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IT Competences for Professional Accountants. A Review

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Abstract

Uncertainty in world economy in conjunction with the impact of information as a critical resource have reformed drastically the role and contribution of an accounting and finance professional. IT has modified the way data is collected, stored, processed and distributed between business stakeholders, and as a result accountants were strongly affected by this change. Nowadays, the use of IT in accounting is widely applied and has turned into an every day routine, so that it is no longer possible to perform most of the accounting and financial operations without the engagement of IT. This implies a significant transformation in the competences required from the accountants in order to successfully perform their tasks. This change has been acknowledged by both academic and practitioners. Several scholars attempted to investigate these new competences as well as a number of International accounting organizations proposed competences frameworks. However, a lot of concerns about the level of IT related competences required from the contemporary accountants has been raised by many business parties. In this article, the IT competences required by contemporary accountants are identified, based on a concise literature review in order to track all major changes realized during the last decades and develop an IT competency framework.

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1. Introduction

During the last decades information technology (IT) has made enormous progress and this have drastically influence every aspect of business domain. IT has modified the way data is collected, stored, processed and distributed between business stakeholders (Nasiopoulos, Sakas, Vlachos, 2014). Accountants were among the first professional groups that affected by this change, since they incorporate IT as an integral part of their everyday work (Rom and Rodhe, 2007; Kaye and Nicholson, 1992; Ellis, 1986). Nowadays, the use of IT in accounting is widely applied and has turned into an everyday routine, so that it is no longer possible to perform most of the accounting and financial operations without the engagement of IT. This implies a significant change in the competences required from the accountants in order to perform their work. This change has been acknowledged by both academic and business (Ahmed, 2003) and several scholars attempted to investigate these new competences (Kaye and Nicholson, 1992; Belfo and Trigo, 2013; Lange et al., 2006; Kaye and Nicholson, 1992; Ellis, 1986). Also a number of International accounting profit or non-profit organizations proposed competences frameworks such as the International federation of Accountants (IFAC) and the Chartered Professional Accountants of Canada (CPA) (Nasiopoulos, Sakas, Vlachos, 2014). However, a lot of concerns about the level of IT related competences required from the contemporary accountants has been raised by many business parties (Chang and Hwang, 2003).

In this article, first we present briefly IT impact on the work of accountants and generally the accountancy. Afterwards, we identify the IT competencies required by accountants, based on a short historical review in order to track all major changes realized during the last decades.

2. Theoretical Background

2.1. Information Technology (IT) in accounting

As technology and especially IT evolved and this evolution was adopted by the business world, enormous changes were occurred in the way they are operating. The term IT is used to describe the technology that concerns the entire business industry and includes systems that integrate the use of both hardware and software technology in order to manage information, known also as Information Systems (IS). In fact any system for retrieving, collecting, processing, storing and transmitting data is considered as part of the IT/IS. IT professionals are those that perform operations such as data management, software and database development design, computer engineering, management and administration of entire systems, and integration with other various technologies such as mobile devices, cell phones etc. (Larres and Oyelere, 2010).

The first applications of IS was related to accounting (Brandly et al., 2001; Shields, 2001) and their purpose was to automate some basic accounting operations such as data input, sorting, and other basic calculations. Major application types of this era were spreadsheets, word processing and statistical packages (Bean and Medewitz, 1987). As Ellis (1986) states, during this first stages there was not a truly change in the nature of the work of an accountant but a carrying out of work with massive technological support. In the next years, new software types were added such as databases management software, communication applications and the first integrated accounting software applications were emerged changing the landscape. As the technology continues to evolve, new types of IS were emerged such as the management information systems and especially the accounting information systems which brought new challenges and opportunities for accountants which changed totally the way accountants work.

A simple definition of the term accounting information system is that it refers to a computerized system that is used for performing accounting operations using IT resources. Ghasemi et al. (2011) attempted to identify the impact of IT development in accounting and the way this development changed the way accountants perform their operations. They identified a list of advantages that have been occurred by accounting information systems as follows:

- **Increased functionality.** The use of IS helped accountants the timeliness of financial reports and by that way to prepare analyses that give a more accurate picture of the current financial state.
- **Improved accuracy.** The internal check and balance mechanisms that have accounting IS provide insurance that all transactions and account are properly recorded and balanced. Also can provide easily limited access to critical information and can ensure that critical operations will be performed only from the authorized personnel.
• **Faster processing.** Accounting IS can handle large amount of financial information in a very short period and reduce by that way the cost and time needed to perform heavily workload operations by the accountants such as for example the close of accounting periods.

