DEVELOPING A MASTERY - HUMILITY CONVERGENCE MODEL FOR A TAWHIDIC - BASED ENGINEERING CURRICULUM

BY

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ABSTRACT

This thesis addresses the void in the spiritual dimension in the Madinah Accord meant for substantial equivalence of accreditation to recognise undergraduate engineering qualifications in Muslim countries. The Cartesian dualism exists in the curriculum despite its name perpetuating a disconnect between the Creator and the created. For realignment, the doctrine of *Tawhid* is regained and intellectually reconstructed utilising *Bil-Mizan* (balance) concept to be comprehended and translated into actions by the present generation. The research adopted the Mixed-Methods Exploratory Sequential Design Approach utilising interviews and document analyses followed by questionnaire survey involving academics and students of two local universities. The enquiry was driven by the Straussian grounded theory to reach the theoretical saturation point. The research questions addressed mastery, humility and their convergence. Before the primary interviews, piloted interviews and survey were performed. The main interviews then documented 30 transcripts and uploaded as open, axial and selective codes using NVivo. Six constructs with 24 items were developed for the main questionnaire survey receiving 507 responses. Using SPSS Amos, the construct validity achieved CFI .963Ó.95, TLI .956Ó.90 and RMSEA .068Ò.08. Upon verifying the measurement model, SEM then confirmed the theoretical proposition (HC), that mastery and humility formed the converging variable. The second hypothesis (HM) relating mastery with IDP was significant, but the third hypothesis (HH) relating teaching modules with humility was insignificant. In conclusion, the theory is grounded in the data. The convergence occurs when all things are at their correct positions. This condition, achieved by wisdom manifested by ó*adab'* (proper conduct), is defined as justice thus assuring stability. Allah (SWT) as *Al-'Adl* (Justice) and *Al-Khalik* (Creator) governs this condition. An engineer with ó*adab*ô as an *'abd'* (servant) and *Khalifah* (vicegerent) on earth can become closer to Him through his engineering design. A *Murabbi* academic can incorporate both of His names in statics as in reinforced beam and dynamics in colloids settling.

خلاصة البحث

تتناول هذه الأطروحة الفراغ في البعد الروحي في اتفاق المدينة المنورة الذي يهدف إلى تحقيق معادلة كبيرة نحو الاعتماد للاعتراف بالمؤهلات الهندسية الجامعية في البلدان الإسلامية. توجد الثنائية الديكارتية في المناهج الدراسية على الرغم من أن في تسميتها إدامة انقطاع بين الخالق والخالق. لإعادة الاصطفاف، يتم استعادة عقيدة التوحيد وإعادة بنائها فكريا باستخدام مفهوم بل ميزان (التوازن) لفهمه وترجمته إلى أفعال من قبل الجيل الحالي. واعتمد البحث على ج التصميم المتسلسل الاستكشافي المختلط باستخدام المقابلات وتحليلات الوثائق التي تليها استبيانات شملت أكاديميين وطلاب جامعتين محليتين. وكان الدافع وراء التحقيق نظرية شتراوسية على الأرض للوصول إلى نقطة التشبع النظرية. وتناولت أسئلة البحث الإتقان والتواضع وتقار ا. وقبل إجراء المقابلات الأولية، أجريت مقابلات استقصائية وتجري على أساس تجريبي. ثم وثقت المقابلات الرئيسية 30 نسخة وتم تحميلها على أ ا رموز مفتوحة ومحورية وانتقائية باستخدام NVivo. وجرى وضع ست ثوابت تضم 24 بنداً من أجل الاستبيان الرئيسي الذي تلقى 507 ردا. وباستخدام SPSS Amos، حققت الصلاحية الإنشائية CFI.963Ó.95و TLI.956Ó.90 و .RMSEA 068Ò.08. وعند التحقق من نموذج القياس، أكدت تحليل SEM بعد ذلك الاقتراح النظري (HC)، وهو أن الإتقان والتواضع شكلا المتغير المتقارب. الفرضية الثانية (HM) المتعلقة بالإتقان مع النازحين داخلياً كانت كبيرة، لكن الفرضية الثالثة (HH) التي تتعلق بوحدات التدريس بتواضع كانت غير ذات أهمية. في الختام، تقوم النظرية على البيانات. والتقارب يحدث عندما تكون كل الأشياء في مواقعها الصحيحة. هذا الشرط، الذي تحقق بحكمة تتجلى في "أدب" (السلوك السليم)، يعرف بأنه العدالة مما يضمن الاستقرار. الله (SWT) المتصف بالعدل (العدالة) والخالق يحكم هذا الشرط. يمكن للمهندس الذي يحمل "أدب" بصفته عبد (خادم) وخليفة على الأرض أن يصبح أقرب إليه من خلال تصميمه الهندسي. ويمكن للأكاديمي المربي دمج كل من أسمائه الحسنى في ساكنات كما هو الحال في وتعزيز وديناميات الحزم في تسوية الدمج.

