

The Challenges of Developing a Validation Protocol for the New Curriculum of Making 4.0: Between Malaysian and European Education Systems

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This paper discusses the challenges on developing a new program that could be recognised between Malaysian and European countries. It is crucial as it involves readiness for future production toward the Industry 4.0 policies and how it may create innovation in education systems. The essential goal of Industry 4.0 is to make manufacturing and related industries, such as design, faster, more efficient, and more customer-centric. At the same time, Industry 4.0 aims to go beyond automation and optimisation, and detect new business opportunities and models. At this point, frontier technologies identified by select organisations to represent the characteristic of Industry 4.0. However, there is no universally agreed definition of frontier technology. The following technologies have been most commonly identified as frontier: 3D

printing, the Internet of Things, AI, and robotics. The reviews of COPPA between European-Malaysian with the reason to develop a master's degree for engineers of furniture smart factories that will modernise Higher Education degrees. This will be achieved by focusing on the ICTs skill needed to increase the competitiveness of the wood and furniture industry of Malaysia. Comparative studies of the existing frame of references have been selected as the methodology. The results indicate that a framework of qualifications must be fit for purpose. As we can see, what exactly “fit of purpose” entails, depends to some extent on the setting. To put it simply, whether or not a framework is “fit for purpose” depends on its purpose.

Keywords: *Education systems, industry4.0, making4.0, new curriculum, validation protocol.*

Introduction

Recently, the trend in education is rapidly changing due to technological innovation and work demand (see Haseeb, 2018). The framework of the co-creation approach for Malaysian interactive multimedia should be developed (see Jantan et al., 2020). Especially when the Industry 4.0 revolution comes to fruition, the environments for teaching and learning needed adjustment. The term Industry 4.0 refers to a further stage of development in the organisation and management of the whole system of the value chain involved in the manufacturing industry. The Fourth Industrial Revolution is another word for this cycle. The Industry 4.0 concept is widely used across Europe, particularly in the manufacturing sector in Germany. More specifically, in the United States and the English-speaking world, some writers also use the terms Internet of Things , Internet of All, and Industrial Internet. All these words and definitions have in common the understanding that traditional methods of production and manufacturing are in the throes of a digital transformation. Humanity is in the midst of a significant transformation regarding the way we produce products which involves the digitisation of manufacturing with cyber physical systems environment. According to Schwab (2016), this is characterised by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres. The term Industry 4.0 refers to a Fourth Industrial Revolution with four main characteristics:

- 1) The vertical networking of smart production systems, such as smart factories and smart products, and the networking of smart logistics, production and marketing and smart services, with a strong needs-oriented, individualised and customer-specific production operation.
- 2) Horizontal integration by means of a new generation of global value-creation networks, including integration of business partners and customers, and new business and cooperation models across countries and continents.

3) Engineering throughout the entire value chain, taking in to account not only the production process but also the end product (the entire product life cycle).

4) Acceleration through exponential technologies that, while not really new in terms of their development history, are only now capable of mass-market application as their cost and size have come down (e.g. sensor technology) and their computing power has risen massively (Deloitte, 2015). According to Ratnasingam et al. (2020), the lack of knowledgeable and skilled workers to handle Industry 4.0 technology is a concern among furniture manufacturers. It is possible that the proposed university-level Industry 4.0 program may be beneficial to train workers for the future of the industry. Therefore, in order to benefit both consumer and producer, education needs to take part in the trend. The potential courseware should be developed with artistic skills to discover the Technological, Pedagogical, and Content Knowledge components in the design of the courseware (Anuar, Abidin, & Zakaria, 2019). However, in design, the mental images interact in some way with action schema to play a part in the designers' apparently intuitive form giving practice (Abidin, Bjelland, & Øritsland, 2008; Mohamed Kamil, Abidin, & Hassan, 2018). The aesthetics in this perspective can be interpreted as a study of the effect of form giving on human sensations towards the subject of furniture and design, with a particular focus on the courses offered at the university level (Zainal Abidin, Sigurjónsson, Liem & Keitsch, 2008; Abdul Aziz, Abidin, & Anwar, 2019; Anwar, Abidin, & Hassan, 2015). This paper explores how this should be achieved and validated by developing a new master's degree course related to wood and furniture for Industry 4.0, also known as Making 4.0.

