International Review of Social Sciences and Humanities
Vol. 9, No. 1 (2015), pp. 33-50
www.irssh.com
ISSN 2248-9010 (Online), ISSN 2250-0715 (Print)

Investigating the Strategic Relationship between Information Quality and E-Government Benefits: A Literature Review

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(Received: 15-1-15 / Accepted: 19-2-15)

Abstract
This paper presents a review of the literature on information quality and the benefits and outcomes of e-Government. According to Ge and Helfert (2007), research on information quality is related to three aspects, such as: information quality management, information quality assessment, and the quality of the contextual information. Literature suggests that there are two primary contributors to high information quality: information systems themselves and organisational factors. This paper presents crucial key findings and concepts from the literature examining one or other of these two factors. First, the contribution of information systems is examined; second, an array of writings on information quality is presented, painting a composite picture of the role of organisational factors and their contribution to information quality.

Keywords: Information Quality, e-Government, Literature Review.

1. Introduction

Over the past couple of decades there has been a growing demand for information technology (IT) in small-medium and large multinational organizations (Tarhini *et al*., 2015a, b). Organizations seem to be compelled to invest a significant amount of capital into IT and Internet services. Among these technologies, E-Government services increasingly centre on

the needs of citizens and businesses. Government leaders and e-Government advocates, therefore, continually seek to provide efficient transactions and services from e-Government initiatives to achieve both strategic and institutional benefits (Redman, 1995, 1998; Scholl, 2005; Hu *et al*., 2013; Abu-Shanab, 2013; Abbasi *et al*, 2015). However, the achievement of these benefits may be dependent on information quality and systems quality that are regarded as significant factors in the adoption of e-Government websites (Zhao & Benyoucef, 2014; Zhao *et al*., 2012). Moreover, the restructuring of government departments and the interoperation and collaboration of government agencies and their respective Electronic Government Information Systems (EGIS) across different levels and branches may also be required. This has made the computer-supported sharing of information a core issue of e-Government integration and interoperation (Scholl & Klischewski, 2007; Gil-Garcia *et al.*, 2007; Jimenez *et al.*, 2014, Mas'deh *et al*, 2015a).

In sharing information with citizens, or within governmental organisations, high quality information enables the participants to gain different types of benefits from such projects (Gil-Garcia *et al.*, 2007; Zheng *et al.*, 2009; Li &Feeney, 2014). Yet information can be shared based on different levels of quality and in many distinct ways, requiring different degrees of integration. Hence, academics and researchers argue that research needs to be explicitly dedicated to the phenomenon of Information Quality (IQ) which may have significant effects on the achievement of strategic and institutional benefits of e-Government. The researchers are therefore focused on information quality and its effects on e-Government benefits from the strategic and institutional perspectives, and its subsequent effects on performance.

The rest of this paper is structured as follows. Section 2.1 explores information quality in terms of its theoretical roots in information and quality and contemporary research addressing formal definitions, different dimensions, measurement techniques, management approaches and contributing success factors. Section 2.2 reviews information quality and information sharing benefits, including information sharing in e-Government; and factors influencing information sharing initiatives. Section 2.3 focuses on ensuring success in information strategies and e-Government including the quality of information in e-Government Services. Section 3 concludes the paper.

2. Literature Review

2.1. Information Quality

Information quality has been the subject of research for many years. Herein the researchers begin by looking at the theoretical roots from which information quality develops and then discusses the predominant research on establishing a rigorous definition of information quality. The section continues by examining the research on the dimensions of information quality, its management and in different ways it is measured.

2.1.1. Theoretical Background of Information Quality

Before exploring the nature of information quality, this section explores the concept's roots from theoretical perspective. These are found in separate disciplines (such as information systems, quality, strategy, and economics) of information and quality and further discussed below.

With a heavy emphasis on philosophical issues, Liu (2000) identified a number of research and practical applications of semiotics. Among these are linguistics, education, anthropology, computer science, information systems and organisational theory. Of particular relevance to the context of this research are the study of organisational semiotics and the application of

semiotics to the development of information systems. Most notably, when viewed through a semiotic lens, organisations themselves can be thought of as information systems. In line with this, the organisation can be described in terms of three nested layers of information systems. As the outermost layer, one finds the informal information system, "a sub-culture where meanings are established, intentions are understood, beliefs are formed and commitments with responsibilities are made, altered and discharged" (Liu, 2000). Next are the formal information systems, consisting of bureaucratic forms and rules, which serve to replace meaning and intention with codified systems. The innermost layer is made up of technical information systems, where information technologies are deployed to automate portions of the formal systems.