APPROVAL PAGE

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DECLARATION

I hereby declare that this thesis is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

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CHAPTER ONE

INTRODUCTION

The education of an engineer consists of formal and informal training. The former comprises of primary, secondary and tertiary forms of education. The schooling periodôs duration is the same for many countries, Malaysia included, namely 12 years before entering the University for a four-year Degree Programmes in any engineering disciplines (EAC, 2020). The focus of his/her studies in the primary and secondary stages should be preferably in mathematics and science because engineering by definition is simply the utilisation of forces for the public good (ABET, 1986) and forces are represented by mathematical, scientific and/or physical models (Isaac Newton, 1643-1727).

Like other professionals, the informal part of the education consists of unstructured training, although preferably following a mentor-mentee arrangement. After several years of working experience, he/she will sit for the Professional Interview as a process before being certified as a Professional Engineer (IEM, 2018).

A curriculum is guided by an intention to educate, executed through training to meet its objectives and intended outcomes (Ralph, 1949). Thus locally, the engineering curriculum must comply with the Engineering Accreditation Council (EAC) requirements for it to be acceptable by the Board of Engineers of Malaysia as a graduate engineer (BEM, 2016). The curriculum is to be designed to follow a general path of shifting the emphasis from engineering science and principles from the beginning towards more integrated studies at the end (EAC, 2020). The graduates are being prepared to solve órea-worldô problems in the workplace. Besides technical

competency, the students are expected to acquire soft skills and be ethical (IEM, 2018). The curriculum is, therefore designed based on this framework.

1.1 BACKGROUND OF THE STUDY

Like many countries in the Muslim world, historically, the Malay Peninsular and Southeast Asia were colonised by the Europeans with the Portuguese, who established themselves by capturing Malaccan Sultanate in 1511, Dutch in 1641 (Moen, 2020). The Dutch ceded Malacca to the British in 1824. The Japanese occupied the then British Malaya from 1941 to 1945. The British returned in 1945 and ruled until 1957, when Malaya gained independence in 1957. Summing up, the colonisation period spanned 446 years, which has impacted the population both physically and mentally (Rahimin et al., 2009). Undeniably, the process of reducing the impacts involves the religious discipline, social science and science itself. However, Rahimin et al. (2009) believed that there are two main groups concerning science and technology issues.

The first group in the country was very sceptical towards Western science and technology to a large degree but forgetting on efforts to develop the Islamic science and technology framework (Mohd Hazim Shah, 2004). This scientist-scholars group preferred on the nostalgic paradigm of the great achievements of the Islamic science civilisation of the past in rhetoric forms without developing any programs for an appropriate Islamic science and technology framework (Hashim Musa, 2004).

