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## Industry 4.0 Readiness of Accounting Education: Professional Quotient and CHED's accounting program standards

Arnel Onesimo O. Uy<sup>1</sup> and Joy S. Rabo<sup>2</sup>

<sup>1</sup> De La Salle University

<sup>2</sup> De La Salle University

\*Corresponding Author: arnel.uy@dlsu.edu.ph

**Abstract:** As Industry 4.0 disrupts workflow processes and business models, the accounting profession needs to change and adopt to these new realities. This study evaluated the program policies, standards and guidelines of the four (4) accounting programs issued by the Commission on Higher Education in 2017 in relation to their readiness to address the challenges of Industry 4.0. Using the professional quotient (PQ) model, the study concludes that by design, the curricula are geared up for the challenges of Industry 4.0. However, the study recommends program implementation should consider the expanding the learning activities and experiences of the students beyond the traditional classroom and integrate the current advances in technology to increase the readiness of program graduates in an Industry 4.0 world.

**Key Words:** Accounting education in Industry 4.0; professional quotient; Philippines

### 1. INTRODUCTION

In 2017, the Commission on Higher Education (CHED) issued a series of 4 memorandum covering the policies, standards and guidelines (PSG) for accountancy education. These are for the 4 undergraduate accountancy degrees, namely Accountancy (revised from 2007), Accounting Information Systems (replacing the Accounting Technology program), Management Accounting (new) and Internal Audit (new). These new program standards are aligned with the International Accounting Education Standards (IAES) competency standards issued by the International Federation of Accountants (IFAC).

Almost at the same time, discussions about changes in the business environment driven by

technology and innovation have escalated. This is popularly referred to as Industry 4.0.

This study analyzes how these PSGs address the challenges posed by the fourth industrial revolution, or Industry 4.0.

#### *1.1 The Fourth Industrial Revolution (Industry 4.0): Handles for Business*

Industry 4.0 is considered as the next phase in the digitalization of the manufacturing sector coming from the lean revolution of the 1970s, outsourcing phenomenon of the 1990s and the automation in the early 2000s. This is primarily driven by four disruptions: rapid rise in data, computing power and connectivity, emergence of

analytics and business-intelligence capabilities, new forms of human-machine interaction, and improvements in the communication interface between the digital and physical world (Lee et al, 2013). Schwab (2016) adds that the fourth industrial revolution includes the impact of these disruptions to civil society, governance structures, and human identity in addition to its economic and manufacturing ramifications.

To navigate this changing landscape, Baur and Wee (2015) provides businesses an Industry 4.0 digital compass which includes 8 value drivers and 26 practical levers (refer to Figure 1)

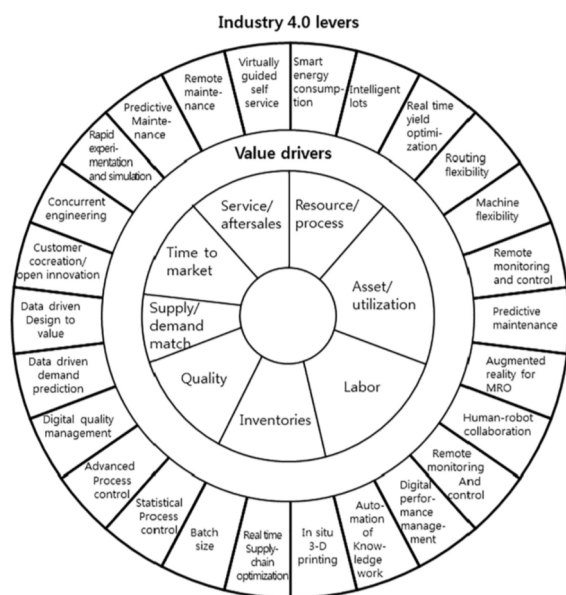


Figure 1. Digital Compass (Baur and Wee, 2015)

The new Industry 4.0 environment will be vastly different and this will affect the business models of firms. Future initiatives and business strategies should consider how it fits with these drivers and levers.

### 1.2 Accountancy in Industry 4.0

Accountants are not immune to this disruption brought by technology and innovation. This will reshape how accountants work, relate, communicate and learn as it reinvents institutions.