Issues of the New Curriculum Development In Malaysia

In this section, three major issues will be addressed by the local institution that wanted to offer the program prior to discussions related to the development of the new program associated with Making 4.0. The three major issues of the new curriculum development in Malaysia involved locus standi, or legal standing, of the program such as National Policy on Industry 4.0, National Timber Industry Policy 2009-2020, and Code of Practice for Programme Accreditation.

National Policy on Industry 4.0

As indicated in the Industry 4WRD: National Policy On Industry 4.0. (Ministry of International Trade & Industry, 2018), from the first industrial revolution (mechanisation through water and steam power) to the mass production and assembly lines using electricity in the second, the fourth industrial revolution will take what was started in the third with the adoption of computers and automation and enhance it with smart and autonomous systems fuelled by data and machine learning. Even though some dismiss Industry 4.0 as merely a marketing buzzword, shifts are happening in manufacturing that deserves our attention. When computers were introduced in Industry 3.0, it was disruptive thanks to the addition of an entirely new

technology (Abidin, Warell, & Liem, 2011). An intangible ecological form model can formulate the change for environmental communication to digitise and screen an intangible ecological form according to extrapolative strategy morphing of the technology (Chumiran, Abidin, Anwar, Vermol, & Sirat, 2020). The criteria, capability, and characteristics (3C) of ecological system with the awareness of producing the recycling product design (forms context) and to help practicing designers identify problems, issues, and gaps in relation to ecological concept using suitable methodologies and its applications (Chumiran, Abidin, & Sirat, 2015; Ali, Khairuddin, & Zainal Abidin, 2013). However, the identification of designers' abilities to perceive, understand, analyse, and reflect in enhancing the value of an existing product by interpreting the design needs from the four attributes of unconscious interaction in everyday human behaviour is lacking in the technological area (Kamil, Abidin, & Hassan, 2019; Abidin, Christoforidou, & Liem, 2009).

Today, as Industry 4.0 progresses in the future, machines are linked and are used to collaborate with each other to make decisions without human involvement. Combining cyber-physical systems, the Internet of Things, and the Internet of Networks allows Industry 4.0 and the smart factory to become a reality. Our factories will become more efficient and productive and less inefficient as a result of supporting smart machines that keep getting smarter as they gain access to more information (Pahl & Beitz, 1996). Essentially, it is these machines' networks that are digitally connected to each other and generate and share information which results in Industry 4.0's true power. While many companies may still question how Industry 4.0 will affect their business or struggle to find the talent or expertise to know how to better adapt it for their specific use cases, several others are currently implementing changes and planning for a future where smart machines are improving their business.

Throughout history, the improvement of industry by migrating from established production methods to utilising cutting-edge technologies. Frontier technologies identified by select organisations (ESCAP, 2018). There is no universally agreed definition of frontier technology. It shows that the following technologies have been most commonly identified as frontier: 3D printing, the Internet of Things, AI, and robotics. In Malaysia, there is several initiatives with regards to Industry 4.0. Some policies include the Development of the National Industry 4.0 Policy Framework Year of 2018, Establishment of Industry 4.0 High Level Task Force year of 2017, Launch of the Centre of Excellence on Industry4.0 year of 2017, Launch of the Digital Free Trade Zone (DFTZ) Initiative and Pilot Project year of 2017, The Malaysian ICT Strategic Plan 2016-2020 year of 2016, Launch of the National e-Commerce Strategic Roadmap year of 2016, 11th Malaysia Plan 2016-2020 year of 2015, National IoT Roadmap year of 2015, National Broadband Initiative year of 2006. Most of the policies describe the similar issues. Some of the issues surround how frontier technologies could support the Sustainable Development Goals (United Nations, 2015).