• **Better reporting.** Accounting IS can provide better reporting in terms of time and accuracy allowing by that way the business stakeholders and inventors to obtain a better picture about the state of a company and to determine if there is an opportunity for a good investment or not.

• **Availability in Software tools.** Accounting IS also provide accountants with a set of software tools to help them to provide their accounting operations effectively and efficiently. Such tools are the following:
  - **Specific Accounting software,** refers to software types varying from simple applications such as spreadsheets to highly integrated applications such as ERP systems.
  - **Income tax,** refers to applications that assist accountants to prepare taxes at short period time despite the complexity of the tax laws sourcing from their frequent change and complicated nature.
  - **Word processing,** refers to applications used to create, edit, print etc textual data.
  - **Graphics software,** refers to applications used to prepare graphics that can be used to crate slides, presentations etc.
  - **Image processing,** refers to creating of electronic images of documents for easier processing and sharing.
  - **Electronic data interchange,** refers to software used for communicating electronically and exchange documents.
  - **Electronic funds transfer,** refers to software used to perform banking operations electronically such as payments, fund transfers etc.

According to (Belfo & Trigo, 2013), an accounting information system is responsible for the collection, storage and processing of accounting and financial information’s required for the daily business operations and for supporting the business decision making management. They define three basic subsystems within an accounting information system as follows:

• **Transaction Processing System (TPS)** for supporting the everyday operations

• **General Ledger System and Financial Reporting System (GLS/FRS)** for summarizing the transaction activities and performing measurement and reporting of the status of financial resources both for internal and external use by the business.

• **Management Reporting System (MRS)** for providing reports that will support the internal management system of the business and the decision making in topics such as budget, variance reports, future planning, investments etc.

Summarizing, the environment that an accountant operates has changed significantly (Kutsikos & Bekiaris, 2007), either concerning the variety of tools available to perform its operations or variety and extent of operations that an accountant have to perform and consequently the competences and skills required to cope with all these.

### 2.2. IT Competences for professional accountants

The role of accountant in business during the last years has changed and transformed from manual accounting to computerized accounting. The extensive use of IS in business has create the term “knowledge – worker” in order to describe the worker that operates within an IT environment as well as the competences possessed. These possession of appropriate skills will allow the creation of an environment where the IS technology will operate at an optimum resulting to the advantage of the entire business operation (Maisurahetal., 2012). IT competences considered imperative for accountants in order to perform their tasks (Wessel, 2008). The determination of these competences is essential for accountants but this involves, first, the determination of the roles of a modern accountant in business and second, the definition of term competences. The determination of the role of the modern accountant in business is important as it sets the framework within an accountant operates and hence this affect the IT/IS tools it is required.

### 2.3. New emerging IT related roles of accountants

It was early acknowledged that the profession of accountant has a wide variety of roles ranging from providing accountant services to providing consultancy services for planning control and decision making to business and individuals. These functions enable a great amount of data processing and decision making functions which can only
be carried out with the use of IT systems. (Kaye & Nicholson, 1992). (Ahmed, 2003) identified four roles of an Accountant within an IT system. These are the accountant as a user, manager, designer and evaluator of an IS. This approach describes the various relationships that an accountant can have with an IS and not how it uses it in order to perform accounting activities. In the same approach the International Federation of Accountants (IFAC) in the document called “Information Technology for professional Accountants” (IFAC, 2006a) identified various roles for accountants within an IS such as Accountant as user of an IS (e.g. financial manager and controller, tax practitioner, information analyst etc.), accountant as assurance provider and evaluator (e.g. financial auditor, evaluator of IS etc), accountant as manager of IS and accountant as designer of a business system. Following a different approach Belfo and Trigo, (2013) proposed a set of accounting roles that are depended in various IS levels for their success. As such identified the Accounting operations, External reporting, Management accounting, Management support, Staff management, Training, Scrutiny of capital projects, Interactive reporting, Auditing, Internal control implementation, Risk management, Error or fraud detection and Accountability.