The second group consisted of those scholars and scientists who held strongly on the British legacy. They believed in the knowledge of science and technology that came from the West without any reservation (Baharudin Ahmad, 1994), without due diligence at epistemology level, in other words on the ónature and a way of acquiring knowledgeô (*Al*-Ghazali) (1058-1111). It fitted well with Ibn Khaldunôs views (1332-

1406) on the subservient mentality held by people, who were once colonised. They believe in the colonialistsô supremacy, and whatsoever they should be emulated (Zainal Abidin, 2002). Furthermore, Syed Hussein *Al*-Attas explained this mentality as ócaptive mind mentalityô, a pro-Western attitude held by Malaysian society. Some of their views are): (a) Clinging irrationally to all values from the West, (b) Unable to generate any new approach or to be creative to solve real-life problems instead preferring to rely on the legacy of the colonialist, (c) Being educated in the West they are always full of admiration towards Western theory and literature, (d) Not being critical and rarely oppose anything that comes from the West and, (e) Not realising the short-coming of their ócaptive minds mentalityô (Syed Hussein Al-Attas, 2005).

Between the 1960s and 1980s, just like any developing countries that have gained independence, all efforts were focused on uplifting the countryôs status to be better than the pre-independent period. The route taken was to imitate the Western modernisation framework (Baharudin Ahmad, 1994). It was confined to the concept of Western modernisation at the macro-level and materialism (Muhammad Syukri Salleh, 1990) and scientific-rationalism overtaking the way of thinking of traditionalism held by the Eastern society (Abdul Rahman Abdullah, 2001). This imitation culture led to various policies, mainly the New Economic Policy, which emphasised science in education (Hairudin Harun, 2001). Many students were sent overseas to study science and engineering, he wrote. At the end of the ó70s and early ó80s, a large crop of graduates had returned and formed a bulk of highly literate and professional middle-class society. Without denying modernism policyôs success by its heavy emphasis on science and technology from the Western, it has led to a serious intellectual crisis. Many of them were involved in questionable and unethical practices (Muhammad Kamal Hasan, 1996).

Imitating the West blindly has hindered the Muslim world from pursuing to develop its science and technology system to reflect the identity of the Muslim culture (Habib, 2006). Fascinated by the West, it was envisaged that importing secular schools would achieve growth in the economy and its strength of politics. However, there was a mismatch when the imported secular systems were ingrained in the heart of Islamic traditional societies resulting in churning out a group of educated individuals but culturally detached from their own society and the intellectual legacy (*Al*-Zeera, 2001).

The secular education system weakened the comprehensive and unifying understanding of knowledge from Islamic worldview since religion is offered as a separate subject within the curricula isolating it from its relationship to culture, science and other fields. In the Islamic paradigm, religion encompasses being indispensable to every subject and every feature of the educational process (Wan Mohd Nor, 2013). It is the unity between ótraditional sciencesô (*Al-ulum Al-naqliyyah*) and óIntellectual-rational sciencesô (*Al-ulum Al-aqliyyah*) and the balance between them that ensures the preservation of Islamic epistemology, the (oneness) epistemology in its entirety (Bakar, 2012). With the introduction of modern secular education, other epistemological branches like ópositivism, evolutionism and scientismô were embedded instead. Sidek (2019) said the crisis of knowledge, in other words, the idea of ótime of great danger or troubleô, resulted from the disintegration of *Ulum Naqliah* and *Aqliah*. Bakar (2012) mentioned that the ótime of great danger or troubleô for the *Ummah* has turned for the worse during the colonial period when the surviving elements, that is, eroded values of Islamic thoughts of *Tawḥid*ic epistemology were further marginalised in Muslim education in favour of modern secular education. The Muslims were not aware of the impacts of Western-originated

epistemologies such as positivism (only scientifically proven), constructivism (reality experienced by the learner) and relativism (morality relative to oneôs culture) on Islamic thought (Bakar, 2012).

As far back as in 1978, Naquib *Al*-Attas has said that ñmodern western knowledge is infused with western secular values and associations leading to Muslimôs loss of identity and inability to realise Islamic faith and values. The secularism and the educational systemôs dualistic nature have been perpetuating error that will lead to Ummatic identity loss (Bakar, 2012).