In Agriculture (SDGs 1, 2, 5, 8, 10 and 12), the issue of the application is on recent advances in image recognition which allowed researchers to scan more than 50,000 photos of plants to help identify crop diseases at sites using smartphones with a success rate of over 99 per cent (ESCAP, 2018). Autor (2015) argues that the extent of machine substitution for jobs tends to be overstated by ignoring strong complementarities which increase productivity, raise earnings, and augment demand for labour. Autor adds that even if automation does not reduce the quantity of jobs, it may affect the quality of jobs that are available. Policy implication: human capital investments must be at the heart of any long-term strategy on preparation for the impact of technology on jobs. While Industry 4.0 is still evolving and we might not have the complete picture until we look back 30 years from now, companies who are adopting the technologies realise Industry 4.0's potential. These same companies are also grappling with how to upskill their current workforce to take on new work responsibilities made possible by Internet 4.0 and to recruit new employees with the right skills.

National Timber Industry Policy 2009-2020

As stated in the executive summary of National Timber Industry Policy 2009-2020, the Malaysian timber industry is one of the major revenue contributors to the country's economy (Ministry of Plantation Industries and Commodities & Malaysian Timber Industry Board, 2009). In 2008, timber and timber products contributed an estimated RM22.5 billion or 3.3 per cent out of the estimated total merchandise exports (RM674 billion) and has provided employment to about 300,000 workers. Malaysia is one of the worlds largest exporters of tropical timber and has established itself as a major producer and exporter of sawn timber, panel products (plywood, medium density fibreboard, and particleboard), flooring, doors and other joinery products.

All upstream and downstream operations characterise the timber industry. Upstream operations include systematic and sustainable mining of natural forests and cultivation of trees. From the production of raw materials (logs) to the manufacture of semi-finished and finished timber products, downstream activities include primary, secondary and tertiary operations. Approximately 60% of the export value in 2008 was generated from primary activities under the current structure of the timber industry, including log harvesting and storage of sawn timber, plywood, veneer, fibreboard, and particleboard.

The other 40% of the export value comes from activities related to the manufacture and export of mouldings, walls, laminated veneer timber, laminated wood, furniture, workshops and carpentry for builders, such as doors, windows and window frames, balusters, and other materials.

To overcome these challenges, the current structure of the timber industry needs to be re-evaluated in line with the Third Industrial Master Plan (IMP3) goal and based on higher downstream value-added activities. To achieve the IMP3 goal, greater emphasis will be put on higher downstream value-added activities that are expected to generate 60 percent (RM31.8 billion) of export earnings. Other operations include the manufacture of furniture products for wood and composite furniture, panel products such as medium density fibreboard, blockboard, plywood, particleboard, laminated veneer lumber, and wood products. The remaining 40% (RM21.2 billion) is expected to come from primary wood products such as logs, sawn timber, and plywood.

The growth of human capital is another key factor in ensuring Malaysia's timber industry's productivity and sustainability. Local labour and skilled workers at all levels are missing in the industry. The lack of local resources has resulted in an increase in foreign labour, which has risen by a record 58% in 2008 compared to 2000. Therefore, the industry cannot attract highly skilled workers, especially at managerial and supervisory levels, since the working environment at these levels is not considered conducive. In fact, the industry's requirement has not been met by the total output of the current timber-related learning institutions. The industry's requirement for these groups of employees in 2008 is expected to be 9,810 per year up to 2020. However, the institutions are able to train just 2,064 workers per year (2000 to 2020), representing 21% of the industry's requirements.

In the past, the timber industry had always relied on foreign technology and machinery, and very little indigenous technology was produced. Research institutes and universities should make greater efforts to develop indigenous technologies through greater involvement in research and development activities.

Although these research institutions have been founded by the government to support the industry, promotion of their results is still small. In addition, the research findings often overlap and replicate due to the lack of cooperation and coordination between research institutions and industry. Therefore, there is a need for greater cooperation and communication between these research institutions and the industry in order to conduct research relevant to the industry's requirements.

The strategy should now be to target niche markets for unique Malaysian designs and brands that are particularly well received in the countries of Western Asia. Malaysia's timber industry faces many challenges over the next decade and beyond. It is particularly evident in decreasing raw materials, lack of skilled labour, low acceptance and use of cutting-edge technology, increased demand for timber products from sustainable sources of timber to protect the environment, health and competition. To remain competitive and perform on the world market, the timber industry in Malaysia must reconsider and re-strategise to meet these challenges.