2.4. The term “competences”

In the context of this study, competences have been defined as a collection of knowledge and skills that allow an employee to act effectively in his/her work within various situations. As knowledge is defined what one knows while skill is what one can do (Stone et al., 1996). The importance of distinguishing between these two terms and especially between the accounting related knowledge and skills has been acknowledged by various accounting academics and organizations (Stone et al., 1996; Deppe et al., 1991). Ahmed (2003) makes a distinction between the term “knowledge” and “skill”. He distinguishes “knowledge” in two main categories, the “knowing –that” and the “knowing-how”. According this approach, it is probable that someone knows to do something but cannot know how to do it. For example may someone can handle complex situations but cannot describe how to do it (Ahmed, 2003). The “knowing-how” to do something is synonymous to skill and has a more procedural approach. The “knowing – that” is something different that is similar to “content-knowledge”, the knowledge that is acquired through taught. Basselier et al. (2003) defined two types of IT competences : a) the IT related knowledge and b) the IT experience. The first one refers to specific knowledge that someone has and the second to the technical knowledge that someone has obtained from his previous interaction with technology. IFAC identifies two types of IT knowledge the “conceptual” IT knowledge and the “practical” IT skills. So when we refer to IT competences should be aware that competences concern these two basic categories.

2.5. IT competences and accounting

In the early stages of IT/IS in business and especially in accounting the IT competences required by accountants was relate to the ability to use specific software packages. For example according to Bean and Medewitz (1987), the basic IT competences required for accountants were divided in four categories as follows: a) Programming, b) Software, c) Hardware and d) Networking and communication.

The good knowledge of microcomputers, which had recently introduced in the market, and the very good knowledge of spreadsheets were the most important IT competences, followed by the need for good knowledge of databases, accounting packages, statistical packages and word-processing. Also the knowledge of a programming language, mainly BASIC, and knowledge about computer communication was desired.

In the decade of 90’s a change in the required IT competences appeared. It was the evolution of technology and the introduction of IT systems in business that brought that change. In that era, accountants should be aware of IS such as accounting information systems (accounting packages included), management information systems, expert systems, computer science (including programming and database design) and mathematical programming (Kaye and Nicholson, 1992). Heagy and Gallum (1994), in their research for the required IT skills for the graduate accountants identify six categories of IT skills. These are the following: a) Spreadsheets, b) Database management systems, c) Telecommunications, d) Accounting systems, e) Systems development, f) Other IT topics.

According to their research, the knowledge of spreadsheets was still among the most important skills, followed by the need for very good knowledge of accounting systems, including accounting systems concepts and features in general and the ability to use specific accounting software. The good knowledge of how to manage and use a
A database management system was still of high importance as the ability to use word processing software and operating systems. A significant change was that telecommunication and networking competences become important. Accountants should know how to transfer files, uploading and downloading data, use local area networks, electronic commerce, world wide web etc (Larres and Oyeelere, 1999; Williams and Leung, 1995). The programming competences seemed to be in decline however a new competence category was emerged and that was the System development. Accountants should aware of how to identify new system requirements, evaluate computer software and hardware and generally have the ability to take part in new systems design and implementation process (Heagy and Gallum, 1994). Although this category was not at that point of high importance it was the first sights of the upcoming changes in IT accounting competencies which will requires that accountants should have except from strictly software skills, problem solving skills, analytical skills and a conceptual knowledge of accounting systems and information systems (Stone et al, 1996).

Trying to define the IT competences in accounting, Carnegie, (2004) states that IT competences is “the qualities which are demonstrated by activities such as the capacity to create a spreadsheet or database for a particular purpose, or the ability to use software”. Although this approach covers a big part of the IT competences that an accountant should have, restricts the accountant role to a simple user of an IT system. However the role of accountant in modern business is multidimensional and the possession of a wider range of skills is mandatory (Mohamed and Lashine, 2003). In line with this approach the International Federation of Accountants in document called “International Education Standard 2” (IES 2) (IFAC, 2014) formerly known as “International Educational Guide 11” (IEG 11) (IFAC, 2006b) acknowledges that an accountant in relation with an IT system should act as: a) User, b) Assurance provider and evaluator, c) Manager of an information system, and d) Designer of an information system.

