TAFHIM: IKIM Journal of Islam and the Contemporary World 5 (2012): 1–44

Globalisation of Knowledge: Re-Orienting the Muslim Mind for Building Knowledge Societies in the Muslim World*

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Abstract
In recent years, globalisation has increased interconnections allowing nations greater access to trade, finance, technology, skills, knowledge and information. In the new economy driven by globalisation, knowledge has become a motor for productivity and growth in nations that have invested in knowledge creation and human capital development. Currently, however, the knowledge gap between Muslims and non-Muslims is widening and, therefore, an enabling environment based on effective knowledge strategy needs to be constructed in order to close the gap. The aim of this article is to examine the potential of building capacity for knowledge societies in the Muslim world. Generating knowledge capacity requires re-orienting the Muslim mind to become more innovative and creative.

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* Originally a paper presented at the "2012 International Conference: Re-Orienting the Muslim Mind: Charting the Future" organised by the Institute of Islamic Understanding Malaysia (IKIM) held in Kuala Lumpur 10–11 July 2012.

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Keywords
Knowledge society, Muslim minds, innovation, globalisation, human capital, science and technology, development.

Introduction

Recent trends in development studies have identified knowledge as a key driver in job creation, wealth distribution and socio-economic transformation. In this age of globalisation, knowledge is a global good which can be acquired and used by individuals, enterprises and nations. In particular, the developing countries can derive advantage by making use of the global knowledge as a substitute for locally produced knowledge to close the knowledge gap. Countries with limited physical and human capital resources can accelerate the process of development through access to global knowledge, skills and technology. Globalisation has improved factor mobility, increased global trade and permitted technology transfer. Meeting the challenges of globalisation entails building institutional infrastructure, accumulating human capital stock, and generating technological learning to facilitate knowledge absorption and adaptation of foreign technologies. Building such capacity would permit Muslim counties to accelerate the process of modernisation by leapfrogging over several stages in their development.

Muslim countries are not investing enough in science and technology, skills, digital technologies, innovation and lifelong learning. Widening of the knowledge and digital gaps between Muslim countries and the rest of the world could engender serious consequences by rendering Muslim countries inadequately equipped to deepen global integration, enhance competitiveness, foster economic growth, promote innovation and build knowledge societies. A knowledge society is a society in which knowledge serves as a driver for dynamic growth

and leapfrogging. Lifelong learning, innovation, training and skill acquisition are among the important features of the new society. Knowledge is a powerful enabler. It empowers people to make informed choices and participate in decisions concerning allocation of resources.

This article aims to explore the status of knowledge in Muslim societies as well as to examine the prospect of building knowledge societies in these countries. A widening knowledge gap constitutes one of the most serious challenges facing Muslim societies today. Knowledge is a product of the mind and, therefore, societies should invest to tap the potential of their people's minds by building an enabling environment that supports individual freedom, encourages research and development, promotes innovation and create knowledge. This article presents ideas concerning building knowledge societies in Muslim countries as an alternative model for development.

What is Knowledge Society?

The concept of "knowledge society" is used to describe a society in which knowledge is widely applied and created. Knowledge society strives to increase society's stock of knowledge through the building of human, physical and technological infrastructures capable of absorbing, applying and creating knowledge. A knowledge society differs from an information society, which whereby provides information to all users of information. Ultimately, the knowledge society becomes equipped with adequate information and skills to empower the society to enable it to overcome social, economic, financial, technological and environmental challenges. Making the transformation from information to knowledge society affords countries great potential to alleviate poverty, create wealth, enhance productivity, reduce inequalities and

sustain development. Unlike traditional societies, knowledge in the new society generates a highly specialised talent people through learning and training.

The United Nations (UN) defines knowledge society as one where

> . . . knowledge diffusion, production and application become the organizing principle in all aspects of human activity: culture, society, the economy, politics and private life. Knowledge nowadays can provide the means to expand the scope of human freedoms, enhance the capacity to guarantee those freedoms through good governance and achieve the high moral human goals of justice and human dignity.[1]

Four guiding features can be identified to describe knowledge society. These include:

1. fostering the sharing of knowledge;
2. creating new opportunities by information and communication technologies (ICTs) for reaching this objective;
3. being wider and richer than the narrower information societies; and,
4. offering a fresh and relevant approach for the development of countries of the south.[2]

Knowledge can be classified into two different categories:

1. *Arab Human Development Report 2003* (New York: United Nations, 2003), 3–4.
2. Mary-Louise Kearney, "Higher Education, Research and Innovation: Charting the Course of the Changing Dynamics of the Knowledge Society," in *Higher Education, Research and Innovation: Changing Dynamics*, Report on the UNESCO Forum on Higher Education, Research and Knowledge 2001–2009, ed V. Lynn Meek, Ulrich Teichler, and Mary-Louise Kearne (Kassel: International Centre for Higher Education Research Kassel (INCHER-Kassel), 2009), 13, accessible at http://unesdoc.unesco.org/images/0018/001830/183071E.pdf.

explicit and tacit. The former is developed through experience and can easily be codified and translated into practical knowledge. Such knowledge is usually available to the public and can be acquired and used by enterprises. Muslim countries can acquire, and make use of, such knowledge through networking until indigenous capacity is developed to produce their own knowledge. Tacit knowledge, on the other hand, is more difficult to capture and use due to its nature of being embedded in the experience and the mind of the individual. Transferring this knowledge into practical usage requires discrete skills acquired through educational institutions and training centres. Without codification, tacit knowledge will be compartmentalised in the minds of select individuals without being diffused throughout society. In this respect, codification of tacit knowledge underscores the importance of vocational training and skill development programmes as mechanisms to mobilise tacit knowledge.

Driving lifelong learning and innovation, knowledge and creativity are the sine qua non of a knowledge society. Investment in people spurs creation of knowledge and creativity. In a knowledge society, new ideas and high technical skills drive a dynamic process of continuous change that ensures knowledge production and application. Modern comparative advantage depends on the country's ability to produce and use knowledge in productive activities. Mere abundance of natural resources and cheap labour can no longer generate sustained rapid economic growth. Rather, economic growth is a product of research and development, new ideas, innovation and creativity.[3] In other words, knowledge has the capacity to transform ideas into useful products or devices used to increase productivity and induce rapid structural change and economic growth if an enabling environment is created

3. See Nico Stehr, *Knowledge Societies* (London: SAGE Publications Ltd., 1994).

in which people are given the opportunity to make good use of their intellectual potential, the prospect for achieved sustained increase in standard of living would be excellent. No greater power exists to turn the wheel of change and speed up the process of modernisation than the human mind, and, therefore, the future success of any society will be linked to its ability to exploit the minds of its citizens. The dynamism of the knowledge society is driven by innovation and creativity which entail the exploitation of people's minds and cultivating their ideas. In addition, building absorptive and adaptive capacity facilitates knowledge transfer and induces linkages across sectors of the economy.

The Muslim world stands far behind the Western countries in industrial production, manufactured goods, technological learning, Research and Development (R&D), knowledge creation and innovation. For a given country, the contribution of knowledge to economic growth and the level of innovative activity by national institutions are measured by the ratio of foreign patent applications to local patent applications.[4] It is estimated that in low-income countries, the ratio of patents filed by non-residents to those filed by residents is 690 to 1. This is compared to only 3.3 to 1 in high-income countries. In 2009, Muslim countries published 63,342 scientific articles with about 55% of these articles published in two countries, Turkey and Iran. These are followed by Egypt 7.0%, Malaysia 6.3% and Pakistan 5.3%. On average, Muslims produced 42 articles per million people compared to 1,355 in Canada, 1,241 in United Kingdom and 894 in Germany. In 2008, the number of patent applications in the world estimated at 1.85 million, less than 1% of which came from Muslim countries.[5]

4. *Constructing Knowledge Societies: New Challenges for Tertiary Education* (Washington: World Bank, 2002), 9–10.