Bakar (2012) views the crisis of knowledge as fundamental, comprehensive and multi-dimensional in nature that leads to the Ummatic crisis and the contemporary Muslim societal problems, on all sides of the spiritual-moral, intellectual, political, and sociocultural. The Muslim world is rooted from the problem of educational dualism and disintegration between *Ulum Aqliyah* (rational knowledge) and *Naqliyah* (transmitted knowledge) (two streams of education) and between *Umara*ô (leaders) and *Ulama*ô (religious scholars) (Sidek, 2019). In describing the nature of this ócrisis of knowledgeô, Naquib *Al*-Attas (1993), identifies the modern Western culture as the source of this challenge which leads to the corruption of knowledge, loss of *Adab* (noble manners) and to be appeared as a neutral or value-free phenomenon in Muslim Education system and society.

It was only in the 1970s that there was a turning point for the better for the *Tawḥid*ic epistemology in the modern period (Bakar, 2012). He said in the period between 1970-1980, there were events like the 1975 First Islamic World Conference on Science and Technology in Riyadh, the 1977 Islamic Conference on Islamic Education in Mecca, and the 1979 Iranian Revolution Among these events, he highlighted the 1977 Conference on Islamic Education which was instrumental in

generating a revival in developing further the all forgotten dimensions of *Tawḥid*ic epistemology. It was extremely significant for the reconstruction of education in Muslim societies. The meeting, a major landmark in Muslim education with over 350 Muslim scholars from various academic fields taking part presenting papers, tried to analyse the problems facing education, determined aims and objectives and to work out policies and programmes for the realignment of Muslim education to meet the challenges ahead. It was essentially meant to bring back into the Muslimsô education its true form of the Islamic vision from which it had been detached, deciding to take action on significant and pivotal recommendations including the Islamisation of knowledge (Ghulam, 2000).

Education could not be Islamised without first defining the Islamic epistemology and the methodology of Islamisation of all education areas (Ghulam, 2000). The integration of the Revealed Islamic sciences and the Acquired, secular sciences under Islamisation of Knowledgeôs overall vision was carried out by institutions and individuals (Sidek, 2019; Solehah and Rahimah, 2008). Various workers made attempts at the pre-school (Hamdi, et al., 2012), secondary schools (Khalija, et al., 2011) and the university (Ssekamanya, et al., 2011) in Malaysia.

However, different scholars differ on steps to be applied in the Islamisation of Science, suggesting different approaches and methodologies. The rationale of the Islamisation of Science has been accepted by many Muslim scholars (Syed Muhammad Naquib *Al*-Attas, Ziauddin Sardar, Ismail Faruqi, Osman Bakar, Shaharir Mohamad Zain, and Wan Mohd Nor Wan Daud) (Mahadi, et al. 2016). It seems there is no agreed method, however on how the actual Islamisation of knowledge occurs today. Although the 1977 Mecca Conference, the óintegration of knowledgeô has been the mainstay of the approach, it remains unclear how it is to be done.

In the 1977 Conference, engineering had been categorised as Acquired or Empirical knowledge. It was indicated that the categorisation was intended to assist the Muslims always to design their curricula, making the Revealed Knowledge as compulsory core subjects. The elective subjects and activities have to be taken then from the Acquired category wherever appropriate for schooling levels and differing contexts.

In the case of engineering education at the first-degree level, in 2009, through the Board of Engineers (BEM), Malaysia became a member of the Washington Accord signatories. Becoming a full member of the Accord indicates that Malaysian undergraduate engineering programmes are of the same standard as others in Accord about accreditation systems and criteria (International Engineering Alliance, 2013).

As a result of the membership, Malaysia implements the outcome-based education (OBE) system moving from a prescriptive based education system (EAC: 2020). The OBE is a system of education focusing on the educational process's outcomes to prepare students for engineering practice. There are altogether 12 programme outcomes (Appendix A). The curriculum must meet these outcomes to be accredited, enabling the graduates to enter the industry designated as Graduate engineers by the Board of Engineers, Malaysia (EAC, 2020).

By following the OBE's principles, the undergraduate engineering education outcomes of learning must be concerning themselves with the domains of the cognitive (knowledge and thinking), affective (attitudes and feelings) and psychomotor (skills and doing). Learning outcomes (LOs) must be definite, precise, attainable, quantifiable, doable, realisable, detectable, and noticeable. The education framework must also be arranged in such a way as to include a lower, intermediate, and higher learning level. The OBE system's advantages include nurturing quality