According to IFAC an accountant is expected to perform more than one of these roles throughout its career. This does not limit the case that more specific roles in a narrower domain will needed to be performed by the accountants within the main roles. In order to cope with these roles IFAC proposes a wide set of IT skills which are categorized as a) General IT skills, b) User Role IT Control Competences, c) Assurance provider and Evaluator Role Competences, d) Manager Role Competences, e) Designer role competences. In Table 1 can be seen a summary of the proposed IT competences proposed by IFAC.

| Category/ Subcategory | Competences |
|-----------------------|-------------|
| (1) General IT Skills  | Be able to describe and explain the importance of aligning IT strategy to business strategy e.g. enterprise strategy and vision, current and future IT environment etc. |
| Information Technology | Be able to describe and explain how IT architecture relates to entire business model e.g. General concepts, hardware and software components, protocols, technologies etc. |
| It as Business Enabler  | Be able to describe and explain how IT impacts on the business model, processes and risks e.g. Stakeholders requirements elicitation, risk and opportunities related to IT etc. |
| Systems Acquisition and Development process | Be able to describe and explain the stages of the system acquisition and development process and understand the role of the accountant within it e.g. System design, requirements analysis feasibility study etc. |
| Management of Information Technology | Be able to describe and explain how IT is managed within an organization, with focus on accounting systems, performance monitoring, change management and procedures for updating software and hardware e.g. management of IT operations, IT asset management, IT security management, performance monitoring etc. |
| Communication and IT | Be able to describe and explain IT and the benefits and risks of IT in relation to communication. |
| (2) IT control knowledge | Be able to describe and explain IT internal control environments, IT objectives, IT risk events, IT risk assessments, IT risk responses, IT control activities, Information and communication in relation to IT, monitoring in relation to IT. |
| (3) IT control competences | Be able to describe and explain suitable control criteria for analyzing and evaluation controls, the IT internal control environment, selected IT objectives, identified IT events, IT risk assessment, selected IT responses, IT control activities, information and communication in relation to IT, the monitoring process in relation to IT, application of appropriate IT systems and tools to business/accounting problems, understanding of business and accounting systems and application of control to personal systems |
| (4) IT User Competences | Be able to apply appropriate IT systems and tools to business and accounting problems, demonstrate an
understanding of business and accounting systems and apply control to personal IT systems.

(5) Manager of Information System Role
Be able to describe and explain the managing an entity’s IT strategy, managing an IT organization, managing IT operations’ effectiveness and efficiency, maintaining financial control over IT, managing IT controls, managing system acquisition, development and implementation, managing systems change and related problem management

(6) Evaluator of Information Systems Role
Be able to describe and explain the planning systems evaluation, evaluating systems and communicate results of evaluations and following up.

(7) Designer of Information System Role
Be able to analyzing and evaluating the role of information in an entity’s business processes and organization, applying project management methods, applying systems investigation and project initiation methods, applying user requirements determination and initial design methods, applying detailed systems design and acquisition /development methods, applying system implementation methods and applying systems maintenance change management methods

However this is not the only guidance for IT competences that IFAC provides to its members. Another classification is the one implemented in International Educational standard 7 (IES 7) (IFAC, 2006c) and is related to IT competences required according accountants relevant work. The roles identifies are the a) Manager of information Systems, b) Evaluator of Information Systems and c) Designer of Information Systems. The proposed IT competencies are similar to those described before in Table 1 in the corresponding categories. However the approach of IFAC is referred strictly to IT skills and is not take into account and other skills that are related to the IT skills and can enhance them. Maisurah et al., (2012) during their research, identified that except technical IT skills, a number of other skills are of equal importance to be obtained by accountants in order to perform their job effectively such as organizational, conceptual, social and various other skills. These skills are considered supplementary to technical IT skills and provide support to them. A list of the identified skills can be seen in Table 2.