5. For details, see Statistical Information about Research and Development in Muslim Countries available at www.sesric.org, the official

Data also reveal that Muslim countries fall far behind the world average in terms of researchers per million people: 649 versus 2,532 respectively. The gap is much wider when it is measured against the European Union (EU) which has 6,494 researchers per million. In total, about 80% of global expenditures on research and development are spent by developed countries, of which 33.5% by the U.S., 23.5% by the EU and 13.4% by Japan. Muslim countries account for 1.8 of the world total expenditures on R&D. On average, Muslim countries spend about 0.4% of their GDP on research and development, which is far too low to support the creation of knowledge societies. This is compared to 1.76% in the EU countries, 3.44% in Japan, 3.23% in South Korea and 1.78% worldwide. On per capita basis, Muslim expenditures on R&D account for $23.3 compared to $193 in the EU countries and $81 for the world. More than 50% of the total expenditure on R&D in Muslim countries is by the government sector except for Malaysia, whose share of total expenditure on R&D by business enterprises is high at about 85%.

Building knowledge societies require Muslim countries to rethink development and to reengineer the economic structure in order to release society's creative capabilities and to diversify the economy. Achieving such objectives mandates radical reforms designed to build efficient institutions and to invest in human capital in a way that broadens the knowledge base and supports innovation. Diffusion and creation of knowledge should be the key policy aims for the establishment of the new economy given the role of knowledge as a powerful input to generate economic diversification and capital formation. Toward this end, Muslim governments need to augment investments designed to promote education and

website of The Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC), a subsidiary organ of the Organisation of Islamic Cooperation (OIC).

skills and encourage research and development that develops capacity to absorb and apply knowledge vital for building knowledge societies.[6]

It is important that Muslim countries identify the core elements that enter into the construction of a knowledge society to speed up the process of knowledge creation and information dissemination. In recent decades, the Muslim world has been witnessing rapid population growth accompanied by rising unemployment, particularly among the youth. Reducing the risk of social unrest and political instability entails building an enabling environment capable of creating jobs and sustaining development. Knowledge generates spill-over effects and accelerates economic growth by increasing productivity and diversification. In addition, knowledge deepens global integration, which facilitates competition, induces technology transfer and facilitates knowledge acquisition and information dissemination. Investment in knowledge creation and human capital development provides a solution based on sound knowledge ecology to economic, social and political challenges facing Muslim countries in the coming decades.

The knowledge society is undergirded by a knowledge ecology, whereby "the right environment must be generated to pave the way for participation, capacity building and technology transfer, and to avoid the brain drain phenomenon in a sustainable way."[7] Muslim countries could speed up the process of building knowledge societies through the diffusion of foreign technology and augmentation of cooperation among member states that generate productive linkages. In so doing,

6. *UNESCO World Report, Towards Knowledge Societies* (Paris: UNESCO, 2005).

7. *Towards an Integrated Knowledge Society in Arab Countries: Strategies and Implementation Modalities* (New York: United Nations, 2005), 1. See also *The Road Not Traveled: Education Reform in the Middle East and North Africa*, MENA Development Report (Washington: World Bank, 2008), which is accessible at http://siteresources.worldbank.org/INTMENA/Resources/EDU_Flagship_Full_ENG.pdf.

clusters that enhance network development and stimulate the building of technological and physical infrastructure progressively agglomerate.

Knowledge society aims to create a culture that absorbs and share knowledge in order to enhance the society's capability to create wealth, reduce poverty and improve the quality of life. In other words, a knowledge society will be beneficial to all members of the state by providing equal opportunity to all citizens to participate in all decisions concerning development. The benefits of a knowledge society can be achieved through the formation of strategies that create new modes of scientific and technological methods capable of producing new knowledge to support balanced development. This innovation accelerates the process of structural transformation through the development of new products and generating backward and forward linkages.

The knowledge society must continuously produce knowledge in order to maintain productivity increases, promote creativity and support knowledge creation. It is important that universities and educational institutions contribute to the advancement of knowledge and innovation through skills, and research and development to raise productivity sustainably and ensure that structural changes occur within the productive structure. E-learning provides lifelong learning, which is important for adaptation of technologies, diffusing knowledge and increasing market labour flexibility to react faster to technological change.[8]

The Knowledge-based Economy

In the new knowledge-based economy, knowledge has become a key input in production process. The transformation of a

8. For detailed information about Knowledge Societies, refer to *Understanding Knowledge Societies* (New York: United Nations, 2005), as well as *Towards Knowledge Society* (Paris: UNESCO, 2005).

conventional into a knowledge-based economy is linked to the ability of the economy to produce skilled and well-trained workers capable of performing complex scientific and technological tasks to support knowledge dissemination and technology diffusion. The new workers are also called knowledge-workers to distinguish them from traditional activities. In the knowledge society, the workforce must enjoy some degree of flexibility in order to adapt to the new development, and therefore, lifelong learning becomes vital for providing the necessary adjustment and ensuring dynamism.[9] In the knowledge economy, investment in people, science, technology and innovation represents the cornerstone for building an enabling environment. Insufficient investment and inadequate infrastructures delay the process of transformation into a knowledge-based economy by rendering the productive structure incapable of generating scientific ideas and adapting technological methods for development.[10]

The building of a knowledge-based economy relies more on the use of "ideas rather than physical abilities and on application of technology rather than the transformation of raw materials or the exploitation of cheap labour."[11] In this respect, society must be prepared to meet the challenges of

9. For knowledge-based economy, refer to *Lifelong Learning in the Global Knowledge Economy: Challenges for Developing Countries* (Washington: World Bank, 2003); Derek C. Jones, *New Economy Handbook* (Amsterdam: Elsevier, 2003); Dale Neef, ed., *The Knowledge Economy* (Boston: Butterworth-Heinemann, 1998); Joseph H. Boyett and Jimmie T. Boyett, *The Guru Guide to the Knowledge Economy* (New York: John Wiley & Sons, 2001); Wilfred Dolfsma, *Knowledge Economies* (London: Routledge, 2008); *China 2030, Building a Modern, Harmonious, and Creative High-Income Society* (Washington: World Bank, 2012) accessible at www.worldbank.org; and *The Knowledge-based Economy* (Paris: Organization for Economic Co-operation and Development (OECD), 1996).

10. UNESCO points out that knowledge society represents an important source of development. "Knowledge societies are about capabilities to identify, produce, process, transform, disseminate and use information to build and apply knowledge for development." See *UNESCO World Report, Towards Knowledge Societies*, 17.

11. *Lifelong Learning in the Global Knowledge Economy*, xvii.

the new economy by introducing a new method in teaching and learning that involves learning throughout the life of the individual. Emphasis in the new model of learning should be directed at cultivating the power of the mind to promote innovation and encourage the creation, application and dissemination of knowledge.

Table 1 illustrates the differences between traditional learning and lifelong learning. As the table shows, lifelong learning models empower people with new skills demand by the knowledge economy. The educational system in Muslim countries must be restructured to re-orient minds to enable individuals to become creative and productive through the acquisition of new skills that are useful in knowledge creation and technology dissemination.

TABLE 1
Characteristics of Traditional and Lifelong Learning Models

TRADITIONAL LEARNING	LIFELONG LEARNING
The teacher is the source of knowledge	Educators are guides to sources of knowledge
Learners receive knowledge from the teacher	People learn by doing
Learners work by themselves	People learn in groups and from each other
Tests are given to prevent progress until students have completely mastered a set of skills and to ration access to further leanings.	Assessment is used to guide learning strategies and identify pathways for future learning
All learners do the same thing	Educators develop individualised learning plans
Teachers receive initial training plus ad hoc in-service training	Educators are lifelong learners. Initial training and ongoing professional development are linked
Good learners are identified and permitted to continue their education.	People have access to learning opportunities over a lifetime.