Academics and practitioners have defined the concept of quality in different ways and perspectives. For example, among the earliest proponents of quality as a management concept was W. Edwards Deming, best known for his contribution to the industrial reconstruction of Japan after World War II. In recognition of this work, the Japanese Union of Scientists and Engineers established the Deming Prize in 1951 to distinguish businesses, which achieved a certain level of quality. Deming (1982) asserted that quality improvements inevitably lead to productivity improvements, hence enhancements in competitive position. In Deming's view, low quality wastes effort and production capacity and causes reworking, each of which brings down productivity, increases cost and has the potential to damage a firm's reputation. Deming also emphasized that "the customer is the most important part of the production line". In particular, he noted, "the cost to replace a defective item on the assembly line is fairly easy to estimate, but the cost of a defective unit that goes out to a customer defies measure". Ironically, "the most intriguing feature of the criteria for the Deming Prize is that there is no mention of customer satisfaction" which is determines the firm's image (Mahoney and Thor, 1994).

Another important contribution to quality is the work of Juran (1988). Like Deming, Juran (1988) also highlighted the importance of the customer in defining and measuring quality and proposed that "a simple definition of quality is 'fitness for use'". He also noted that this "definition must quickly be enlarged, because there are many uses and users". In a departure from Deming, Juran (1988) greatly expanded the definition of customers "to include all persons who are impacted by our processes and our products". He went on to discuss a variety of internal and external customers, including essentially everyone involved in the processing or handling of a product until it reaches its eventual end user. Juran identified what he saw as three compelling reasons for an organisation to pay attention to quality: loss of sales, the costs of poor quality and threats to society, such as those resulting from product defects. To manage quality effectively, Juran defined and prescribed what he termed as a "trilogy" of quality management processes: quality planning, quality control and quality improvement.

A third major contributor to the work on quality is Crosby (1992, 1996). Echoing Deming and Juran's work, Crosby (1992) emphasized the role of the customer, stating that "the only absolutely essential management characteristic of the twenty-first century will be to acquire the ability to run an organisation that deliberately gives its customers exactly what they have been led to expect and does it with pleasant efficiency". To fulfil this mission, he advocates that an organisation should work to make all its key constituents successful, above all its employees, suppliers and customers. He cautions, however, that "quality is hard to pin down, because each person thinks everyone else defines it the same way he or she does" (Crosby, 1996). The other major development in quality is the ISO 9000 series of international standards. The focus of these standards is on organisational capabilities in regard to quality management. Organisations doing business internationally may voluntarily seek ISO 9000 certification as a way of assuring their international customers that they have the demonstrated organisational ability to provide quality products and services (Mahoney and Thor, 1994). The above outline of the background to information quality information suggests that quality definitions come from different viewpoints, owing to the contextual nature of

quality. In the following section, the researchers review the different dimensions of information quality and their arrangement.

2.1.2. Defining Information Quality

Considerable research attention has focused on the need for a rigorous definition of information quality (e.g. Juran *et al.*, 1974; Wang and Strong, 1996; Otto *et al.*, 2009; Obeidat *et al.*, 2012; Jingjun *et al.*, 2013; Ayala and Franch, 2014). This section explores the research literature seeking to establish such a definition, including looking at the early attempts on defining information quality. Furthermore, this section assesses different dimensions of information quality identified by different models, including discussing on the model used in this research. The awareness of information quality as an issue emerged gradually during the early years of computing and computers. In 1958, for instance, Maffei wrote, "a theory of the cost and value of information is needed. We need to know quantitatively what price is being paid by deviating from a 'best' course of action and weigh this against the cost of getting better information" (Maffei, 1958). In describing this as a cost issue, Maffei was referring to cost in the broadest possible sense, including such notions as opportunity cost and the cost of making poor decisions based on inferior information. Similarly, Trueblood (1960) focused on what was at the time the newly emerging field of operations research. As he put it, "the purpose of operations research is not to replace management judgment but to provide more and better information".

2.1.3. Information Quality Dimensions

Information quality literature provides a detailed classification of the dimensions of data quality; however, most dimensions contain discrepancies in their definition owing to the contextual nature of quality. The six most important classifications of quality dimensions are provided by Jarke *et al.* (1995); Wang and Strong (1996); Wand and Wang (1996); Naumann (2002); Bovee *et al.* (2004); and Redman (2005). By analysing these classifications, Catarci and Scannapieco (2002) reported that a basic set of data quality dimensions, namely, accuracy, completeness, consistency and timeliness, which form the focus of most studies, can be defined. Batini *et al.* (2009) however argues that there is no general agreement as to which set of dimensions defines the quality neither of information nor on the exact meaning of each dimension. For the purpose of this research the four main dimensions described by Catarci and Scannapieco (2002), underlying most definitions and studies of information quality provided in the literature are discussed below (Accuracy; Completeness; Consistency and; Time related dimensions).