Table 2. Classification of IS abilities/knowledge/skills (Maisurah et al., 2012)

| Skills Categories / Elements                                      |
|-------------------------------------------------------------------|
| Technical Skills                                                  |
| Analysis and design, programming language, specific application and general IS knowledge, information system product, database and data communication, advanced applications, computer applications systems, systems theory and concepts, business functional knowledge, technology management knowledge, operating systems, network, personal computer tools. |
| Organizational Skills                                             |
| Time management, priority, information organization               |
| People skills                                                      |
| Organizational skills, organizational unit, interpersonal, communication, interpersonal relationships, management, professionalism, business, management, social, society, personal trait, professional skills, business knowledge. |
| Conceptual Skills                                                  |
| Problem solving, abstraction, strategic planning                   |

The Chartered Professional Accountants of Canada (CPA) organization which created by the merge of the Canadian Institute of Chartered Accountants (CICA) and Certified Management Accountants of Canada (CMA) in its Uniform Evaluation (UFE) Candidates’ Competences Map for 2014 for chartered accountants identifies also a list of IT competences required to have chartered accountants. (CPA, 2013). Examining the proposed IT competencies can easily be concluded that this list can also be applied not only to chartered accountants but to all professional accountants. The proposed competencies cover a wide range of IT aspects as the a) Professional skills, b) Governance, strategy and risk management, c) Performance and reporting, d) Assurance, e) Management decision making. In Table 3 are presented the proposed IT competences for each category.

Table 3 Competences Map for 2014 for Chartered Accountants.

| Professional skills            | Understands how IT impacts a CA’s daily functions and routines                                                                 |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Performance and Reporting     | Identifies the importance of governance activities. Understands the entity’s strategic plan and planning processes.           |
|                               | Evaluates the adequacy of the entity’s IT strategy. Assesses the IT risks and how they are managed. Understands the need for access to information |
| Governance, Strategy          | Develops or evaluates reporting processes to support financial reporting. Establishes or enhances financial reporting              |
Considering all the above proposed competences lists that have been presented, can be concluded that IT competences have evolved during the last three decades following the evolution in technology and in business. The first years IT competencies were limited to the knowledge of a specific software packages and that was the basic requirement by business. During the following years such competencies started to be considered trivial and the requirement for IT competences was moved to more IT/IS conceptual aspects from technological view and to more managerial aspects from business view. In current guides proposed by various International organizations can be notice that there are IT competences that are not strictly related to information technology but these can be explained by the fact that IT had become an integral part of almost every task undertaken by accountants, and consequently for many competences although IT is not directly in their description is always a constituent part or consideration.

3. Conclusion

Accounting and Information technology are closely related for many decades now. Accounting was the domain of business that first adopted IT and made an extensive use of it. During all these years the IT competences required by accountants was under a continuous change and evolution. Modern accountants are expected to have a high level of IT knowledge and skills and towards that direction the curriculum in accounting education have adopt a wide range of modules in order to provide accounting students with the required competences. However there are still questions about the level of IT skills and knowledge that is required by business and provided or should be provided to the accountants (Maisurah et al., 2012; Ahmed, 2003). As a response many international organizations, recognizing that need, have proposed various guides of IT competencies for a range of modern accounting roles. These competencies can be acquired either during the accounting educational stage or during the professional stage through various training programs.

In the future, the investigation of accountants’ competencies and skills should be focused on an holistic framework considering leadership, behavioural, and managerial aspects (Trivellas & Drimoussis, 2013; Trivellas & Reklitis, 2014; Trivellas & Santouridis, 2012) as well as exogenous and endogenous factors determining individual effectiveness such as emotional intelligence (Trivellas, Gerogiannis & Svarna, 2013), work stress (Kakkos & Trivellas, 2011; Trivellas, Reklitis & Platis, 2013), work motivation and commitment (Trivellas, 2009; 2011), infrastructure (Metalidou et al., 2014; Trivellas & Santouridis, 2013), culture (Trivellas, et al., 2014; Trivellas, Reklitis & Santouridis, 2006), strategy (Kutsikos & Sakas, 2014; Sakas et al., 2014; Trivellas, 2012; Trivellas, Reklitis & Konstantopoulou, 2007) and quality management (Trivellas & Santouridis, 2009). Moreover, vast research interest has been placed on accounting education for the development of the key competencies determining accountants’ success (Santouridis et al., 2013).

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