Source: World Bank, *Lifelong Learning in the Global Knowledge Economy: Challenges for Developing Countries* (Washington: World Bank, 2003).

Knowledge economy depends on knowledge as an input for creating new knowledge. Thus, development of human capital, establishment of ICT, building efficient institutions, and promoting R&D and innovation increases national capacity to absorb, apply, and create knowledge and also to adapt new technologies. With respect to Muslim countries where locally-produced knowledge is insufficient to speed up the process of knowledge advancement, external knowledge could substitute for local knowledge. In the main, most Muslim countries, other than those characterised as failed states or least developed countries, exhibit no major impediments blocking the building of capacity necessary to upgrade technologies to support knowledge absorption and information dissemination. However, it is important to acknowledge that the readiness of Muslim countries to build knowledge-based economies is not uniform reflecting wide variation in relation to availability of finance, skills, government incentive regimes, physical infrastructure, digital technologies and access to external markets. Bridging these differences could facilitate knowledge sharing and strengthen the fundamentals for building a knowledge economy.[12]

Building a knowledge economy in the Muslim world will depend on the ability of the economy to disseminate knowledge through various sectors of the economy as well as on the flexibility of the institutional structure to absorb and apply knowledge. The flexibility of the knowledge system reflects society's capabilities to promote vocational skills in order to ensure that knowledge assets are converted into knowledge capital. In the Muslim world, the knowledge deficit is due to the low rate of knowledge production, weak scientific research, inadequate funding, lack of physical facilities and

12. Amer Al-Roubaie, and Jamal Al-Zayer, "Knowledge Readiness and Sustainable Development in the GCC Countries," in *World Sustainable Development Outlook 2006*, ed. Allam Ahmed (London: Inderscience publishers, 2006).

poor incentives. In total, governments in the Arab world spend about 0.2% of GNP on R&D with little or no contribution to the knowledge systems in these countries. On average, 371 per million people are engaged in R&D in Arab countries—very low compared to the global rate of 979 per million. These depressed rates not only reflect lack of interest in R&D, but also illustrate the inadequacy of the institutional, physical and educational infrastructures for conducting research.

Most Muslim countries are currently trying to produce knowledge using mainly Western knowledge without taking into consideration the local knowledge system. A viable knowledge infrastructure capable of meeting the local economy requirements is unlikely to obtain from such an approach. Western knowledge is important, but without taking into consideration the local environment, production of scientific research and technology cannot be fully utilised to support the building of an effective local knowledge system. For instance,

> Arab countries' experiments with the transfer and adaptation of technology have neither achieved the desire technological advancement nor yielded attractive returns on investment. Importing technology has not led to its adoption and internalization in the host country, let alone to its diffusion and production.[13]

This implies that reliance on external scientific and technological methods without learning to adapt to the local environment will not achieve the objectives desired.[14]

Several criteria have been developed for measuring progress towards building a knowledge-based economy. For example, the index developed by the World Bank uses four

13. *Arab Human Development Report 2003*, 5.
14. For details, see Amer Al-Roubaie, "Building Indigenous Knowledge Capacity for Development," *World Journal of Science, Technology and Sustainable Development* 7, no. 2 (2010).

indicators aiming at capturing the ability of the economy to increase the share of knowledge in development. These are:

1. An economic and institutional framework that provides incentives for the efficient creation, dissemination and use of knowledge to foster economic growth.
2. An educated and skilled population that can create and use knowledge has been established.
3. An innovation network composed of firms, research centres, universities, consultants, and other organisations that can tap into the growth stock of global knowledge, adapt it to local needs, and transform it into products valued by markets has developed.
4. A dynamic information infrastructure that can facilitate the effective communication, dissemination, and processing of information has been put in place.[15]

Key indicators of the knowledge-based economy show that innovation, education and information and communication technologies are among the core ingredients for creating knowledge and diffusing technology. Unfortunately, very few Muslim countries are presently qualified to meet such requirements and close the knowledge gap. The majority of Muslim countries are below the average in all indicators which are used to measure the performance of the economy to increase the share of knowledge in production. This tendency must be reversed if Muslim countries have to strengthen the fundamentals for closing the knowledge gap and speed up the process for building knowledge societies.[16]

15. *The Road Not Traveled*, 85.
16. For details about key indicators of knowledge-based economy including

Human Capital and Skill Development

The human factor is the most creative input in production and, therefore, education and training are critical for the development of a knowledge society. In addition, building a knowledge society requires the development of communication systems capable of connecting people using digital and electronic networks. Modern production techniques depend on knowledge application and information dissemination which can be shared and applied through information and communication technologies.[17] Modern technologies including e-services, e-learning, the internet and access to computer facilities must be integrated into the learning system to enhance society's capabilities for producing knowledge and promoting human capital development.

Investment in people represents the cornerstone for building a knowledge society. Educational attainment and skill acquisition accelerate the process of knowledge absorption, application, adaptation and creation. The human factor plays a key role in generating new ideas as well as in the development of new knowledge to solve problems. Due to low skills and insufficient training in non-industrialised countries, the local knowledge stored in the minds of the people remains unused to support the local knowledge system. Human capital is defined as the "knowledge, skills, competencies and

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the ranking of Muslim countries, see http://info.worldbank.org/etools/kam2/kam_page5.asp.

17. In a study by the World Bank, *The Road Not Traveled*, the role of education in the development of the Middle East and North Africa (MENA) region has been examined in detail. The report discusses the main challenges facing these countries to reform the educational system and increase the region's capabilities to foster economic growth and promote global integration. The report suggests that MENA region needs to travel a new road that serves two things: (1) a new approach to education reform in which the focus is on incentives and public accountability; and (2) closing the gap between the supply of educated individuals and labour demand.

attributes embodied in individuals that facilitate the creation of personal, social and economic well-being."[18] By creating enabling working conditions for people to participate, it enhances creativity through exploiting people knowledge potential especially tacit knowledge. Endogenous knowledge is critical for building capacity for development and, therefore, it is necessary to harness the local knowledge through increasing choices and encouraging participation.[19]

Human capital underscores the importance of cognitive skills and explicit knowledge which can be used in problem solving and converting ideas into practical use. In the knowledge economy, such knowledge is useful in production where application and adaptation of knowledge are vital for the creation of new knowledge and development of new products. Human capital accumulates through use, training, and informal and formal learning. With respect to the Muslim world, it is reasonable to postulate that sharing knowledge and networking will facilitate the process of knowledge dissemination among various productive sectors in different countries. Such cooperation facilitates the development of new ideas and increases the potential of making use of tacit knowledge. The new society is also described as a learning society in which communication, networking and application feature prominently in knowledge creation. Building capacity for a knowledge-based economy involves a process of structural change driven by production of high-tech products. These structural changes drive demand for new technology-intensive skills and competencies.

Exploiting people potential requires an institutional framework capable of providing incentives to engage more people in economic activities. Unequal opportunities and

18. *The Well-Being of Nations: The Role of Human and Social Capital* (Paris: OECD, 2001), 18.
19. Al-Roubaie, "Building Indigenous Knowledge Capacity for Development."

the dominant of social elite have limited people participation in the economy. Today, the bulk of income and wealth in Muslim societies is concentrated in the hands of a few leaving the majority locked in a poverty trap. In this age of global interdependencies, competitiveness entitles greater access to information and knowledge to enhance people's capabilities to participate in the new economy and contribute to productivity. In Muslim countries, most businesses are still state-owned enterprises greatly controlled by special interest groups linked to top government officials and military personnel.

