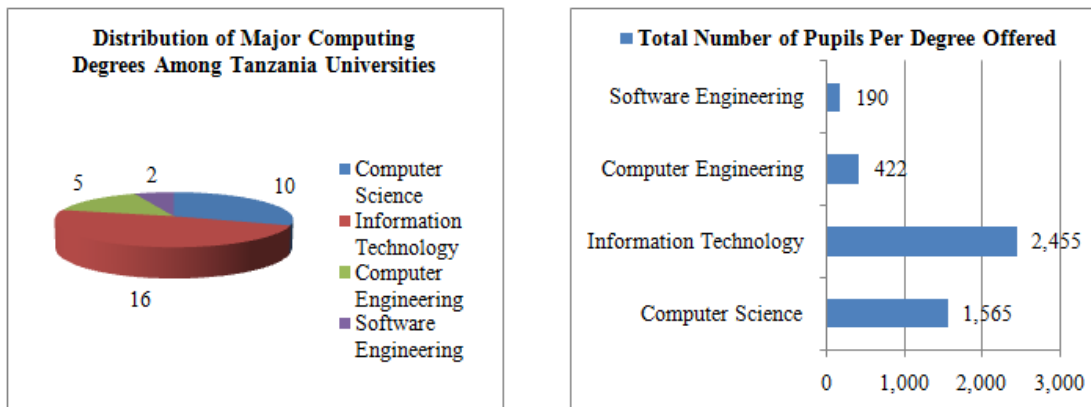


Fig 1. Distribution of major computing degrees and total number of pupils per degree offered

On other hand this degrees needs enough practical hours to enable effective transfer of skills to students. However, from the survey it has been found that there are limited facilities to support these courses and also most of the facilities available are not in good working conditions. Here the computing facilities mean, Computer Laboratories, Computers, and Supporting Infrastructure (Network, Electricity, Projectors, et al).

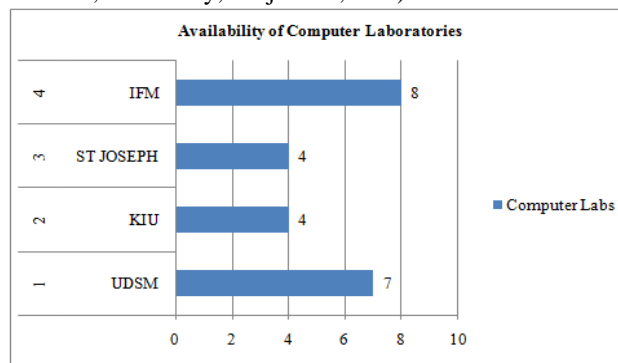


Fig 2. Number of computer laboratories in universities offering computing degrees

Based on the data presented above, taking into consideration those institutions having many computer laboratories as good example, it has been found that; UDMS despite having (7) Computer Laboratories, five (5) being at the main campus and two (2) outside. There are eleven (11) engineering degrees doing Pascal programming, five (5) actuarial science degrees with programming and 14 informatics degrees offering core programming. All these thirty (30) degree courses make use of these limited facilities. Finding a computer LAB that can accommodate 200 students is impractical; it forces students to share computers. Most of these LABS are not well maintained; some computers are not working properly. Institute of Financial Management (IFM) as another example, many computers are not in good condition even during the assessment or exam sessions. During this period, students are forced to use more than one LAB as they are forced to look for working computers or computers ready for practical tests. This is despite the fact that, IFM is having eight (8) computer LABS and two (2) informatics degrees enrolling 900 students a class and 2,700 in total. The network being the major problem with the thin client or network computers, electricity blackout during class sessions, the resources' available and shared offices with poor facilities do not provide an environment conducive for both teachers and students.

Lastly, the other area of interest is the curricula review. This is very important to adapt to the industry requirements and changes happening around the globe. Curricula reviews should be focusing not only on subjects but also on other resources that supports the institutions to create the learning that is required for each and every graduating class. It has been found that one of the most popular and iconic university i.e. The University of Dar Es Salaam, ceased employment of faculty since 1992 creating a shortage of staff. In addition to that, they increased the number of students admissions to an alarming rate, this further crippled the capability of the institution to offer quality education as retired professors where required to come back.

Head of administration and academic registrar for these universities when interviewed, only one university declared to have a curriculum review policy, to which after every five (5) years, the university committee for curriculum review involving stakeholders from different sectors including government are invited to contribute. This was the University of Dar es Salaam. Further, despite of this, only recently it has started an Alumni office and office of educational research & knowledge exchange. Sharing the same fate as other universities, the alumni office sole function is still a fund raising office rather than a curricula support office, the challenge being poor communication and research resources.