This revolution will bring new opportunities for people and machine to collaborate across geographies – both physical and cyber. While today artificial intelligence is still in its infancy stage and big data analytics is heavily dependent on human oversight, in the long run, accountants need to develop some competencies to survive.

Uschi Schreiber, former EY Global Vice Chair – markets and Chair of Global Accounts Committee said that “the challenge...is to find new ways of thinking and acting as our world is disrupted by technology and innovation. Akhter and Sultana (2018) mentions adaptability or the ability to take challenging new responsibilities with added values and flexibilities beyond historical job descriptions and judgmental capabilities among others.

Burnett (2003) adds that new skills (such as analytical/critical thinking, communication and decision making) are important to new accounting graduates and internships is a key innovation. The study of Lawson, et al (2014) sums up the different competencies needed by accountings in the 21<sup>st</sup> century (Figure 2).

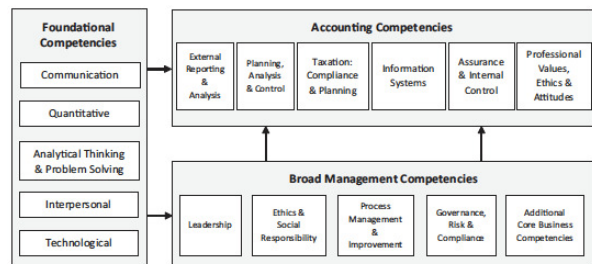


Figure 2. Competency Integration Framework (Lawson, et al, 2014)

In a study made by the Association of Chartered Certified Accountants (ACCA, 2016), they provided insights into the future dynamics of the profession in the coming decade. They stressed that there are 4 main drivers for change that will have the most impact to the profession including the technical, ethical and interpersonal skills and competencies. These drivers include increased regulation and



stronger governance, spread and convergence of digital technologies and their impact on businesses, changing business expectations from professional accountants, and continued globalization yet harmonization of accounting and business standards.

Thus, Industry 4.0 would require professional accountants to likewise perform various roles in different countries, businesses/industries, and organizations aside from its conventional functions.

### 1.3 Professional Quotient

In order for professional accountants to remain relevant in Industry 4.0, they need to develop and demonstrate the ability to combine their technical knowledge, skills and abilities with soft skills including interpersonal behaviors and qualities. ACCA (2016) recommends that to add value for their employers and clients, professional accountants should demonstrate competencies in seven constituent areas. Technical skills and ethics (TEQ) and experience (XQ) should be combined with intelligence (IQ) and digital awareness (DQ). Interpersonal behaviors, skills and qualities should be reflected in quotients for creativity (CQ), emotional intelligence (EQ) and vision (VQ). Together, these seven quotients comprise what ACCA calls the Professional Quotient (PQ).

The PQ identifies the technical and interpersonal skills and competencies which will be most important in the next 10 years in each of the following six technical areas (ACCA, 2016):

1. audit and assurance,
2. corporate reporting,
3. financial management,
4. strategic planning and performance management,
5. tax, and
6. governance, risk and ethics.

### 1.4 Philippine Program Standards

Higher education institutions (HEIs) in the Philippines is administered and regulated by the Commission on Higher Education (CHED through the passage of the Higher Education Act of 1994 (Republic Act 7722). Part of its regulatory mandate is to set

minimum standards for programs and institutions of higher learning through the issuance of memorandum orders, or CMOs. In 2017, CHED issued four (4) memorandum orders for the policies, standards and guidelines of four accountancy baccalaureate degrees. In these PSGs, CHED promulgated an outcomes based approach, thus providing flexibility for each HEI to design their programs based on the PSGs and according to their vision-mission-values and typology. Table 1 shows the breakdown of the reference CMOs, number of program outcomes as well as the minimum curricular credits/units.