The objective of national strategies in Muslim countries should include policies to induce technological change to speed up the process of development through creativity, technological learning and innovation. Muslim countries could accelerate the process of modernisation through knowledge sharing and networking. Collaboration among member states facilitates increased productivity, reduces poverty and creates wealth. In addition, Muslim countries need to undergo serious changes and adjustments to promote society driven by knowledge and innovation.

The new society presupposes a process of socio-economic transformation driven by information dissemination and technological learning through the use of digital technologies, mainly ICTs inasmuch as, in the new society, knowledge and information represent the foundation for economic activities. The new technologies have enabled countries to codify information and process knowledge to make it usable across industries and nations. Muslim countries possess the potential to seize upon the new opportunities offered by globalisation to strengthen their access to global knowledge and information. However, this potential is unlikely to be realised given that Muslim countries are handicapped by deficits in freedom—with the result being that Muslim countries trail behind the rest of the world, in particular Western countries. Lack of

freedom limits choices to participate in the economy and hamstrings development. Lack of freedom reduces creativity by preventing people from gaining access to external knowledge, information, skills, finance and markets.

The Importance of Institutions

At present, the institutional set up in most Muslim countries does not provide much choice and flexibility for people to participate in decision-making given the absence of freedom of expression. The public sector is tightly controlled by a small elite that is dominant and controls society's resources with limited freedom to participate in the economy given to private enterprises, individuals, women and minorities. Being excluded from participating in the economy, the contribution of individuals, women and minorities to society's development is marginal. At the same time, government interference in the operation of private enterprises results in resource misallocation and depresses investment. In addition, inequities in income and wealth empower the elite to exercise hegemony over decisions concerning allocation of resources. In the knowledge society, the institutional structure of the society is an integral part of the knowledge system aimed at producing and disseminating knowledge. The new culture created by the new society exhibits values that empower people to acquire and use knowledge. In this culture, the institutional set-up plays a key function by providing the necessary incentives for economic agents to produce and disseminate knowledge.

Failure of Muslims is also due to their inability to establish institutional capacity to formulate effective policies and construct sound decisions. The economic success of Japan, South Korea and Singapore was largely attributable to the incentives provided by state institutions. These incentives gave rise to dynamic and aggressive private enterprises which

took the lead in the creation of knowledge and promoting global competitiveness. In the process, these countries have benefited from global scientific development and technological learning through business partnership and joint venture. State institutions contribute to the productivity of the economy by making managerial, organisational and financial decisions with the intention of supporting development through knowledge creation, information dissemination, technology transfer and labour training. Universities and other educational institutions play a key role in labour market flexibility by contributing directly to research and development, innovation and knowledge sharing.[20]

In the Muslim world, state institutions are geared to providing services for the elites with little incentives for supporting private enterprises and promoting entrepreneurial spirit. Weak or absent institutional support hamstrings domestic production in Muslim countries is isolated from internationalisation of business and globalisation of technology. Most revenues from exploitation of local resources defray the cost of luxury imported goods to satisfy the elite demand at the expense of imported capital goods and technology for development.

The effectiveness of the institutional structure of the society and its impact on innovation is influenced by several variables including the political environment, the regulatory environment and condition for business provided by public institutions. These variables impact the way economic agents interact among themselves sharing in the process knowledge and exchanging new ideas. Among the top countries that

20. See for details, Amer Al-Roubaie, "Building Capacity for Labour-Market Flexibility in a Globalized World: The Role of Universities," in *Higher Education in the Twenty-First Century: Issues and Challenges*, ed. Abdulla Al-Hawaj, Wajeeh Elali and E. H. Twizel (London: CRC Press, 2008).

enjoy enabling institutional environment for innovation are Singapore, Sweden, Hong Kong and Finland.

Knowledge and technology have become the foundation for modern development. Absent well-articulated strategies to restructure their productive systems and reengineer their scientific institutions to promote technological development and innovation, the prospect for technological and scientific advancement will remain limited in the Muslim world. Building capacity for institutional infrastructure empowers individuals, enterprises and states to use knowledge and enhance innovation, i.e., infrastructure affects the productive structure as well as the productivity of other factor inputs used in production. In addition, infrastructure increases technological learning—vital for adaptation and upgrading of imported technologies. Governments in Muslim countries must recognise the importance of infrastructure and adopt effective strategies to enhance their infrastructure in order to facilitate knowledge absorption and innovation.

Contemporary Knowledge in the Muslim World

The widening of the knowledge gap represents one of the important challenges facing Muslim countries today. The knowledge deficit hinders the process of socio-economic transformation by reducing the capabilities of these countries to accelerate economic growth and catch up with the rest of the world. The new economy is driven by creative ideas and knowledge creation involving the transfer of tacit knowledge into practical solutions. To this end, society's attitude towards knowledge and learning must change in order to create enabling culture that encourages positive thinking, freedom of expression, knowledge sharing and global access.[21]

21. See for details, Karim Abdullah, "Strengthening Critical Thinking Skills among Muslim Students," *Islam and Civilisational Renewal* 1, no. 4 (2010); Ali Allawi, *The Crisis of Islamic Civilization* (New Haven: Yale University Press, 2009); and Mehmet Ozay, *Islamic Identity & Development* (Kuala Lumpur: Forum, 1990).

The Muslim mind must be re-oriented to exercise greater interest in the building of a knowledge society through education, skills, incentives, rewards and management. Creative and productive ideas in the mind of people can be exploited to germinate the building blocks of a knowledge society. Denying people the right to participate in decision-making not only undermines the human contribution to development, but also represents a substantial waste of the most important resource of society. In the knowledge society, people are the real resources which reflect the importance of investment in human capital to enhance creativity and increase productivity.

Despite the fact that Islam encourages positive thinking and endorses knowledge creation, Muslims seem to have rejected such religious endeavours by equating modern scientific knowledge and technological achievement with Western secular progress. Muslims are satisfied with the consumption of Western materialism, but they reject Western scientific ideas and technological development because of their religious beliefs. However, it was the knowledge of Muslims that the West benefited from to foster scientific discoveries and build modern civilisations driven by creativity and innovation. In this age of global interdependence, knowledge acquisition could strengthen the process of knowledge creation through investment in education and human capital development. Muslim countries have substantial untapped resources, including abundant human potential, to build societies driven by knowledge and innovation.

Dependence on the knowledge of others provides only a partial solution to remedy the existing knowledge gaps. Building a sustainable knowledge society requires the formulation of an effective knowledge strategy capable of utilising both global and indigenous knowledge systems achieving a shift from the current modes of production fuelled by natural resources to

a "knowledge mode of production." In the Muslim world, unfortunately, a large majority of governments have not been able to construct a development strategy capable of building up national science and technology capacity to link knowledge application to economic growth.

Islam encourages learning and knowledge acquisition to induce change and foster development. Unlike early Muslims who developed great interest in exploration and learning, the current Muslims are more interested in religious teaching with little or no interest in scientific studies and technological advancement. For early Muslims,

> . . . learning became an essential component of the popular culture, and was not confined to matters of religion, language and literature. An appetite for knowledge became one of the hallmarks of Arab culture.[22]

Meeting the challenges of the new society and restoring the values of the old culture will require Muslims to re-examine the educational system and rethink the importance of learning in knowledge creation and scientific development. It was the access to the knowledge of early civilisations, including the Greek and Indian that helped Muslims to create new knowledge and develop new scientific discoveries. As Mehmet Ozay points out:

> Islamic scholars, ulama, pushed the frontiers of ancient Greek rationalism to new heights. Then, in the tenth century, quite mysteriously, the ulama declared the 'Gate of Knowledge' closed, believing that all possible human problems had been answered, and decreed that henceforth only education by imitation would be permissible. Theology replaced rationalism and Islamic scholarship and creativity entered a long period of decline.[23]

22. *Arab Human Development Report* 2003, 43.
23. Ozay, *Islamic Identity*, 11.