Code of Practice for Programme Accreditation

Malaysian Qualifications Agency (MQA) (2018) was established under the Malaysian Qualifications Agency Act 2007 (Act 679) to quality assure higher education (HE) in Malaysia. To carry out this responsibility, the Malaysian Qualifications Framework (MQF) was developed to describe, systematise, unify, and harmonise all qualifications in Malaysia.

To ensure quality in higher education, MQA has developed a series of guidelines, standards, and codes of practice guided by MQF to assist higher education providers enhance their academic performance and institutional effectiveness. The key among these is the Code of Practice for Program Accreditation (COPPA) issued in 2008. COPPA (2008) is a general standard for higher education providers, quality assurance auditors, officers of the MQA, policy makers, professional bodies, and other stakeholders engaged in higher education. However, HE has witnessed rapid and disruptive changes in the last decade. The 11th Malaysia Plan, the Malaysia Education Blueprint 2015–2025 (Higher Education) and Malaysian Higher Education 4.0 (MyHE 4.0) have marked out the changes to be instituted in HE to produce competent and creative talent for the new economy.

In response and in consideration of these developments, MQA updated the COPPA based on feedback from HE suppliers, assessors, quality assurance experts, regulators, as well as adjustments in accreditation requirements, qualifications and standards in and around the world. Following MQA's standards development protocol, a wide array of stakeholders was consulted to explain the proposed changes and seek feedback and support for the revised COPPA.

Unlike COPPA (2008), this revised COPPA has a single layer of 98 standards which are stated in seven areas of evaluation. COPPA is now more streamlined, more rationalised, simpler, and contains some new requirements to strengthen it. The criteria for submitting higher education providers or HEPs for provisional and full accreditation are sufficiently revised to include information on the new requirements. Also clarified is a new self-review approach to complete accreditation using an Excel tool. Such reforms will provide more efficient guidance for the creation, accreditation, management, and enhancement of programmes.

Case Example

In order to understand how the new program of Making4.0 is being developed between Malaysian and European partners collaboratively, the difference of Criteria and Standards for Program Accreditation of the Code of Practice for Program Accreditation (COPPA2.0) of the Malaysian Qualifications Framework (MQF) (Malaysian Qualifications Agency, 2018) and the COPPA of European Qualifications Framework (EQF) (see European Union, 2018; European Training Foundation, 2012) need to be comprehended (see Table 1).

Table 1: COPPA of MQF Versus EQF

No	Document	Criteria and Standards for Programme Accreditation	Remarks
1	COPPA for MQF	The seven areas of evaluation for programme accreditation are: i. Program Development and Delivery; ii. Assessment of Student Learning; iii. Student Selection and Support Services; iv. Academic Staff; v. Educational Resources; vi. Programme Management; and vii. Programme Monitoring, Review and Continual Quality Improvement.	The guidelines are applicable to Panel of Assessors Report for Provisional and Full Accreditation, and Compliance Evaluation. The focus of Provisional Accreditation is to evaluate the soundness of the proposed programme in terms of Code of Practice Program Accreditation, applicable program, industry or professional standards, and related policies, while Full Accreditation focuses on the delivery of an approved programme. In the case of Compliance Evaluation, the focus and emphasis is on the delivery and sustainability of the programme.
2	COPPA for EQF	The ten criteria of evaluation for programme accreditation are: 1. The responsibilities and/or legal competence of all relevant national bodies involved in the referencing process are clearly determined and published by the competent authorities. 2. There is a clear and demonstrable link between the qualifications levels in the NQF or systems and the level descriptors of the EQF. 3. The NQFs or systems and their qualifications are based on the principle and objective of learning outcomes, and are related to arrangements for the validation of non- formal and informal	The European Qualifications Framework for lifelong learning (EQF) aims to improve the transparency, comparability and portability of people's qualifications. The EQF was set up in 2008 as a common reference framework of qualifications, expressed as learning outcomes at increasing levels of proficiency. The framework serves as a translation device between different qualifications systems and their levels. It is