Table 1. CMOs of Accountancy Programs (2017)

CMO# / Program Title <i>Policies, Standards and Guidelines</i>	Outcomes	Gen Ed	Business	Core Acctg	Professional	Electives	Total
		Min. Units/Credits					
CMO 27 s 2017 <i>Bachelor of Science in Accountancy</i>	19	50	6	81	24	12	173
CMO 28 s 2017 <i>Bachelor of Science in Management Accounting</i>	19	50	6	81	24	6	167
CMO 28 s 2017 <i>Bachelor of Science in Internal Auditing</i>	19	50	6	81	24	6	167
CMO 29 s 2017 <i>Bachelor of Science in Accounting Information System</i>	19	50	6	81	24	6	167

## 2. METHODOLOGY

### 2.1 Conceptual Framework

The main vision driving Industry 4.0 is the emergency of “smart” factories which are anchored on growth of technologies such as the internet of things, artificial intelligence, among others, These technological advancements and its impact on the workplace are the forces and drivers which redefines the qualifications of the workforce (Benesova, Tupa, 2017).

To assess the impact of Industry 4.0 to the accountancy profession, Lawson, et al (2014) emphasized the need for accounting curricula to use an integrated competency-based approach. As such, this study uses the Professional Quotient or PQ model of the ACCA (2016) to match it with CHED’s policies, standards and guidelines for the accountancy programs (Figure 3).

Technical skills and ethics (TEQ) refer to the skills and abilities to perform activities consistently to a defined standard while maintaining integrity, independence and skepticism in the areas of audit and



assurance, corporate reporting, financial management, strategic planning and performance management, tax, and governance, risk and ethics. Intelligence (IQ) refers the ability to acquire and use knowledge through thinking, reasoning and solving problems. Creative quotient (CQ) covers the ability to use existing knowledge to make connections, explore potential outcomes and generate new ideas. The awareness and application of existing and emerging digital technologies, capabilities, practices and strategies is captured in the Digital quotient (DQ). Emotional intelligence (EQ) refers to the ability to identify your own emotions and those of others and harness them to tasks. Vision (VQ) captures the capability to anticipate future trends accurately by extrapolating existing trends and facts. Lastly, the Experience (XQ) measures the skills required to understand customer expectation, meet desired outcomes and create value.

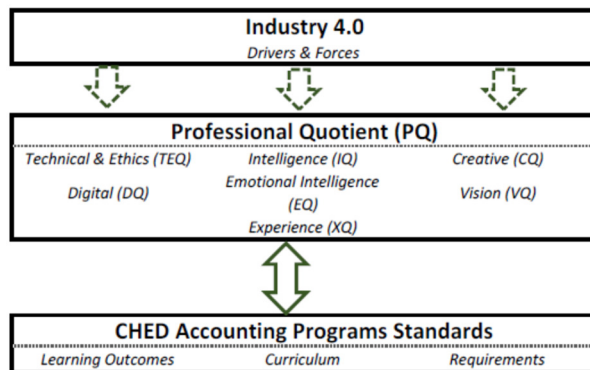


Figure 3. Conceptual Framework

## 2.2 Methodology

This study used document analysis by matching the four (4) CMOs containing program policies, standards and guidelines and comparing them with the required competencies, behavior and qualities necessary in Industry 4.0 using the Professional Quotient (PQ) model. Document analysis is a qualitative research method in which documents are interpreted to give meaning around an assessment topic (Bowen, 2009). In this study, we used public records (CHED Memorandum Orders, CMOs) and assessed its relevance to the professional

competencies, behavior and qualities of accountants in Industry 4.0.

Based on the CMOs, the study matched the alignment of the program’s learning outcomes with the seven quotients or PQs. No scoring was employed. The study then compared the TEQ components with the curricular standards in the CMOs. Recommendations were then made based on the gaps identified by matching the learning outcomes and PQ as well as the curricular standards and TEQ.

## 3. RESULTS AND DISCUSSION

### 3.1 Learning Outcomes and PQ

The 19 program learning outcomes of the 4 accounting programs cover all the constituent areas of the PQ framework. The 4 programs vary in terms of specialized and technical competencies based on the role professional accountants play in the organization. For instance, the Bachelor of Science in Accountancy emphasizes the role of an external auditor and the qualifications of being a certified public accountant.

In particular, 8 outcomes address technical and ethics quotient (TEQ) and 7 address intelligence quotient (IQ) directly while only 1 outcome addresses experience quotient (XQ). This implies that the accountancy programs learning outcomes are aligned with the required skills and abilities to perform activities consistent to a defined standard while maintaining the highest standards of integrity, independence and skepticism (TEQ) and the ability to acquire and use knowledge thru thinking, reasoning and solving problems (IQ). However, the programs only specify one outcome to demonstrate the ability and skills of the accountants to understand customer expectations, meet desired outcomes and create value (XQ). Table 2 shows the breakdown of PLOs of the 4 accountancy programs with the PQ domains.