Accuracy: Several definitions are provided for the term accuracy. Wang and Strong (1996) define accuracy in terms of the extent to which data are seen to be correct, reliable and certified. Michnik and Lo (2009) specify that data are accurate when the data values stored in the database correspond to real-world values. According to Redman (2005), accuracy is defined as "a measure of the proximity of a data value, 'v', to some other value, 'v', which is considered correct". In general, two types of accuracy can be distinguished, syntactic and semantic. Information quality methodologies consider only syntactic accuracy and define it as the closeness of a value, 'v', to the elements of the corresponding definition domain 'D'.

Completeness: Completeness is defined as the "degree to which a given data collection includes all the data describing the corresponding set of real-world objects". Comparing several definitions of completeness reveals that there is a substantial agreement on the abstract definition of completeness. Definitions differ as to the context to which they refer; for example, Wand and Wang (1996) refer to the information system; Jarke *et al.* (1995) report of the data warehouse and Bovee *et al.* (2004) denotes completeness as the sense of an entity. In the research area of relational databases, completeness is often related to the meaning of null

values. A null value has the general meaning of a missing value; a value which exists in the object described but is not available in the data on it. In order to characterise completeness, one should understand why the value is missing. A value can be missing either because it exists, but is not known, because it does not exist at all, or because it is not known whether it exists (Atzeni and Antonellis, 1993).

Consistency: The consistency dimension refers to the violation of semantic rules defined over a set of data items. With reference to the relational theory, integrity constraints are a type of such semantic rules. In the statistical field, data edits are typical of the semantic rules allowing for consistency checks (Batini *et al.,* 2009). In information systems, consistency is regarded as the extent to which information is presented in the same format and compatible with previous data (Kahn *et al.,* 2002). Consistency is also regarded to be part of representation quality category as it concerns itself with how the information is presented to meet the need of the user (Abu-Shanab, 2014).

Time-Related Dimensions: A vital aspect of data is of being updated over time. The main time-related dimensions proposed in the literature are currency, volatility and timeliness. Wand and Wang (1996) and Redman (2005) provide very similar definitions for timeliness and currency. Liu and Chi (2002) assume the same meaning for timeliness, while Bovee *et al.* (2004) provide a definition for timeliness in terms of currency and volatility. The definition of currency expressed in Bovee *et al.* (2004) corresponds to timeliness as defined by Liu and Chi (2002). This comparison shows that there is no agreement on the abstract definition of time-related dimensions; typically, currency and timeliness are often used to refer to the same concept.

Adopting a customer perspective similar to that advocated by Juran (1988), Wang *et al.* (2005) noted that the use of the term information product emphasizes the fact that the information output has some value which is transferred to customers, whether internal or external to the organisation. This perspective subsequently became one of the driving forces for Wang and Strong (1996) to develop a framework for the important aspects of information quality in the eyes of information consumers. Wang and Strong (1996) stated "although firms are improving data quality with practical approaches and tools, their improvement efforts tend to focus narrowly on accuracy". They then went onto report on the results of a major study involving a two-stage survey. Beginning with a very broadly based set of nearly 200 data quality attributes, Wang and Strong (1996) used factor analysis to narrow the set to a much more parsimonious set of 20 dimensions. On the basis of this second-stage survey, they reduced this set even further to 15 dimensions, along with four categories for grouping those dimensions: intrinsic, contextual, representational and access and summarised their findings as follows:

- Intrinsic Data Quality (DQ) denotes that data have quality in their own right.
- Contextual DQ highlights the requirement that data must be considered within the context of the task in hand.
- Representational DQ and Accessibility DQ emphasize the role of systems.

These findings are consistent with the understanding that high-quality data should be intrinsically good, contextually appropriate for the task, clearly represented and accessible to the data consumer.

2.1.4. Information Quality Management

This section examines the research literature on information quality management. Information quality is considered as sufficiently distinct to warrant its own approach to management, as opposed to the available approaches to managing quality in general. The researchers provide

in-depth insights to the research on measuring information quality, including both subjective and objective measurement approaches, since an understanding of measurement is essential to any management approach. Furthermore, major approaches to managing information quality, namely, Total Data Quality Management (TDQM); data production maps and benchmarking are discussed. Most of the frameworks and approaches proposed for managing information quality are derived from an analogy between physical product manufacturing and information product manufacturing (Paradice and Fuerst, 1991; Wang *et al.*, 1995; Wang and Strong, 1996; Ballou *et al.*, 1998; Wang *et al.*, 1998; Shankaranarayanan *et al.*, 2000; Scannapieco *et al.*, 2005; Smith *et al.*, 2014).