	<p>learning and, where appropriate, to credit systems.</p> <p>4. The procedures for inclusion of qualifications in the NQF, or for describing the place of qualifications in the national qualification system, are transparent.</p> <p>5. The national quality assurance system(s) for education and training refer(s) to the NQFs or systems and are consistent with the principles on quality assurance as specified in Annex IV to the EQF Recommendation.</p> <p>6. The referencing process shall include a stated agreement from the relevant quality assurance bodies that the referencing report is consistent with the relevant national quality assurance arrangements, provisions and practice.</p> <p>7. The referencing process shall involve international experts and the referencing reports shall contain the written statements of at least two international experts from two different countries on the referencing process.</p> <p>8. The competent authority or authorities shall certify the referencing of the NQFs or systems with the EQF. One comprehensive report, setting out the referencing and the evidence supporting it, shall be published by the competent authorities, including the EQF National Coordination Points, and shall address each of the criteria separately. The same report can be used for self-certification to the Qualifications Framework of the European Higher Education Area, in accordance with the self-certification criteria of the latter.</p>	<p>intended to benefit learners, workers, job-seekers, employers, trade unions, education and training providers, qualification recognition bodies, government authorities and international organisations.</p> <p>The EQF Recommendation was revised in 2017 in order to adapt it to the reality of today and be ready for the challenges of tomorrow. Its revision has kept the core objectives agreed a decade ago to create transparency and mutual trust in the landscape of qualifications in Europe. The revision was one of the 10 key actions of the New Skills Agenda for Europe, which aims to improve the quality and relevance of training, make skills more visible, and improve skills intelligence. As its name suggests, the EQF is also one of the frameworks to help deliver on the principles of the European Pillar of Social Rights. The very first of the Pillar's 20 principles is that everyone has the right to quality and inclusive education, training and lifelong learning in order to maintain and acquire skills that enable them to participate fully in society and successfully manage</p>
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		<p>9. Within six months of having referenced or updated the referencing report, Member States and other participating countries shall publish the referencing report and provide relevant information for comparison purposes on the relevant European portal.</p> <p>10. Further to the referencing process, all newly issued documents related to qualifications that are part of the NQF or systems (e.g. certificates, diplomas, certificate/diploma supplements) and/or qualification registers issued by the competent authorities should contain a clear reference, by way of NQFs or systems, to the appropriate EQF level.</p>	<p>transitions in the labour market.</p>
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The certification systems are still on the drawing board in some of the countries that have been examined. As such, nothing can be said about their actual implementation coordination. However, there are important issues of coordination between stakeholders even in the development process. When designs are produced, there are inevitably problems that show strong similarities to other countries' problems.

A key question is whether a national framework should be an umbrella structure for a number of subsystems or whether it should be structured as a unitary framework for all learning and training from scratch. The key question is implicitly concealed here: are you designing a framework and matching its contents or are you creating (or having existing) subsystems and constructing the structure around it?

The key questions:

- Who coordinates which and is the intent or function of the structure defined by this?
- What institutions are needed and what new institutions are needed?
- What are the consequences of the introduction of an interinstitutional coordination system, an autonomous or neutral certification body or a quality assurance agency?
- How can a qualifying system be best developed and organised by countries with limited resources? Should they use existing institutions and build on the existing system? Should we set up new institutions?
- Which representation of shareholders should there be in the management of a framework? Is the sole leadership of the state necessary in developing countries where social partnership activities are limited or unknown?

Quality assurance of qualifications at the MQF and EQF level should be in accordance with both national circumstances and taking into account sectoral differences:

- Addressing the development of credentials and the implementation of the approach to learning results;
- Ensure valid and reliable assessment in compliance with agreed and consistent learning outcome criteria and discuss the certification process;
- Composed of feedback mechanisms and continuous improvement procedures;
- At all stages of the process, include all relevant stakeholders;
- Are clear forms of evaluation, self-assessment, and external analysis;
- Be an integral part of the internal management of bodies issuing qualifications at the MQF & EQF level, including subcontracting activities;
- Based on specific and measurable targets, criteria, and guidelines;
- Fund adequate resources;
- Include a regular review of established external quality assurance management bodies or agencies;
- Include reports of assessments which can be viewed electronically.