Muslim societies possess a tremendous amount of knowledge stored in people's minds, in institutions, in traditional systems and in a variety of other religious, cultural, social and spiritual sources. Capturing this knowledge entails an effective leadership and efficient institutions capable of mobilising the existing knowledge sources and channelling them into various socio-economic programmes. In this society, knowledge becomes the engine that drives the functioning of the productive structure in society. Unfortunately, most Muslim countries are far removed from such a society. They fail to accord importance to the knowledge of the present age including mathematics, philosophy, logic, chemistry and physics. Instead, they replaced these subjects with religious subjects and teachers who "seek to impose religious dogma upon their students." Early Muslims were able to take advantage of the teaching of the Qur'ān and developed a knowledge system driven by understanding, comprehension, invention, contemplation and thinking. In other words, when a society suppresses individual rights for freedom of expression, sciences, inventions and innovation then the society is left with "those scientists who specialize in the fields of halal and haram."[24]

Muslims need to have a good understanding of the relationship between religion and science in order to create a culture for scientific development. The Muslim mind must be re-oriented to adapt to the new age by accepting the fundamentals of scientific philosophy in order to become creative and productive. Muslims acquire technology and science to bring comfort to their lifestyles. To Muslims, science means consumer goods and not the underlying philosophy of its construction. The Muslim mind fails to understand that

24. For details, see Khalid Alnowaiser, "The problems facing Muslim nations," *Arab News.com*, accessible at http://www.arabnews.com/columns/problems-facing-muslim-nations.

scientific development brings with it a new system of moral values, a new culture and psyche and a new worldview."[25]

Ineffective leadership in Muslim countries has also weakened the capabilities of the society's institutions to support acquisition, dissemination and creation of knowledge. Many Muslim leaders blinded by western culture and civilisation (which they ironically have identified as the "external sources and causes of our dilemma") have, as pointed out by al-Attas, become the enemy within. According to him, "If the underlying principles and methods of these sciences are not made subject to some kind of Islamizing formula whereby they are rendered harmless . . . they would continue to be harmful to the Islamic welfare of the community."[26] It is important that we learn the knowledge and wisdom exemplified by our leaders in the past and make use of them to further contribute to knowledge in the future. The United Nations, concurring with this, asseverates:

> [L]essons learned from this history of indigenous and acquired knowledge during the early Arab scientific and linguistic renaissance were not enlisted when the modernization of science became a central question in the Arab world. Attempts at scientific modernization by Muhamad Ali and Gamal Abdel Nasser during the 19th and 20th centuries respectively neither drew nor built upon this legacy. Instead, leaders turned to imitating what the West offered. Neglecting this heritage and settling for the pragmatic importation of science and technology from 19th century Europe—an approach that still dominates the minds of officials and reformist intellectuals today—was a missed

25. Arshad Mahmood, "Muslims are not against Science and Development," accessible at http://www.viewpointonline.net/islam-today.html.

26. See an article entitled "Knowledge and Adab" available at www.al-balagh.net/education/objectives_of_islamic_education.shtml, which is claimed to be an abridgement of Syed Muhammad Naquib Al-Attas's introduction to *Aims and Objectives of Islamic Education* (Jeddah: King Abdul Aziz University, 1978).

> opportunity, historically, and likely created a significant impediment to establishing a knowledge society in the modern Arab world.[27]

Intellectuals in the Muslim World are preoccupied with politics at the expense of scientific studies and intellectual products. This, in turn, has created societal obstacles to knowledge production "arising from ideological conflicts between different political currents."[28] For example, in the case of Islamisation of knowledge, some intellectuals may not be willing to study history and current scientific issues at the same time. That the Islamic knowledge model is in the process of construction represents an opportunity to rethink the intellectual basis for building knowledge societies in Muslim countries. Muslims should incorporate scientific thoughts into the indigenous Islamic knowledge system to reconstruct new Islamic knowledge models capable of supporting the formation of knowledge societies. Weak demand for knowledge in most Muslim countries inflates the knowledge gap with other countries. Governments in Muslim countries think more of establishing power over knowledge than in using knowledge to empower the economy. Thus, re-orienting the minds of leaders from a single-minded obsession over exertion of power to a focus on knowledge creation and dissemination is essential to enable development of a knowledge economy.[29]

On the organisational level, the supply of knowledge depends on the institutional structure of the state and, therefore, the state plays a key role in creating and disseminating knowledge in society. As Khalid Alnowaiser points out: Islamic nations can achieve progress if they appreciate thinking and

27. *Arab Human Development Report 2003*, 44.
28. For details see ibid., 45.
29. Seyyed Ḥossein Naṣr, *Knowledge and the Sacred* (New York: State University of New York Press, 1989).

are willing to ask questions about all aspects related to life. He said,

> We must turn the page on extolling religious dogma that breeds ignorance and fear of the future, especially when we have the great religion of Islam which is valid and applicable in every time and place. There is no question that Islam, as revealed to believers in the Qur'an, is a true miracle but only for those who are open to change their mindset and embrace critical thinking. Let us hope future generations, if we cannot,will emerge to lead us toward a brighter future![30]

Economic Development in Muslim Countries

Recent trends in development studies have examined the importance of knowledge and innovation in accelerating the process of economic growth, improving living standards and building knowledge societies. In this age of global interconnections, knowledge has become easily accessible through trade, investment, technology transfer and social networking. Taking advantage of the new economy requires nations to construct effective strategies and build institutional and technological infrastructures in order to strengthen the fundamentals for knowledge acquisition, application and creation. In the new economy, economic growth is no longer driven by natural resources and financial endowment but rather by the creative minds of the people. Recent experience with development has shown that economic growth is positively correlated with investment in education and human capital development. Japan, South Korea, Singapore and Taiwan are among few successful economies that invested in human capital to tap human knowledge, support rapid economic growth and build knowledge-based economies. These countries were

30. See Alnowaiser, "The problems facing Muslim nations."

able to create value by exploiting the minds of their people to produce new knowledge, develop new products and invent new technologies.[31]

Muslims, on the other hand, continued to voice doubt concerning modern scientific knowledge, especially Western knowledge, stigmatised as being secular and materialistic. Such attitudes have led to the widening of the knowledge gap between Muslims and non-Muslims forcing the former to import technologies and scientific products from the latter. In Muslim countries, emphasis on education is directed toward social and religious studies with little attention paid to science and technology. In addition, lack of individual freedom and equal opportunity discourage Muslim contribution in Muslim countries to scientific studies through research and development and innovation. Educational institutions in Muslim countries stifle creativity by disallowing critical thinking and philosophical debate. Modern philosophy has been rejected in some schools of thought on the ground of its divergence from religious teachings. Imposing such constraints on thinking has kept the Muslim mind far from becoming creative and productive in the search for new ideas and inventing new products. Today, Muslims lag behind in almost every category of scientific thought and modern knowledge unable to re-orient their minds to contribute to the well-being of their societies through knowledge creation and learning.[32]

31. Osman Bakar explains in detail the role of economics from an Islamic perspective in relation to modern development. See his "Economics as a Science: Insights from Classical Muslim Classifications of the Sciences," *Islam and Civilisational Renewal* 1, no. 3 (2010).

32. Most Muslim countries have adopted Western theories for development without some modifications to meet their development needs. As pointed out by the World Bank,

> Too many developing countries are uncritically adopting the OECD model of technological development, and too many development institutions are unwittingly aiding and abetting this process. Technology policies in OECD countries generally focus on expanding the frontiers of scientific research.