Table 2. Mapping of PQ Domains with PLOs

PQ Domains	No. of PLOs related			
	BSA	BSAIS	BSMA	BSIA
TEQ (Technical & Ethics)	8	8	8	8
IQ (Intelligence)	7	7	7	7
CQ (Creative)	2	2	2	2
DQ (Digital)	2	2	2	2
EQ (Emotional)	2	2	2	2
VQ (Vision)	2	2	2	2
XQ (Experience)	1	1	1	1
<b>No. of PLOs</b>	<b>24</b>	<b>24</b>	<b>24</b>	<b>24</b>

\* may exceed 19 as some are related to 2 PQ domains

### 3.2 TEQ and the Curricular Standards

Technical expertise and ethics are and will remain vital in the coming years as Industry 4.0 rolls out. Some technical skills will increase in value and new knowledge and skills will be required. This is spelled out in the 60 TEQ competencies in the six technical areas.

The TEQ competences can be broken down into professional knowledge (38), skills (13) and attitude (9). The detailed competences are shown in Table 3.

Mapping the 60 knowledge and ethics competencies identified by the ACCA (2016) report with the courses which comprises the common business and management education (6 units), core accounting education (81 units) and the professional courses (24 units) of the programs, it would show the variation across the four programs (Table 4).

Table 3. TEQ Competencies

TEQ Competences	
<b>Knowledge</b>	<b>38</b>
Business, management & economics	13
Technology	5
Governance	3
Strategy	5
Reporting	6
Specialized knowledge	6
<b>Skills</b>	<b>13</b>
Communication	6
Analytical and Critical thinking	2
Technical skills	5
<b>Attitudes</b>	<b>9</b>
Professional ethics	5
Perspective (Global, Long-term)	3
Professional scepticism	1

Table 4. Mapping TEQ with PSG Courses

Knowledge	BSA	BSMA	BSIA	BSAIS
Business, management & economics	18	21	18	21
Technology	9	6	6	24
Governance	3	6	21	3
Strategy	3	9	6	3
Reporting	15	15	15	15
Specialized knowledge	63	54	45	45
<b>Total Number of Credits/Units</b>	<b>111</b>	<b>111</b>	<b>111</b>	<b>111</b>

## 4. RECOMMENDATIONS

While the PSGs of the 4 program show that generally address the challenges of Industry 4.0, it is recommended that the following be considered.

Recommendation 1: Alignment of the PQs in the customization of their PLO. When course learning outcomes are formulated, the academic program administrators should intentionally develop the other domains of PQ aside from technical and ethical, and intelligence quotients. Monitoring the effectiveness of these designed courses is key to ensuring the development of these competencies.



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Recommendation 2: Accounting educators must get outside of their comfort zone and be willing to integrate different teaching and learning techniques in the accounting classroom. This is echoed by Buckhaults and Fisher (2011) in their study addressing accounting anxiety and promoting new methodologies in accounting education.

Recommendation 3: Design the capstone requirement (i.e. research and industry internship) to enhance the experience quotient of the students.

Recommendation 4: Intentionally develop out-of-classroom learning activities to support emotional, vision and experience quotient. A deliberate and more structured approach to co- and extra-curricular programs should consider developing these other competencies.

Recommendation 5: Include more technology-related competencies into the program. This can be done thru the offering of elective courses which tackles these emerging technologies and how it impacts the accounting profession.

## 5. CONCLUSIONS

The ascent of Industry 4.0 requires professional accountants to consider new competencies and attitude to remain relevant to society. These competencies are captured by what the ACCA calls the professional quotients (PQ), an integration of seven domains.

CHED's PSGs for accounting programs follows an outcomes-based (OBE) approach. Thus, mapping these outcomes and competencies shows that the programs generally address the development of the PQs of future accountants. By design, the curricula are geared up for the challenges of Industry 4.0. However, program implementation should consider the expanding the learning activities and

experiences of the students beyond the traditional classroom and integrate the current advances in technology to increase the readiness of program graduates in an Industry 4.0 world.

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