It is reasonable to find out why the extant approaches for managing the quality of physical products (Deming, 1982; Juran, 1988; Crosby, 1992, 1996; Mahoney and Thor, 1994) were deemed unsuitable or insufficient for managing the quality of information products. As Ballou *et al.* (1998) stated that the differences arise from the nature of the raw material. More generally, these differences have to do with the nature of information itself, producing differences in the nature of information quality as opposed to the quality of a physical product, with the difficulty of measuring information and with the contexts in which information is used. As regards the nature of information itself, a key difference between information and physical products is in the fact that data can be consumed repeatedly, indeed, indefinitely, without being depleted (Paradice and Fuerst, 1991; Ballou *et al.*, 1998; Wang, 1998; Shankaranarayanan *et al.*, 2000). In this context, information is more like a tool crib than an inventory (Ballou *et al.*, 1998). However, even this analogy falls short, given that tools are not incorporated into final products. In pointing out that a single piece of raw data can be captured once and then used in multiple information products, Shankaranarayanan *et al.* (2000) make the point that a good representation imperatively must be accurate over the details of whatever triggered the capture of these data along with how, by whom and where it was done.

Data may also be collected continuously and stored indefinitely without knowing whether it will ever be incorporated into an information product. Unlike physical manufacturing, the collection and storage of an additional piece of raw information material on the chance that it might be used in the future results in relatively little additional expense to the organisation. Differences in the nature of quality between information and physical products can be accounted for partly by considering the specific dimensions of information quality that lacks a physical counterpart. For instance, as Wang (1998) observed, it can be said that an item of raw material arrived just in time, but one would not ascribe the intrinsic property of timeliness to the raw material. Similarly, dimensions such as believability simply have no counterpart in product manufacturing. These differences also manifest themselves in the aggregate, in that, for information products, the quality of the individual data items which make-up an information product are as important to the consumer as the quality of the overall product (Shankaranarayanan *et al.*, 2000).

Another difference between information quality and product quality is to do with the difficulties associated with measuring information, given that information has no physical properties to measure (Redman, 1995). With respect to the accuracy dimension, which Wang and Strong (1996) identified as one of the intrinsic dimensions, accuracy cannot be measured intrinsically; its measurement must always reference something else, such as the real world situation represented by the data (Redman, 1995; Wand and Wang, 1996). In terms of the context of use, Redman (1995) pointed out a subtle but important distinction between information quality and physical product quality, namely, that most useful data are novel or unique. As a hypothetical example, he considered the absurdity of including genus and species fields in employee records. With every entry identifying the employee as homo-sapiens, the data would be highly accurate, but uninteresting. Instead, it is the uniqueness of the values that makes them interesting. This contrast with most manufacturing processes where one strives for uniformity and can apply standard measures. To handle this uniqueness

while maintaining quality control, Pierce (2005) suggested the use of automatic range checking or an assortment of feedback mechanisms, such as customer-driven, staff-driven, or management-driven feedback, or a combination of these.

2.1.5. Information Quality Measurement

Essential to the ability to manage something is the ability to measure it; managing information quality therefore may not be done properly without measuring it appropriately. This section discusses on the measurement of information quality, beginning with a brief historical look at the issue, followed by discussions of subjective measurements, objective measurements and combined approaches. Ballou *et al.* (1998) recognised that information quality is a relative rather than absolute term. In support of their work, they proposed a model for evaluating the magnitude of errors. They also identified four dimensions as relevant: accuracy, timeliness, completeness and consistency, and proposed measurements for each in terms of its differential in relation to some reference point. Taking a rather different approach, Agmon and Ahituv (1987) applied the concepts of quality control theory, as used in industrial engineering, to the issue of data reliability in information systems. In doing so, they subdivided the concept of data reliability into three components: internal reliability, relative reliability, and absolute reliability. In their use of the terms, internal reliability is most closely associated with what they call commonly accepted data use and characteristics, such as allowing positive values for quantities only in an inventory control system. Relative reliability is measured against user requirements, such as requiring that every vendor should have the name field specified. Absolute reliability is measured against experience and verified by observation (Agmon and Ahituv, 1987).

