



# A FRAMEWORK FOR MAPPING KNOWLEDGE-BASED ECONOMY WITH GRADUATE ATTRIBUTES: AN EDUCATIONAL PERSPECTIVE

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## ABSTRACT

The emergence of knowledge-based economy has led many sectors of industry to become more focused on knowledge in the broadest sense of the term. Knowledge-based economy is viewed as a shift into highly developed knowledge and skills with a new combination of content skills, process skills, entrepreneurial skills, problem solving skills and self-directed skills. Industries have realized that a broad range of abilities and skills are useful to new ways of managing business that require highly cognitive related jobs demanding graduates to become lifelong learners. For this reason, higher education institutions (HEIs) should supply graduates who have the ability to create knowledge content and integrate practical knowledge. The recognition of the importance of HEIs in developing a sound knowledge-based economy has led into the belief that they are strongly needed by industries to be able to meet the changing needs of the labor market.

At present times, knowledge-based economy and the growing demands for highly skilled and educated graduates are essential elements that claim for a paradigm shift in higher education. There are two different paradigms linking knowledge, skills and values which have implications on the relationship of the enterprise and individuals in view of the knowledge-based economy. The first paradigm is on the understanding and application of cognitive, psychomotor and affective abilities of the graduates. The second paradigm is a framework that shows the analysis of how knowledge-based economy is developed which are enhanced through the structural components of foundation of information, communications technology, open innovation, education and knowledge management.

This study explores the above-mentioned paradigms and how graduate attributes and the knowledge-based economy are practically developed and linked. A framework for mapping knowledge-based economy with graduate attributes in relation to the education process, performance indicators, market demands and employability of graduates is proposed.

**KEYWORDS :** Knowledge-Based Economy, Graduate Attributes, Framework, Higher Education Institutions, New Paradigm

## INTRODUCTION

The Sultanate of Oman is geared towards the fulfillment of a very promising strategic direction of creating a knowledge-based economy that is resilient to economic diversification and sustainable development which could best be backed through a substantial investment on education and training. Apparently, education has been pointed out as one of the aspects of the society that is particularly vital in realizing the Sultanate's grand vision 2020 and carried through its vision. The growth of industries has brought about a wider spectrum of the need for skilled workforce which has tremendously changed how the education sector responds to societal needs. Hence, the Higher Education Institutions (HEIs) have to transform in order to be able to cope with the demands of the global labor market.

To achieve this end, HEIs use generic graduate attributes to articulate their outcomes, the descriptions of the unique characteristics of their graduates. The HEIs need to look into their graduate attributes and the professional and personal qualities of their graduates that would need to be developed. They have to design their curricula in order to develop graduates who could be gainfully employed and be able to contribute to Oman's strong manpower and supply industries.

In view of this, many HEIs are revisiting their graduate attributes to ensure the quality of their outcomes. The graduate attributes must be thoroughly examined on whether these longer satisfy and contribute to the knowledge economy. This process is called for due to the need to re-examine whether the graduate attributes cover a combination of skills, knowledge and values.

## THEORETICAL BACKGROUND

Different authors have given their distinct definition of knowledge-based economy. Many authors described knowledge-based economy as an avenue to promote economic growth and social development (World Bank Institute, 2001; Organization for Economic Cooperation and Development, 1996). Likewise, in this paper, knowledge-based economy is defined in consonance with

World Bank Institute (2001) and Organization for Economic Cooperation and Development (1996).

Simon Barrier claims that there exists a flimsy and theoretical and conceptual basis of the development of graduate attributes in higher education. His previous work calls for development of a conceptual framework which could ultimately help HEIs to articulate its generic graduate attributes.

Knowledge-Based Economy is defined as a term used to describe an economy of knowledge focused on the production and management of knowledge that could help in creating solutions in the economy. It requires the workers to have profound skills needed to complete assigned tasks of any sort, extremely higher level of communication skills, technical skills, leadership skills, lifelong learning skills, and most-sought abilities and values.

The structural components of Knowledge-Based Economy are the following: Knowledge Management, Foundation of Information, Communications Technology, Open Innovation and Education (White, S. D., Gunasekaran, A., and Ariguzo, G., 2012).