In a rapidly changing world, economic survival depends on the nation's ability to compete in the global markets. The new economy, driven by globalisation, is a knowledge-based economy which requires production and use of knowledge in productive sectors. Building a competitive capacity underscores the importance of creating of new ideas, new technologies and new knowledge. Unfortunately, most Muslim countries are "passive technology learners" that rely mainly on use of imported technologies without making efforts to adopt, upgrade and modify them in order to produce their own. As a consequence, Muslim countries have not been able to build capacity for innovation similar to that of "active technology learners" which, in turn, reduced these countries capabilities to speed up the process of socio-economic transformation.

The benefit of a nation from technology transfer is to acquire and learn how to make use of imported technology in order to support local enterprises acquiring knowledge and know-how for creating new methods. Speeding up the process to close the knowledge gap requires Muslim nations to work collectively to build capacity that uses, absorbs, upgrades and adapts new technologies to strengthen creativity and innovation. Achieving these objectives cannot be realised without investment in research and development as well as in

> This OECD model is based on the race to gain a competitive edge by developing new products based on new, frontier technologies. This makes sense for OECD countries, where many firms compete by embedding these emerging technologies in products that are new to the world or by using new scientific knowledge to improve existing products. This model has been exported to the developing countries, where it has the unfortunate effect of encouraging them to focus on such inappropriate targets as the number of patents filed at the U.S. Patent and Trademark Office or the share of GDP devoted to R&D . . . . What is referred to as S&T in most developing countries is often reduced R&D, rather than innovation. The process of innovation focuses on the diffusion of existing knowledge through goods and services and often relies on existing knowledge.

See *Science, Technology and Innovation* (Washington: World Bank, 2005), 51.

education and training aimed at creating new knowledge that can be used to support locally-produced new products.

For Muslim countries to improve their socio-economic status, they need to adopt appropriate policies driven by strategic objectives and clear vision. Countries are classified according to their stages of development which reflect the economic condition as well as the policy choices for promoting growth. For example, in stage one, economic development is factor-driven implying that these countries can compete on the basis of their factor endowments, mainly unskilled labour and natural resources. Productivity remains low and this keeps wages and income similarly low. The overall performance of the economy, in this stage, depends on the functioning of public and private sectors, stable macroeconomic policies and adequacy of infrastructure. Among the important features that distinguish these countries are low productivity and low wages; development depends on locally-produced inputs employing low-technology, traditional methods used mainly in production of primary products with volatile markets. Stage 2 represents a more advanced stage driven by efficiency enhancers including higher education and training; technological readiness, market size, financial markets development, labour market efficiency and goods market efficiency. At this stage, the economy becomes more competitive by producing more efficient production processes and higher quality products. It also produces knowledge that can be used to promote competitiveness (the fundamentals of the knowledge economy). At the final stage, the economy becomes innovation-driven which is associated with high income per capita and production of unique products. The main features of this stage are business sophistication and innovation.[33]

33. See for details, *The Global Competitiveness Report 2010–2011* (Geneva: World Economic Forum, 2011).

Table 2 shows that the majority of Muslim economies are either at Stage 1 or in transition to Stage 2. Only the United Arab Emirates is classified among the economies at Stage 3 reflecting the inability of Muslim countries to advance development and move into higher stages of economic sophistication driven by knowledge and innovation. Such challenges faced by these countries are substantial and require not only rethinking the Muslim mind but also restructuring the entire productive system to enhance Muslim capabilities to create knowledge, diffuse technology, increase skills and close the digital divide. Muslim countries must formulate a strategy capable of exploiting the tacit knowledge by expanding people capabilities to acquire and create knowledge as well as to participate in decision makings. Innovation is a key driver for economic growth which requires the creation of an enabling environment suitable for the local economy.

TABLE 2
Countries/Economies at Each Stage of Development

Stage 1: Factor Driven	Transition from Stage 1 to Stage 2	Stage 2: Efficiency Driven	Transition from Stage 2 to Stage 3	Stage 3: Innovation Driven
Bangladesh	Algeria	Indonesia	Lebanon	United Arab Emirates
Chad	Azerbaijan	Jordan	Oman	
Kyrgyz Republic	Egypt	Malaysia	Turkey	
Mauritania	Iran	Morocco		
Nigeria	Kazakhstan	Tunisia		
Pakistan	Kuwait			
Senegal	Qatar			
Tajikistan	Saudi Arabia			
Yemen	Syria			

Source: World Economic Forum, *The Global Competitiveness Report 2011–2012.*

Knowledge Society and Innovation

Innovation is amongst the important determinant of a creative society and the key driver of economic growth and development.

It enables a society to generate new ideas and produce new products which are essential not only in finding solutions to the challenges facing the new economy, but also enhancing the nation's capabilities to gain access to global markets. Innovation enables countries to reduce the technological gap and increase the capabilities to build a knowledge-based economy. Countries, enterprises and corporations invest to increase intangible assets including technologies, new ideas, organisational know-how and knowledge application. Policy-makers ought to ensure that knowledge is transferred into the economy through the creation of research centres, universities, conferences, and training institutions as well as through knowledge sharing and networking.[34]

Innovation is defined as the "conversion of knowledge into new commercialized technologies, products and processes, and how these are brought to market."[35] Studies showed that, "Strategies for acquiring, adapting, limiting and improving technologies and existing techniques in relation to local conditions are the keys to achieving innovation."[36] In other words, innovations usually produce spill-overs which require the existence of certain local conditions in order for the country to realise the benefits of the new knowledge. In recent years,

34. The United Nations has been publishing new literature on the Creative Economy highlighting the importance of indigenous knowledge in development. Creativity is explained in artistic creativity involving imagination and a capacity to generate original ideas and novel ways of interpreting the world; scientific creativity involving curiosity and a willingness to experiment; and economic creativity involving dynamic and continuous process leading to innovation in technology, business practices, marketing, etc. See for details about the meaning and importance of creativity in economics, *Creative Economy Report 2010* (New York: United Nations, 2010).
35. *2011 World Intellectual Property Report: The Changing Face of Innovation*, WIPO Economics & Statistics Series (Geneva: World Intellectual Property Organization (WIPO), 2011), 23, accessible at http://www.wipo.int/export/sites/www/freepublications/en/intproperty/944/wipo_pub_944_2011.pdf.
36. Ibid., 26.

more active drivers have emerged that caused innovation to take place across and within nations. For their part, Muslim countries should take advantage of the new opportunities and build capacity for innovation.[37]

Nations, throughout their history, have been able through innovation to transform their economies and enhance productivity. In Western economies, innovation is estimated to account for about 80 per cent to economic growth and, therefore, government policies have been the key driver behind innovation in many countries. Governments provide the necessary funding and incentives for research and development to enhance the country's capabilities to develop new ideas, new technologies and new knowledge in order to strengthen the fundamentals for fostering economic growth and to diversify the economy. In 2009, about 2% of global GDP was spent on R&D, 70% of which was in high-income countries. In the rest of the world, the total expenditure on R&D is largely made in the emerging nations including China and India. Of importance to note is that promoting innovation requires investment in knowledge creation. Above all, this includes investment in skills and learning. At the micro-level, similar results have shown that increase of a firm's performance and productivity is linked largely to innovation. In other words, firms that invest in knowledge are able to grow faster and develop new technologies that allowed them to become more efficient and more competitive. Although expenditures on R&D have increased in recent years, the fact remains that the bulk of this expenditure is still concentrated in a few countries.

An important measure used for measuring the performance of the economy to produce knowledge and knowledge products is the share of high-tech products in total

37. See *Knowledge Management Methodology: An Empirical Approach in Core Sectors in ESCWA Member Countries*, prepared by United Nations Economic and Social Commission for Western Asia (New York: United Nations, 2003).

exports of a country. In Muslim countries, the share of high-tech export in total trade has increased in recent years, but the distribution of these exports among various Muslim countries remains uneven. Muslim countries must adopt strategies to diversify the economic structure and increase knowledge content in production process. To compete and increase their share in total world trade, they must develop their own indigenous technology by sharing knowledge and networking. The share of Muslim countries in global manufacturing value-added is miniscule in relation to the potential industrial production in these countries. Currently, the share of manufacturing production in total GDP of Muslim countries account for about 20 percent—relatively low to compared to other developing countries.