Against this backdrop, many researchers remained focused mainly on accuracy, considering others of less importance. Paradice and Fuerst (1991), who focused their efforts on a proposed formula for computing a stored error rate, defined this as a combination of the ratio of a particular data element classified as being in error and the percentage of times when the element was classified as correct, weighted by the probability, as measured by random samples, that any given element will be in error. Despite their limited focus, Paradice and Fuerst (1991) provided a valuable contribution to the field of data quality management. For instance, while noting that nearly all the previous literature they had reviewed relied upon the use of internal control processes, such as audits, rather than a quantifiable mechanism such as a calculated error rate, they observed a lack of research seeking to apply the quality control methods of manufacturing to information processing. In this context, Paradice and Fuerst (1991) proposed the metaphor of data as raw material being consumed by a data manufacturing system to produce information. They however, noted that data unlike most raw materials is not consumed when processed and therefore may be reused repeatedly.

Subjective Measurements: Lee *et al.* (2002) observed that despite a decade of research and practice, only piece-meal, ad hoc techniques were yet available for measuring, analysing and improving IQ in organisations. In response to this situation they developed a measurement instrument, known as the Information Quality Assessment (IQA), which measured stakeholder perceptions of each dimension in the model by Wang and Strong (1996). This instrument, which employs 69 items to measure the various dimensions of information quality, has been used as the basis of several studies requiring information quality measurement (Kahn *et al.*, 2002; Pipino *et al.*, 2002) and also for studies which further extend this measurement concept, such as the PSP/IQ model (Kahn *et al.*, 2002). The PSP/IQ model aggregates the results of the 69 items and 16 dimensions measured by the IQA to produce a measure of information quality consisting of only four numbers. By using the IQA to measure the dimensions, the quadrant measurements are derived by calculating the mean scores for the dimensions associated with each quadrant (Kahn *et al.*, 2002; Lee *et al.*, 2002).

Objective Measurements: Despite the quantitative nature of the measurements in the previous section, these measurements are subjective, based on human perceptions and subject to the notions of human interpretation of the state of information quality and the meaning of the questions asked. Herein the focus shifts to objective measurements, beginning with a look at formal definitions, followed by an introduction to the difficulties associated with measuring information quality objectively and proceeding to a discussion of proposed metrics and measurement scales.

Wand and Wang (1996) used an ontological perspective to develop rigorous definitions of the dimension. Drawing on communication theory and information economics, they adopted the fundamental notion that Information System (IS) exists to represent an application domain (also termed the real-world system) as perceived by the user. On the basis of this notion, Wand and Wang (1996) developed a formal definition of an information system and its ideal state as a correct representation of a real-world system. Information quality problems thus manifest themselves as one of four types of deficiency: incomplete representation, ambiguous representation, meaningless states and incorrect states. Each of these is defined precisely and formally in terms of a mapping from the real-world system to the information system and back again. Information quality dimensions (or their negative counterparts) are defined in terms of represented states and deficiencies. For example, an IS is inaccurate if it represents a real world state different from the one that it should have represented. Similarly, inconsistency is a state in which the representation mapping has one element too many.

Although such formal definitions have been developed, the ability to operationalise measurements for some information quality dimensions continues to elude researchers. Accuracy, in particular, is especially troublesome. As Redman (2005) stated, all measurements of data accuracy must, of necessity, make reference to human knowledge of other data, or the world beyond the system. Redman (2005) proposed a four-component framework for measuring accuracy. First, one must consider the point of measurement, which may be the point when the data are transmitted from a data supplier, when they enter a database, whey they are delivered to an end user, when the user perceives them, or across the entire chain. Second, one must decide which data to include in an accuracy measurement. For instance, one might include all the data in a database or perhaps only specified key attributes. Third, the measurement device or mechanism must be considered. Accuracy can be measured in a number of ways, such as by inspection, by tracking its movement along an information chain, by comparison with the real world, or by comparison with a set of permissible answers in accordance with specified business rules. Finally, one must determine the level of analysis, such as the field level, as opposed to the record level.

Another objective measurement concept to be discussed is the need to consider the type of scale, whether ratio, interval, ordinal, or nominal. Pipino *et al.* (2002) noted that, typically, the definition of these dimensions and their associated metrics is based on an intuitive understanding or industrial experience. They went on to caution that “lack of attention to scale type can lead to improper interpretation and application of measurement results, especially when combining dimensions to obtain a single metric”. To address this problem, Pipino*et al.* (2002) developed precise, formal definitions for completeness, correctness, system currency, storage time and volatility, and they demonstrated that each of these dimensions could be measured with the ratio scale.

In this section, the researchers assessed different ways of measuring information quality, either subjectively or objectively, from an assortment of perspectives. Each of these approaches falls short of the call by Wang and Strong (1996) for an overall data quality metric. One recommendation that comes close is described in Pipino *et al.* (2002). In addition to the three generic forms, Pipino *et al.* (2002) proposed the use of a simple two-by-two grid, with high-low subjective assessments on one axis and objective assessments on the other. The resulting mapping onto one of four quadrants can then be used as an overall gauge of

information quality. While this approach does allow a single metric to be assigned, the differences in scale limit what one can do with this metric (Pipino*et al.*, 2002).