In relation to that particular questions, there are cross-cutting issues emerged and it can be seen at the Table 2.

Table 2: Cross-Cutting Issues

No	Issues	Description	Remarks
1	Communication	<p>Communication is a critical part of the development of qualification frameworks that offers both challenges and opportunities. Frameworks can be the object of communication, but they can also be a tool <i>for</i> communication. This chapter discusses how the frameworks are communicated and how they are being used as communication structures.</p>	<p>The key questions:</p> <p>a) Who are the stakeholders the qualifications framework needs to be communicated to? All citizens? All learners? Providers? Government departments and agencies? Sectors? Employers? Social partners?</p> <p>b) What should qualifications frameworks communicate to the different stakeholders? How can a common language of the framework be promoted? How can learners decipher the framework and translate its information into potential learning pathways?</p> <p>c) Do the communication tools serve the requirements of different groups</p>

			of citizens? Are they all addressed and reached adequately?
2	Quality Assurance	<p>Quality assurance is one of the most critical elements of any qualifications framework. It represents a challenge because all qualifications must be quality-assured before they can be entered into the framework, but precisely this obligation is also a huge strength of frameworks. If stakeholders and end-users of qualifications can be convinced of the effectiveness of quality assurance processes related to the framework, this will greatly boost the market value of qualifications. In the end, such confidence will benefit one of the core aims of qualifications: to allow people to employ their knowledge, skills and competences across different settings in the worlds of learning and work.</p>	<p>This confidence hinges on three key aspects:</p> <ul style="list-style-type: none"> • the relevance of the qualifications contained in the framework; • the competence of those who deliver the required training; • the objective assessment of acquired knowledge, skills and competences. <p>From this we can deduce the three key elements of quality assurance related to qualifications frameworks:</p> <ul style="list-style-type: none"> • the validation of qualifications; • the accreditation and audit of education and training providers; • the validation and continued control of assessment procedures. <p>In order to achieve such recognition, qualifications frameworks must:</p> <ul style="list-style-type: none"> • ensure that qualifications are relevant to perceived social and economic needs; • ensure that qualifications are based on education and training standards that are defined by agreed learning outcomes and applied consistently; • ensure that education and training providers meet certain quality standards; • secure international recognition for national qualifications.
3	Resources	How much does it cost to develop and maintain a national framework for	a) Some countries clearly believe it is. Countries such as Spain, Germany, and Poland are using the frameworks

		<p>qualifications? Is it worth the investment?</p>	<p>to bring some system into their liberalised qualifications provision. However, this has taken time to develop. Malaysia has chosen to reform its qualifications system around the blueprint of a framework. But for many other countries, the decision to introduce a framework for qualifications represents a considerable investment, often of scarce resources.</p> <p>b) An assessment of the institutionalisation of the implementation of frameworks requires a review of the financial and human resources that have been or must be allocated for the coordination of the framework, for the development of qualifications, as well as for the alignment of the delivery of education and training, the assessment of learning outcomes and the certification and recognition of competences.</p> <p>c) This study intended to generate indications of resources allocated or budgeted for framework implementation. It has proven to be difficult to get precise figures, but some indications have been generated. The financial resources for implementation identified in this study focus on the coordination of the framework and the development of qualifications.</p>
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Discussion

Challenges

Most countries have opted to establish certification structures. While this appears to be part of a global trend towards remarkably similar solutions, the design, implementation, and management of qualification systems, indeed the reason for implementing them, in practice varies considerably from country to country. It's not an indication that some countries are doing better things than others. It is a logical consequence of what may be the main condition for a framework's success: that it matches its intent and environment and evolves and continues to develop with that purpose and environment. The latter indicates that credential systems are not static. The structures change not only depends on the state of the system, but also on cultural, financial, academic, and international labour market changes. The specific manner in which certification systems are applied and the responsibilities allocated to organisations and stakeholders, such as design and planning, assessment, implementation, interaction, quality assurance and resources, are very relevant. Therefore if the researchers consider local variations, the following general statements can be made:

- When all relevant stakeholders are involved and continue to be involved, a certification process is fit for purpose.
- If the capacity of these stakeholders is adequately enhanced and continues to be established, a qualification structure is necessary.
- A certification system is ideal for use when interacting with existing institutions.
- A qualification structure is sufficient if it contributes to a more complex development system for qualifications.