High-tech exports, products with high R&D intensity, are used as indicators for building knowledge-based economies. In 2007, world high-tech exports reached to $1.7 trillion, 70% of which came from developed countries. The Muslim export share of total world exports accounted for 4.3% with Malaysia and Indonesia together accounted for about 94% of the total high-tech exports of all Muslim countries combined. This evidences the inability of Muslim countries to diversify their economies and increase the share of manufactured production in total output.

Increasing knowledge capabilities and enhancing innovation requires Muslim countries to strengthen cooperation among member states involving the opening of new channels of collaboration. The Muslim World possesses substantial financial and human capital resources, which need to be managed in the context of a well-formulated strategy aimed at increasing R&D and innovation. By enjoining innovative activities, Muslim countries could speed up the process of knowledge creation and technology diffusion through better utilisation of existing resources. Collective projects which

increase knowledge sharing and enhance innovation can provide new opportunities for low-income Muslim countries to diversify their economies and gain comparative advantages. Local enterprises can benefit from the demand for domestic inputs to increase production as well as to improve the quality of products. Firms benefit from the new markets generated by the application of knowledge, technology and information.[38]

Rather than being exclusively in the form of technological development, innovation also occurs in the form of cultural practice and organisational management that contributes to the creation of an enabling environment that enhances business practices, improves communications, increases networking and promotes work flexibility. Most Muslim countries have not yet effectively made use of modern ICTs in businesses which impact the capability to gain comparative advantages and compete in the global markets. In relation to the rest of the world, Muslim countries have yet to take advantage of the new opportunities offered by globalisation and gain access to adapting, using and applying the knowledge and information of the global markets. In addition, the institutional structure in most Muslim countries remains inadequate to induce innovation. Governments must identify some of the important productive areas and allocate investment for promoting innovation. Very few Muslim countries have supported building institutions to promote innovation and encourage creative practices to meet the challenges and gain from opportunities.

The vitality in building knowledge capacity for development innovation reflects the ability of the society to create new ideas and mobilise them productively. In doing so, innovation increases economic capabilities to generate linkages and foster economic growth by increasing both technological

38. See for details, *Innovation: Applying Knowledge in Development*, UN Millennium Project (London: Earthscan, 2005), accessible at http://www.unmillenniumproject.org/documents/Science-complete.pdf.

learning and R&D that drive economic diversification. In Muslim countries, weak organisational, institutional, managerial and financial support for R&D has stymied innovation. In other words, the role of the private sector has been marginalised as a result of its inability to contribute positively to economic productivity. Meagre incentives and outdated technical facilities discourage enterprises from conducting research and developing new products. Generating self-sustaining cycles of innovation, the *sine qua non* of the knowledge-based economy, mandates investments in science and technology as well as strengthens the fundamentals for knowledge production, knowledge sharing, knowledge distribution and knowledge creation.

Strategies for building innovation industrial sectors become essential for promoting manufacturing production and building knowledge-based economies in Muslim societies. A number of steps must be taken to implement such strategies and induce innovation. Governments must take the initiatives by directly contributing to building innovative capacity capable of empowering the economy through the development of new ideas, new technologies and new knowledge. A strategy for innovation must comprise the following elements:

1. The creation of an enabling economic and institutional environment that provide support and incentive to individuals, enterprises and institutions to participate in knowledge creation and innovation. Such an environment must encourage businesses to innovate as well as facilitate innovation by ensuring competition, procurement, creativity, and financial support.
2. Investment in skill creation and training to enhance technological advancement and facilitate innovation. Human capital development plays a

determining role in the absorption, application, and diffusion of new knowledge and technologies. Educational institutions including universities promote research which represents the driver for creativity and innovation. In the new economy, technological learning becomes vital for adaptation and upgrading new technologies. Muslim countries must invest in building technological capacity to ensure knowledge acquisition and technology diffusion. Muslim countries must also learn how to run modern organisation by acquiring entrepreneurial skills in order to become efficient and competitive.

3. Industrial innovation infrastructures which are related to the ability of enterprise to gain access to skills, R&D, knowledge and information about the market. Global competition is a learning process that requires enterprises to communicate and exchange information. Industries rely on local as well as external markets for ideas and techniques that can provide solutions to problems. Thus, connecting industry to universities and research centres facilitates innovation by allowing industries to apply new ideas and new techniques. In such a case, ICT becomes vital for helping enterprises to share, absorb and acquire knowledge as well as in coordination and organisation of global activities.
4. Political Leadership. Speeding up the process of industrial development and innovation require an effective strategy capable of making good use of existing resources and provide incentives for promoting knowledge creation through innovation.

Muslim countries need to create culture for innovation by building first-class educational institutions and research centres in order to reverse brain drain and utilise existing professionals. The UN states that, "Investment in science, technology, and innovation education has been one of the most critical sources of economic transformation in the newly-industrial countries,"[39] in particular, higher education, which is considered as a determining factor in knowledge creation and innovation. Muslim countries should adopt curricula that strengthen scientific and technological education in order to meet shortages of scientists and engineers needed to support scientific research and innovation. This is because,

> Having knowledgeable people is not enough, however. If investments in science and technology are inadequate, scientists and engineers will have few opportunities to apply what they have learned. The acquisition of knowledge and opportunities to apply it creatively are two inseparable parts of the learning process.[40]

The Global Innovation Index (GII) ranks countries on parameters such as human capital, institutional infrastructure and business sophistication. In most advanced countries, innovation proven to be a key enabler for wealth creation, global competitiveness and development advancement. Unfortunately, most Muslim countries are lagging behind the industrialised countries in creativity and innovation. Both of these features are products of people capabilities to invent and discover new methods that increase productivity and promote knowledge creation. Exploiting people potential requires greater investment in education, skills, technological learning and collaboration among business, universities and global institutions. Muslim countries are consumers of technological,

39. *Innovation: Applying Knowledge in Development*, 88.
40. Ibid., 92.

scientific and productive ideas, mainly of Western origin, to support knowledge creation and technological diffusion at home.

TABLE 3
Innovation Input and Output/Selected Countries

Country	Innovation Input	Innovation Output	GII Scores
United States	5.40	3.74	4.57
Hong Kong	5.12	4.54	4.83
Singapore	5.43	3.88	4.65
South Korea	4.73	3.74	4.24
United Arab Emirates	4.64	3.31	3.98
Malaysia	4.51	3.04	3.77
Kuwait	3.83	3.29	3.56
Qatar	4.36	2.73	3.55
Bahrain	4.18	2.56	3.37
Saudi Arabia	4.16	2.15	3.15
Jordan	3.90	2.27	3.08
Turkey	3.67	2.30	2.99
Indonesia	3.62	2.27	2.95
Egypt	3.45	2.37	2.91
Nigeria	3.17	2.21	2.69
Pakistan	3.10	2.24	2.67
Morocco	3.33	2.14	2.74
Bangladesh	2.88	2.16	2.52
Algeria	2.70	2.29	2.50
Syria	2.72	1.54	2.13

Source: Global Innovation Index 2009–2010, *www.globalinnovationindex.org.*

Among the top countries that were able to rank high in the GII are Singapore, Hong Kong, Finland, Sweden, Denmark, New Zealand and Iceland. Table 3 illustrates the performance of various economies based on their ranking in the global innovation index. As the table shows, with the exception of a few Muslim countries, the vast majority are scored low in both innovation input and innovation output. This reflects the challenges facing Muslim countries to rethink their strategies and formulate policies to induce innovation and create

knowledge for development. Building knowledge societies depend on the country's capabilities to produce knowledge and develop new technologies to strengthen the foundation for knowledge absorption and knowledge application.