2.2. Information Quality and Information Sharing Benefits

When studying information integration and information sharing benefits, the researchers identified that Pardo and Burke (2008) divided these benefits into three categories: technical, organisational and political. As depicted in Figure 1, the benefits gained from information sharing initiatives are dependent on Information Quality as an enabler and as a factor in increasing the success of e-Government information sharing projects.

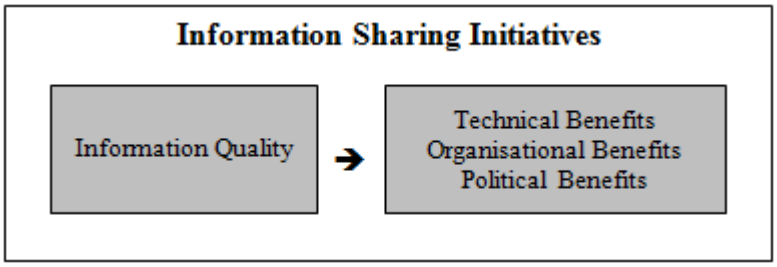

Figure 1: E-Government information sharing relationship with IQ

- Technical benefits are those related to data processing and information management. Information integration and sharing initiatives can also improve IQ, data standards and the sharing of technical resources.
- Organisational benefits are related to the solution of agency-wide problems or the enhancement of organisational capacity. Improving the decision-making process, broadening professional networks, improving coordination, increasing the quality of information and services, and reducing costs are examples of organisational benefits (Andersen and Dawes, 1991; Gil-Garcia and Pardo, 2005).

Political benefits might include better appreciation for government-wide policy goals, more public accountability, more comprehensive and higher quality public information, together with integrated planning and service delivery (Andersen and Dawes, 1991). Political benefits can also be considered as individual benefits for public officials, as a result of the use of specific technology characteristics or applications.

2.2.1. Information Sharing in e-Government

Information technology is potentially capable of changing government organisational structures and business processes and, if implemented correctly, of producing substantial organisational, technical, and business benefits (Heeks, 1999; Kraemer and King, 2003; Masa'deh, 2012; 2013; Tung-Mou *et al.*, 2012; Yang and Wu, 2014; Tarhini *et al*., 2014 a,b,c; Alalwan *et al*., 2014; Masa'deh *et al.*, 2015 b,c). IT projects in general, and information-sharing projects in particular benefit both the public and private sectors. For example, in the public sector, within the criminal justice system, the courts, law enforcement agencies and corrections officers can share evidence and criminal histories to better coordinate their efforts and improve their performance and accountability (Cresswell and Connelly, 1999). In modern supply chains, companies can share forecasts, inventory and data on item movement in pursuit of several benefits, including reduced inventory levels, reduced order variability and improved use of capacity (Clark and Hammond, 1997).

As Scholl (2007) stated that the body of scientific literature on information sharing is spread across various disciplines, such as information systems research, computer science and

engineering, public management, organisation science, and information science, each has addressed various technical and non-technical aspects of integration and interoperation. Yet, a comprehensive, synoptic, and integrative review of those literatures is still missing. However, even if such a review existed, the differences established between the public and private sectors in the literature still apply, in particular in the context of information technology. The author, therefore, considers focusing on closing this gap, firstly by reviewing the topic of information sharing in the literature related to e-Government.

In the public sector, information sharing is defined as exchanging or otherwise giving other agencies access to information (Pardo and Burke, 2008). Information sharing and integration can help government agencies to provide better public services and to solve critical public problems through facilitating collaboration between organisations. Today, the delivery and management of public services increasingly in dealing with ambitious or complex issues relies on complex networks of interdependent organisations (O'Toole, 1997; Bigdeli *et al.*, 2012; Tarhini *et al*, 2013 a,b,c), because networks of organisations can solve problems which are too much or not easy for single organisations. A reciprocal and voluntary collaboration between two or more government agencies or between public and private or non-profit entities is demanded to deliver government services. Tapscott and Caston (1993) suggested that in the development of information and communication technology, inter-organisational networks and external alliances have become more common and consequently sharing and integrating information across government organisations has also become more attractive and practical (Bigdeli *et al.,* 2012; Bertot *et al., 2013*).