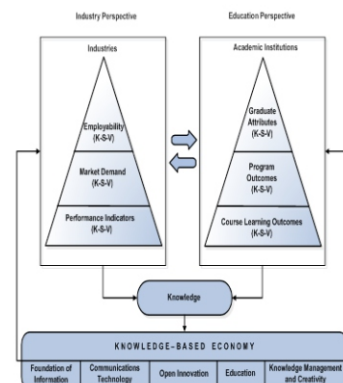


Figure 1. Development of KBE: Education Perspective

**Foundation of Information.** Knowledge-based economy should have a strong foundation of information because knowledge comes from data and quality information. The five characteristics of quality information according to Computer Business Research (2017) include accuracy, completeness, consistency, uniqueness and timelines. "If information is the currency of the knowledge economy, human expertise is the bank where it is kept, invested and exchanged" (Omotayo, F. O., 2015). Therefore, information is considered as an asset in the knowledge-based economy.

**Communications Technology.** Knowledge-based economy views Information and Communications Technology as an enabler for economic growth and development. The process of knowledge creation and diffusion highly depend on communications technology. Its prevalent use in economic and social sectors forms the knowledge-based economy.

**Open Innovation.** Knowledge-based economy views the emergence of open innovation as an agent for economic change and the advancement of knowledge in the global economy. The need to innovate is a means for progress and survival in the competitive world. "Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively" (Chesbrough, H., 2003).

**Education.** "Education, especially higher education, is important for knowledge economy development. Higher education institutions are import for the creation, dissemination, knowledge transfer, and spillover of knowledge to the industry" (Đonlagić, S. and Kurtić, A., 2016). It is recognized that an educated and highly skilled workforce will be able to create, share and use knowledge effectively.

**Knowledge Management and Creativity.** Knowledge-based economy and creativity make use of knowledge to create value in the organization which makes it an asset. To be able to establish knowledge, its effective management is considered an important ingredient in sustaining the competitiveness of the organization. It is then vital for the organization to create, manage, share and use knowledge effectively. Knowledge management has generated significant results such as profitability, competitiveness and capacity enhancement (Chua, A.Y.K., 2009).

#### **A PROPOSED FRAMEWORK FOR MAPPING KNOWLEDGE-BASED ECONOMY WITH GRADUATE ATTRIBUTES**

Organizations should have the capacity to manage and transfer knowledge to innovate in order to survive (Riege, A., 2007). Therefore, knowledge management is critical to every organization as effectiveness and performance are vital (Bosua, R. and Venkitachalam, K., 2013). Knowledge is empowered by knowledge, people, processes and technology.

The structural components are interlinked to be able to produce a knowledge-based driven economy which in turn informs the industry and the educational sectors as regards to its requirements to maintain its competitiveness. To be able to realize a strong knowledge-based economy, the structural components should actively interplay with each other. It is to be noted that the academe and the industry play an important role in the knowledge-based environment.

#### **THE FRAMEWORK FROM EDUCATION PERSPECTIVE**

Higher education institutions in Oman must ensure that they meet the requirements of the KBE. In such manner, they have to properly develop their academic programs accordingly. One way is to develop appropriate graduate attributes which are a reflection of the unique characteristics of a HEI graduate. The changing environment caused by the emergence of knowledge-based economy prompts HEIs to respond to its underlying requirements.

The program outcomes and course learning outcomes should be framed according to the Knowledge, Skills and Values (K-S-V) pattern in order to make it more focused on the appropriate development of required competencies. In the hierarchical structure as shown in the figure, course learning outcomes are developed and mapped against the program outcomes. On the other hand, the program outcomes are developed and mapped against the graduate attributes. The graduate attributes are depicted in the program outcomes. This structure reflects how HEIs attain their graduate attributes. If HEIs would like to address the requirements of the KBE, this framework is recommended. Hence, the HEIs need to consider this approach in the design of their curricula and pedagogies.

This enhancement process would change their practices in the teaching and learning process. Hence, this will create a paradigm shift from a traditional focus to a modern knowledge-based teaching and learning process.

#### **The Framework from Industry Perspective**

Industries play a big role in the academic plethora to inform industry expectations. The very strong relationship between the industries and HEIs should be maintained and sustained to avoid skills mismatch. The industry requires the holistic development of graduates who have developed proper knowledge, strong skills and desirable values. However, HEIs expect an immense support from industries such as providing seminars, workshops, field visits, internships and on-the-job placement, career development and the like in order to keep them employable and be able to cope with the demands of KBE.

It is expected from industries to also identify their requirements in terms of the K-S-V pattern with their corresponding key performance indicators. In such a way, the academe will be properly informed with the kind of graduates they are supposed to produce.

#### **DISCUSSION AND CASE STUDIES**

Knowledge-Based Economy requires high expectations from the graduates of higher education institutions. Graduates should have very high competencies in terms of technical skills, communication skills, leadership skills and other skills and abilities that will produce lifelong learners. In addition, the graduates should also be highly ethical and socially responsible to be able to cope with the implications of the knowledge-based environment.