Globalisation and Acquisition of Knowledge

In most developing countries, including that of Muslims, the environment for building creative and productive system remains inadequate for rapid advancement in science, technology and innovation. These countries, however, can enhance productive capacity by making use of global technologies through increasing trade, investment, networking and exchange of scientific and technological ideas. In recent decades, technological globalisation has improved technological diffusion through technology transfer and activities of multinational corporations.

The challenge facing Muslim countries is to create an enabling environment capable of making use of the global knowledge. By doing so, Muslim countries will be able to cultivate external knowledge through buying international technologies or providing incentives for multinational corporation to set up local production facilities. Enterprises, individuals and national governments should take advantage of the global knowledge system by investing in education and technological learning in order to facilitate the exploitation of global knowledge.

Technological collaboration among Muslim countries in this age of globalisation has also become important where research centres and exchange programmes can be established in various Muslim countries to conduct joint research aiming at exploiting both the global and local knowledge systems. Muslim countries are rich in financial, human, physical, technical and entrepreneurial resources which can be collectively utilised to

diversify productivity and promote knowledge creation. Public policies in these countries should encourage the creation of an enabling environment for knowledge sharing that enhances interactions among various economic agents driven by a vision to strengthen collaboration and build knowledge society.

In this age of globalisation, knowledge is global goods which can be acquired and used by individuals, enterprises and nations. In particular, the developing countries are at an advantage to make use of global knowledge as a substitute for locally-produced knowledge to close the knowledge gap. Countries with limited physical and human capital resources can accelerate the process of development through access to global knowledge, skills and technology. Globalisation has improved factor mobility, increased global trade and permitted technology transfer. Meeting the challenges of globalisation entails building institutional infrastructure, stock of human capital and technological learning to facilitate knowledge absorption and adaptation of foreign technologies. Building such a capacity allows Muslim countries to accelerate the process of modernisation by surpassing several stages in their development.

For an economy that depends on knowledge-based industries, the demand for knowledge becomes an ongoing process needed to support the dynamic process of knowledge creation. High linkage effects increase incentives for institutions, including universities and research centres, to produce more knowledge in order to meet rising demand. As a consequence, the demand for knowledge workers and technical skills to meet industrial growth and manufacturing production will increase, thus causing more investment allocated for human capital. Across the Muslim world, the intensity of knowledge-based industrial production varies reflecting the inadequacy of the technological and institutional capabilities for building knowledge-based capacity. Under

such circumstances, Muslim countries should allocate a greater share of investment expenditure to sectors that have high potential for innovation. For example, oil and gas industries could be promising if more investments are channelled towards the development of knowledge-based industries that will add value to the knowledge-based economy.[41]

Knowledge absorption, application and creation occur more rapidly in economies where industrial production and manufacturing goods account for a sizable share of the country total output. As in Colonial times, the mainstay of the economies of Muslim countries, notwithstanding the attainment of political independence, revolves around production of primary products involving mainly extraction of natural resources. Science and technology are imported. Economic growth in the new economy is no longer dependent on natural resources; but on creativity and innovation driven by new ideas, skills, technological learning and knowledge. Under such circumstances, emphasis in the new economy should be directed toward exploiting the human mind in order to produce creative ideas and support innovation. The wealth of a nation is stored in the minds of its people which must be cultivated to sustain the dynamic process of the knowledge society.[42]

Building capacity for development depends on infrastructure to support technological learning, knowledge creation and innovation. Harnessing new technologies and its rapid diffusion could not have happened in recent decades without building infrastructure in ICTs. These technologies have increased linkages among firms, educational institutions,

41. See *Technology and Innovation Report 2011: Powering Development with Renewable Energy Technologies*, United Nations Conference on Trade and Development (UNCTAD) (New York: United Nations, 2011), accessible at http://unctad.org/en/docs/tir2011_en.pdf.
42. *World Development Report 1998/99: Knowledge for Development* (Washington: World Bank, 1999), which examines in detail the importance of external knowledge in development.

public enterprises and global markets. Gaining access to outside markets through networking and outsourcing has increased knowledge dissemination as well as enhanced local enterprises capabilities not only to upgrade foreign technologies, but also to make use of indigenous knowledge. Similarly, attracting foreign direct investment and encouraging multinational corporations to transfer skills and knowledge into the local economy. Thus, through building infrastructure, Muslim countries will be able to accelerate the process of knowledge acquisition and transfer technology that can be used to advance the local knowledge ingredients including that of the scientific, technological and human capital developments.

Gaining access to global knowledge requires linking global markets with the local enterprises and educational institutions. Digital connectivity involves building ICT infrastructure to enhance access to external knowledge and information which can be used to support technological learning and innovation. Networking technology allows Muslim countries to benefit from new economic opportunities offered by globalisation. In this regard, ICT will become a powerful tool which enables these countries to acquire knowledge and skills to enhance their capabilities and solve their problems. Also, ICT could be a facilitator for sharing knowledge and exchange ideas to foster growth and strengthen the foundation of building a knowledge society.

The global knowledge system facilitates the utilisation of the indigenous knowledge system by increasing the productivity and adaptability of domestic inputs consonant with technological change. Broadening the country's capacity to absorb scientific and technological inputs requires good understanding of the country's needs and the ability to upgrade imported knowledge to meet the country's technological requirements. Above all, leadership is vital for building knowledge society which can be instrumental in constructing

and implementing strategies and executing projects aiming at creating knowledge and providing the necessary support for strengthening the ingredients for building a knowledge society. Muslims are lagging behind on all these objectives which make the challenges ahead far more difficult to be realised.

Conclusion

In this article, a brief assessment of some of the issues that includes building a knowledge society in Muslim countries has been discussed. The new society, driven by the recent changes in the global markets, depends on knowledge creation, innovation and information dissemination to foster rapid socio-economic transformation and sustain development. The Muslim World is still lagging behind its Western counterparts in production and use of knowledge that reflect the weakness of knowledge systems in Muslim countries to support, let alone sustain, rapid economic growth. The challenges facing Muslim countries are multidimensional comprising inadequate strategy for science and technology, low investment in human capital, weak infrastructure, paucity of incentives to promote R&D, ineffective institutions, corrupt and ineffectual leadership and political differences. Until these inadequacies and shortcomings are addressed, the prospect for Muslim states to establish knowledge economies is mainly bleak.

Irrespective, building knowledge societies should not be isolated from the indigenous knowledge system of the local community in terms of cultural, religious, social, linguistic and environmental features of society. The new society must integrate the local knowledge system into the development model in order to ensure that indigenous knowledge contributes to the advancement of the knowledge society. Undoubtedly, scientific progress and modern technologies contribute greatly to development; however, the construction

of a knowledge society involves much broader social, cultural, ethical and political elements. Under such circumstances, building a model for development without integrating the applicable local knowledge system can only backfire—aborting the creation of a genuine knowledge economy. The purpose of Western technologies is to strengthen the components of the local knowledge system—not to substitute for it—involving absorption, application and creation of knowledge through adapting foreign technologies for local development. The knowledge society represents a new approach for rethinking development in a way that mandates restructuring the productive structure to ensure the contribution of the indigenous knowledge system.

In most Muslim countries, encumbrances impeding development revolve particularly around lack of adequate educational, institutional and technological infrastructures to capture and codify tacit knowledge, which is notoriously difficult to diffuse. Without harnessing tacit knowledge, the balanced and sustained development promised by the knowledge economy will remain beyond the reach of Muslim countries. Establishment of international networks that cultivates local knowledge and shares experiences for supporting development holds out a viable prospect for Muslim countries to effectively mobilise and diffuse tacit knowledge through collaboration provided that political differences, among Muslim countries, can be transcended.