2.2.2. Factors Influencing Information Sharing Initiatives

Organisations that embrace an information-sharing project, consider several factors. For example, organisations working on electronic data interchange, which involves the exchange of typical business data, contemplate organisational readiness, system complexity and the expected benefits of the application before committing themselves to it (Pardo and Burke, 2008; Tung-Mou*et al.*, 2012, Tarhini *et al*., 2015c,d). Generally, organisations base their decision to move forward with an information-sharing project on a business case which incorporates the expected benefits and all the relevant costs, including development, installation, and recurring costs (Irani *et al.*, 2005; Cresswell *et al.*, 2006). In addition, they consider the potential impediments, including technological, organisational, political, and legal barriers, which could limit the level of benefit or completely derail an information-sharing project (Caffrey, 1998; Luna-Reyes *et al.*, 2005; Pardo and Burke, 2008; Gil-Garcia *et al.,* 2010; Yang and Wu, 2014; Orozco *et al*., 2015). Zheng *et al.* (2009) in their investigation of the factors influencing information sharing in the public sector identified three perspectives:

- First, the technological perspective, where advances in information technology increase the ease of information flow and provide more options for sharing and integrating information. Different organisations may use various types of hardware, software, data standards and definitions, not to mention programming languages, which would make the task of integrating them a great challenge. In addition, system outsourcing could become a barrier, for contractors may reveal critical government information, go out of business, or decide not to collaborate for reasons of competition.

- Second is the organisational perspective, in which he claims that an ideal bureaucracy is an efficient and fair organisation with laws and administrative regulations established. However, the hierarchical structure of a bureaucracy may impede information-sharing within an organisation. Centralisation in hierarchical structures has a significant negative impact on the sharing of information in a multiunit

organisation. When employees have limited autonomy and need to get approval from superiors for most decisions, their interest in sharing information with other groups is greatly reduced. In addition, Willem and Buelens (2007) claim that the horizontal departmentisation of bureaucracy could also constitute a barrier to information-sharing. Gil-Garcia and Pardo (2005) found that the complexity of cross-boundary information-sharing gradually increases from the organisational level through the inter-organisational level to the intergovernmental level.

- Third perspective is the legal and political perspective, where information-sharing initiatives in government agencies are embedded in a complex legal and political environment. Laws and policies thus have a marked influence on organisations in the public sector. In a democratic system, government agencies must cope with pressure from legislators, courts, interest groups and citizens. Layers of mandates, such as crosscutting regulations and crossover sanctions, escalate coordination requirements and constitute pressures for leaders working in a network structure (O'Toole, 1997). The legitimacy of a cross-boundary sharing programme often rests on general legal authority over a governmental function, on specific legislation, or on a formal executive directive. Without supportive legislation, information-sharing initiatives in the public sector may lack the funding and resources to make them sustainable.

2.3. Ensuring Success in Information Strategies and e-Government

E-Government strategy in a broader sense refers to the fundamental component of modernising the public sector, through identifying and developing organisational structure; interacting in various ways with citizens and business; and reducing the cost and layers of organisational business processes (Cabinet Office, 2000). It provides a wide variety of information to citizens, businesses and employees through the Internet. To be specific, e-Government can develop strategic connections between public sector organisations and their departments and enable e-Government levels, e.g. central, city, and local, to communicate with each another. This connection and communication improves information sharing and as a result improves the cooperation between bodies by making it easier to create and implement government strategies, transactions and policies, and to better use and run government processes, information and resources (Heeks, 2001; Tung-Mou *et al.,* 2012; Yang and Wu, 2014).

To successfully implement these success strategies, different theoretical views have suggested different factors which may be seen as relevant to understanding information technology in organisations. One view is that of Garcia and Pardo (2005); they defined e-Government strategies as systematic and long-term approaches to problems. Federal, state and local governments are nowadays investing in the development of strategies to further their e-Government goals. In their attempt to develop a practical guide for practitioners, they list the following factors in the success of e-Government initiatives:

Information Quality Strategies: To ensure high quality and homogenous information by creating (a) an overall plan to manage information; (b) an information quality assurance programme; (c) agreements with partners by information sharing standards and common data definitions; (d) getting continuous user feedback, and (e) training (Brown, 2000, Burbridge, 2002).

Information Technology Strategies: The main factors in the successful implementation of information systems in e-Government are the usefulness and ease of use of the system (Brown, 2000; DeLone and McLean, 2003; Garson, 2003). Due to the relative complexity of some technologies, the strategy should consider (a) the need to build awareness and to focus early efforts on developing prototypes for the system and process; and (b) the need for strong

technical skills and expertise (Garson, 2003).

Organisational and Managerial Strategies: Establishing clear and realistic goals is an important factor in the success of IT initiatives (Melitski, 2003). Other factors in this category are: (a) identifying relevant stakeholders and getting them involved in the successful development of the project, the end-users in particular; (b) strategic planning techniques; (c) improved business processes; (d) the development of technical skills through training; and (e) the development of financial schemes and partnerships to get e-Government initiatives off the ground (Mahler and Regan, 2002).