Different Context and Different Stakeholder

The reason why they come about is one significant difference between the various systems that are either in place or prepared to be implemented. Some countries built structures in response to evolving needs, typically associated with the ever-increasing demand for labour market flexibility. They gradually developed frameworks that organically related the accomplishments of people. Such structures have a primarily communicative role: they clarify what these mean and how they relate to other qualifications for people working with qualifications.

Table 3: NQF Developmental Stages in the Countries of the Study

Country	Conceptualisation and design (no bodies nominated to manage and implement)	Implementation in progress (some bodies established)	Full implementation (all bodies actively involved)	Reviewed implementation (there has been a reshuffle of institutional roles)
Spain				X
Germany				X
Poland				X
Malaysia			X	

More recently, other nations have run into similar issues and scouted the ground for existing solutions. Before they were introduced, Spain, Germany, and Poland formed full plans for frameworks. In such countries, the additional purpose of certification systems are to promote sometimes quite radical reform. In reality, new qualifications are being established from scratch in some young countries, such as Malaysia, in accordance with the process in which full implementation (all bodies are actively involved). Table 3 shows the developmental stage of the National Qualifications Frameworks (NQFs) in each of the four countries that are the subject of this study. Remember how the last column (reviewed implementation) demonstrates how the creation of qualifying framework is a continuous, cyclical process.

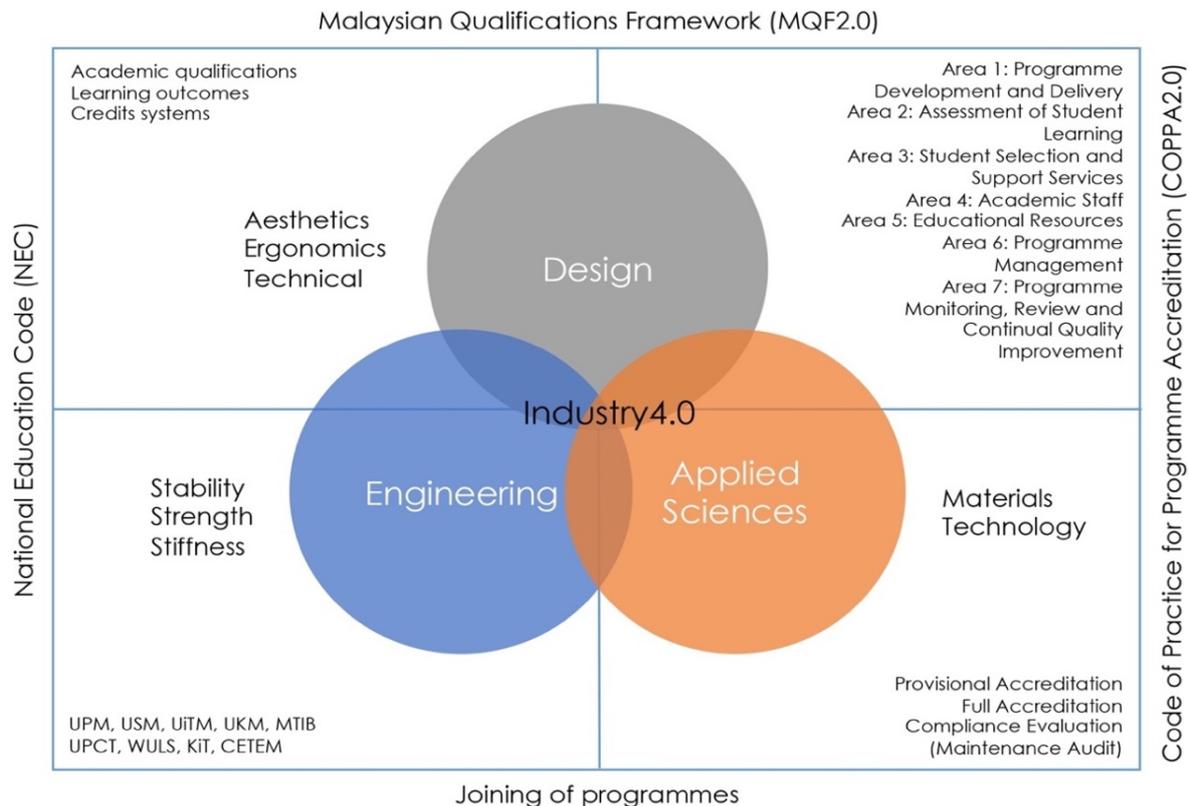
Advantages in Education Systems between Malaysian and European