Hence, HEIs should cope with the high demands of the knowledge-based environment and be able to collaborate and cooperate with industries to be able to produce highly employable graduates. The transformation and application of knowledge in the 21st century is another challenge for higher education institutions. Graduates during this era must be able to develop and acquire qualities that will be able to adapt to the evolving knowledge-based environment.

The following few cases showcased the development of knowledge and the acquisition of skills and values:

Case 1. The Higher College of Technology (HCT) implements a blended learning with the use Open Educational Resources (OER) and the Massive Open Online Courses (MOOCs) facility. Most of the IT courses are taught using MOOCs which makes the teachers more of a facilitator in the teaching and learning process. On the other hand, through this educational process, the students learned to be independent and be self-directed learners.

Case 2. HCT invited external reviewers from Omani companies to evaluate the course projects of students such mobile systems, online systems, edutainment systems, database systems, networking and telecommunication systems, and information systems. After the presentation of course projects, a round-table discussion was conducted with the external reviewers to identify the strengths, weaknesses and opportunities for improvement in

terms of standards, processes, and procedures as required by the job market. The full support of people from industry is necessary in order to produce competitive graduates with strong technical, entrepreneurial skills and personal skills.

Case 3. HCT recently conducted a 5-day technical session called Fast Track Training Program by the Information Technology Authority, Oman, Center of Excellence for Mobile Application Development. The session was a combination of theory and practical/hands-on exercises from two streams which were hybrid mobile app development and android app development with the use of state-of-the-art facilities. After the session, students were able to grasp the new technologies, tools and techniques in developing such applications. The session had contributed to the enhancement of the technical knowledge and skills of the students. Students were able to develop the values of patience, perseverance, teamwork and leadership to be socially responsible individuals.

From the given case studies, it is vital that the academe should strongly collaborate with industries and involve them in the molding the technical skills and soft skills of the students. However, at the present time, there are still emerging issues and challenges that the academe and the industry should address to carry out a strong knowledge-based economy.

### **Pre-employment Training**

There has been a weak skills acquisition during the On-the-Job Training which calls for a more robust training system between the industry and the academia fostering effective and coordinated system. The industry should impart the actual skills that are required in the real workplace.

### **Graduate Unemployment**

The Sultanate's official gazette Times of Oman (2016) highlighted a headline that says 'Oman employment: Graduates need training for future challenges' which reflects an apparent growing unemployment in the country. Though this is a global phenomenon, the graduates should meet the expectations of the job market while the colleges and universities collaborate.

### **Public and Private Needs**

Curricular content should meet the needs both the public and the private labor market needs. Job seekers' job preference influences unemployment. It is a challenge for the colleges and universities to provide skills that are transferable to the job market.

### **Job and Skills Mismatch**

The graduates' extent of knowledge, skills, and values should have a harmonious blend in order to keep one's qualification marketable. Scholastic or academic outstanding skills and range of experience may not guarantee employment. Soft skills should be embedded along the hard skills in order to maintain a sustainable career in the knowledge-based economy.

### **Policy Makers**

Policy interventions should handle a fair and sustainable career development among the young graduates who would become catalysts in the development of the Sultanate. A strong and comprehensive policy should be developed and enforced to ensure the active support of the different stakeholders.

### **CONCLUSIONS AND FURTHER STUDIES**

Higher education institutions must be able to adapt to the changing environment brought by the emergence of the knowledge-based economy. HEIs should have the ability to cope with the rapid changes in the knowledge economy. They have to prepare graduates with lifelong learning skills along with the correct match-and-mix of competencies to be able to compete in the global economy. The increase of high standards of competency requires strong collaboration with all concerned stakeholders to be able to realize the knowledge-based economy.

Moreover, HEIs have a big role in transforming their graduates to be able to perform productively in the job market. It is strongly recommended that HEIs should revisit their graduate attributes and utilize the proposed framework illustrated in this paper. The graduate attributes must conform to the standards set forth by the structural system of the knowledge-based economy. On the other hand, the recommended framework has to be evaluated according to its usefulness and effectiveness.

This paper highlights that educational institutions may serve as change agents of the knowledge-based economy as it will be the main provider of learning, application and advancement. To be able to develop self-directed learners, the learning process should be described as learning-by-doing, learning-by-sharing and learning-by-producing. Hence, the industries support to the academe is paramount to the success of the graduates which will ultimately benefit the knowledge-based economy. The industries will be highly involved by the HEIs into the teaching and learning process.

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