Legal and Regulatory Strategies: Developing appropriate e-Government-wide IT policies and standards can also strengthen the framework in which e-Government initiatives can succeed; moreover, changes to the regulatory environment which allow for or enable people to adopt emerging technologies are essential for the success of e-Government initiatives (Kim *et al.,* 2005).

Institutional and Environmental Strategies: Strategies to deal with institutional and environmental factors are: (a) leadership to capture the attention of legislators or other policy makers; and (b) the strategic use of outsourcing (Chen and Perry, 2003).

As Helbig *et al.* (2009) point out, the goals of e-Government are to improve the quality of the service, increase the efficiency of administrative processes and enable governments to more effectively participate and engage with service users. Hence, the attainment of e-Government goals is of strategic importance for governments. The benefits to be expected from the previously discussed strategies, such as better services, operational savings and increased programme effectiveness, can be gained from these information-sharing initiatives (Zheng *et al.,* 2009; Yang and Wu, 2014). Nevertheless, researchers such as Scholl & Klischewski (2007) suggest that little research has been conducted into identifying the measures that determine e-Government success when enhancing the capacity to share information between organisations.

2.3.1. Quality of Information in e-Government Services

E-Government websites have as their main goal to provide better and more convenient services to citizens and institutions (Gouscos *et al*., 2007; Dolson and Young, 2012; Zhao & Benyoucef, 2014). They can access government information and services anywhere and at any time. Less time is spent on travelling and waiting. In addition, online services are quicker than face-to-face services. From the government's standpoint, the more citizens use e-Government initiatives which are designed to alleviate the problem of having access to information and improve government services, the more operation and management costs are reduced (Gouscos *et al.,* 2007). For these reasons, governments around the world are making their services available online via e-Government websites such as South Korea, South Africa and Nigeria.

In addition, several researchers (e.g. Yang and Wu, 2014) concluded that the significant barriers affecting the use of e-Government websites were the lack of information about which e-Government websites should be used and which services were available, the lack of the desired information or application forms, insufficient instructions, low confidence in the system and its slowness. By contrast, their study showed that the attractiveness of e-Government websites and confidence in the security of the system were inducements. In their research, of adaption and use of e-Government websites, Colesca and Dobrica (2008) grouped the IQ dimensions into such aggregate factors as perceived ease of use, perceived usefulness, perceived trust and perceived quality, with the dimensions of, for example, accuracy, relevance, security, etc., included in the aggregate. Other factors such as user satisfaction and

demographic impact were also analysed. The analysis revealed that the users' higher perception of usefulness, ease of use, quality and trust of e-Government services directly enhanced their satisfaction and implicitly the level of adoption of e-Government. Furthermore Colesca and Dobrica (2008) suggested that for e-Government services to be effectively adopted, widespread and appealing awareness campaigns should be conducted, targeting potential users accurately to inform them about the value of the benefits they would gain.

3. Conclusion

In this study, the researchers reviewed the literature on information, its quality, together with the relationship between them. The researchers further discussed on some different views of quality in general, and information quality in particular, noting the multiple dimensions and different arrangements of quality in dealing with information and its use. Furthermore, this research explored the literature on measuring and managing information quality with a focus on contemporary research, to define the gaps and set out a research stream. Similarly, the literature on e-Government and its critical success factors were also reviewed, including discussing a number of different views on e-Government success strategies. Additionally, the researchers reviewed the benefits of information sharing and the ways in which information quality enables in achieving e-Government strategic benefits and improving organisational performance, along with the advantages gained from information sharing initiatives.

However, synthesis of the literature reviewed in this paper revealed that despite the large amounts of research about information quality, few studies offer a comprehensive understanding of the relationship between information quality and organisations performance. Also, the limited research on information quality and organisations performance focuses on private sectors and pays little attention to governments and public organisations. E-Government success literature has rarely investigated information quality as a contributor to the success of e-Government initiatives. In addition, much of the research has been descriptive in nature with relatively little theoretical grounding and do not demonstrate causality. To overcome these issues, future research should report on developing a model that best explains the information quality factors and their interrelationships that affect e-Government performance. Indeed, this research thus builds a foundation on which to develop a conceptual model and contextual framework of future research. A model could be developed by means of which e-Government strategic benefits and information quality research can be viewed. The coming research framework will allow the researchers to examine a set of strategic relationships between aspects of information quality and organisational success. By investigating such relationships, the coming research could contribute to the body of knowledge by examining the nature, direction and strength of the specific connections between initiatives to improve the quality of information and the success of e-Government initiatives.

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