To all universities subjects such as software intellectual property rights is left to law students only, research and development not emphasized or taught as independent subject, software security is not taught as practical subject, and normal programming classes are assumed to be enough for breeding the software engineers.

B. Research and Development

This is another important area that contributes greatly to software services industry. Six (6) software development firms or institutions where visited to collect data on whether they have established offices dedicated to research and development or not. Most of the firms did not have well established R&D centers and some claims that research and development is an in-built function within their programming or software development centers. However, this shows that, Research and Development is not given enough weight and importance as a separate unit dedicated for that purpose only.

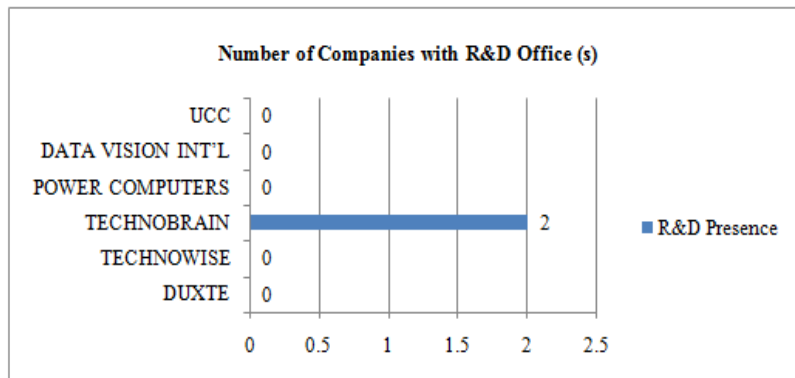


Fig 3. Proportion of surveyed companies invested in research and development

From the above presentation, it can be noticed that, only Techno Brain has well established R&D centers, one being in Nairobi, Kenya and another in Bangalore, India with a total of three hundred (300) staff.

Tanzania government has a research center namely TIRDO, this institution is to support and conduct research for development purposes. However, research for the area of computing is not even started, though under consideration. Not only that, but also research and development for software programs should be under the institutions doing software development. Tanzania has an incubation program to support the emerging computing entrepreneurs, however, the efforts are not software focused, are diversified to different areas of computing and more none of the candidate doing software development has R&D at the center of development.

Most IT-Vendors offer ready-to-use hard and software equipment, and their respective technical support. Value-added services like software application development and web solutions are immature and mainly provided by companies that have developed a distinctive business profile in the field. The majority of companies were started in a period that coincides with the kickoff of the telecommunications sector reform in 1993 and the arrival of the Internet in 1996 – 1998, which contributed to the main boost for the sector. The vendor market is hardware-biased. Only six (6) companies in the survey focus almost exclusively on software application development.

C. Software Intellectual Property Rights

Second from research and development and third to software engineering education, the intellectual property rights contribute greatly to the success software services industry. Based on data collected from institutions in charge of creation, formulation, administration and implementation of this policies, it has been found that software patent does not exist in the Laws of Tanzania, software intellectual property right are defined by the copyright laws are literal work. Meaning, only the expression of idea is protected and not the idea itself that carries the technology component.

One of the major setbacks in this is the availability of specialized skills in the area. Most of these institutions do not have sufficient staff possessing specialized skill set as required in this area. The staff is mostly educated in Laws, which of course cover Intellectual Property Laws, but not the details required. For example, the law doesn't state clearly how

copyright issues should be administered. Also there is no clear demarcation of duties on administration of copyright issues between the institutions in charge of copyright administration and implementation. Currently, the copyright office (COSOTA) doesn't have expertise educated on copyright and intellectual property laws from the top to bottom level management. However, there are training courses that are offered internally, and others organized abroad to educate the licensing personnel on copyright issues. Here below is the distribution of skills available in different institutions in charge of intellectual property laws:

Table 1. Distribution of skilled personnel or experts in the intellectual property administration offices

Organization	Number of Expertise
COSOTA	Zero
BRELA	Two Bachelor Degree IP (Recently Oct, 2012)
COSTECH	One Ph.D and One Masters IP Degree
MINISTRY OF TRADE AND COMMERCE	1 Bachelor Degree IP

Therefore, Tanzania lacks experts in the field who possess a sound understanding of intellectual property rights, and so this is one of the major setbacks that make policies not well-defined and enforced.