One of the most important things when considering the benefits of introducing a new cooperative project between Malaysian and the European education system is that we can allow a multidisciplinary approach. A curriculum integration approach focuses primarily on the various disciplines and viewpoints they offer to explain a concept, subject or problem. A multidisciplinary curriculum is one in which more than one discipline studies the same topic. This is a global trend and we can see the movement of it in Scopus via SciVal metric information. SciVal is an online tool that offers quick, easy access to the research performance of 7,000 research institutions and 220 nations worldwide using bibliometrics. It enables us to visualise research performance, benchmark relative to peers, develop collaborative partnerships, and analyse research trends.

For the Making 4.0 project, the development of a new program model and validation protocol may guide the academic institution. In this collaborative approach, the element of design (aesthetics, ergonomics, and technical), engineering (stability, strength, and stiffness) and applied sciences (materials technology) should be inter-connected in the centre of the Industry 4.0 dimension. Along the way, the formation of the Making 4.0 new curriculum should be

framed within the context of National Education Code (NEC), MQF, COPPA, and Joining Programs (see Figure 1). Between NEC and MQF, academic qualifications, learning outcomes, and credits systems is essential to be addressed. Moreover, between MQF and COPPA, 7 areas need to be complied. Furthermore, between COPPA and the joining of programmes, type of accreditation (provisional, full, and compliance evaluation) need to be met. Additionally, between Joining of programme and NEC, all partners such as Universiti Putra Malaysia (UPM), Universiti Sains Malaysia (USM), Universiti Teknologi MARA (UiTM), Universiti Kebangsaan Malaysia (UKM), Malaysian Timber Industry Board (MTIB), Universidad Politécnica de Cartagena (UPCT), Warsaw University of Life Sciences (WULS), Karlsruhe Institute of Technology (KIT), and Technological Centre of Furniture and Wood of the Region of Murcia (CETEM) need to be hybrid and the certification process must be fit for purpose.

Figure 1. Framing multi-disciplinary approaches and validation protocol for new curriculum of Making4.0



The new program of wood and furniture from the Making 4.0 project was in-line with the national agenda of Industry 4.0. Additionally, wood and furniture design as part of the Making 4.0 initiative can be seen as the professional service of creating and developing concepts and specifications that optimise the function, value, and appearance of products and systems for the mutual benefit of both user and manufacturer (Ulrich & Eppinger, 2015; Heskett, 1980). Moreover, it allows industry-academia cooperation and collaboration in simulating workplace



environments in classrooms and studios, designing tasks and case-based reasonings for learning, and developing assessments of learning as well as a pool of exemplary future proof and future ready industry players.

Conclusion

Overall, what matters is that the credential system of Making4.0 is clear and addresses the rapidly changing demands for skills in the economy and that it provides credentials that allow individuals to do more with their expertise, abilities, and skills in education and the labour market, at home and abroad. Through minimising duplication, improving the importance and quality of education, improving flexible pathways and equal opportunities, and encouraging lifelong learning, they allow governments to achieve productivity. Above all, a certification system is always an instrument, never an aim.

Finally, this study does not go into depth on how countries are making their systems future-proof. Which frameworks are integrated into the process to safeguard the continuing commonness of the framework and qualifications? Since one of our main findings is that the system is never done and that this is not a design flaw, but rather a feature, a strength or even a simple requirement of anything relevant to qualifications, different countries must have found different ways to expect such constant change. This study hints at some of these processes, but case examples of successful forms of flexibility built into the system would be tremendously useful for countries that are in the process of developing frameworks.

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