The population of Tanzania and even among the skillful researchers is not well educated on intellectual property rights; Most of them don't know the benefits and those who know they don't know the procedures. Moreover, most of the organizations don't have a dedicated office in command of technology transfer or intellectual property issues, and therefore, their inventions are lost or do not benefit them at all as they cannot sell or protect.

Most of the owners of intellectual property are not cognizant of the policy or laws and the benefits they would receive from using the laws, especially those entrepreneurs in the interior areas, they hardly possess the knowledge of the benefits and basic rights on their own invention or talents.

The law enforcement mechanisms are not efficient in the administration of copyright laws, the law enforcers such as the police force, and Tanzania Revenue Authority (TRA) - the umbrella body for copyright issues had no copyright policies and section. However, TRA is on the move to introduce and strengthen monitoring and tracking to enforce laws. Nevertheless, the law itself doesn't state how copyright Acts should be administered.

There is also a challenge in facility, instrumentation and implementation. Example, copyright office has only a total of seventy (70) employees in charge of countrywide administration of copyright issues, three (3) offices in dare salaam, Mwanza and Mbeya. Another institution, BRELA, has recently (June 2013) engaged Tanzania Chambers of Commerce and Industry to use its offices across Tanzania to extend its services to other parts of Tanzania.

V. CONCLUSIONS

The paper presents the challenges and problems facing Tanzania software services industry with a focus on key areas that contributes heavily on the success of this industry. These areas are, computing curricula, research and development, and intellectual property rights laws.

The study aims at giving knowledge and exposure that is needful for the industry stakeholders. That is, to help the universities realize the importance of developing curricula that will help students become ready for the industry rather than expect them to adapt to these industries. To promote the software industry in Tanzania to get enough local resources and business environment where they can flourish and penetrate in global competitions or software market. To help the government realize the importance of balancing the needs of different sectors of the economy by addressing issues specific to each sector through effective policies, funding and intervention programs. To give information to educational organizations as they design curricula and training programs, and data that will help these instructors in assessing available and suggested curricula. To help the software developing companies in Tanzania to realize the importance of investing in research and development to enable them to tap into software market more aggressively.

From the three surveys done, it has been found that, most of our universities offers generalized computing degrees such as computer science and information technology, which are multi-disciplinary, that is, giving students only basic knowledge on each area of computing rather than specific area such as software engineering. Nevertheless, these universities have shortage of facilities to effectively transfer skills for students taking practical subjects. For Example; computers, computer labs, steady electricity, network and instructors. It has been found that retired professors are called back to fill the gaps, IT managers take full-time and part-time classes with students even in support of other educational institutions far away leaving their core duties unattended causing poor computing facilities maintenance, lack of improvement and ineffective regulations.

Another finding is that, most of the companies do not have R&D offices; this area has not been given any significance. Most of them do basic web-development or customize proprietary and open-source software, even in doing so management of the same becomes a challenge. More it necessitates companies looking for quality software and services to import from abroad at higher costs, this makes Tanzania a hardware biased economy. In support for research and development, it was expected that there will be strong IPR laws, surprisingly in Tanzania laws are silent on software patents and copyright laws are not well defined to be effectively implemented. For example, the copyright office is under the copyright society of Tanzania, making it difficult to administer copyright on itself, and more there is not clear demarcation on responsibilities of the offices in charge of copyright issues, example Fair Competition Commission, Copyright Society of Tanzania and TNAC. More these institutions do not have sufficient skilled personnel to formulate and administer these laws. Research Policy, Guidelines and Policies for Innovations and Inventors are being prepared by

the ministry of science; communications and technology that will be expected to also strengthen our intellectual property laws and probably introduce software patent laws. From the study it has been found that, the current intellectual property laws are weak because our level of innovation or innovativeness is low, and thus it is not possible to build a framework or mechanism of control where nothing has been experience as a problem, and this include not well defined / generalized ICT policies that do not give enough guidance for law makers to formulate strong IPR laws.[24]

I would like to recommend Tanzania education institution offering computing courses to introduce degrees that are area focused such as software engineering degree to boost this sector of economy. Moreover, degrees such as intellectual property rights and software security should also be introduced. To enable effective transfer of practical skills, our universities should regularly review computing curricula to ensure that, there are enough resources, this includes enough computer labs, working and well maintained computing facilities, dedicated IT mangers, the IT managers should be employed as IT managers only and not lectures. Software services companies on the other hand should recognize the importance of R&D, invest in this area to promote innovation, quality and foster growth. Lastly Tanzania government should promote software services industry by tackling challenges facing this industry, putting effective legal controls and create a business environment in which all participants in the market can benefit, and also attract streams of revenues that add to economic development.

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