Considering Information Re-use in Public Sector Information Systems: A Factor of Success?*

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Abstract
The escalating adoption of information and communication technology in public organizations has significantly broadened access to extensive data. Consequently, there is a heightened demand for strategic information management, aiming to render information not only usable for current purposes but also for future applications, including learning. This paper investigates information technology system user experiences in an ongoing case study of a large public sector authority in Sweden, specifically focusing on identifying additional uses through the application of an archival perspective. The results yield essential insights for information systems design, emphasizing the significance of considering both primary and secondary uses. By expanding the time perspective of system use, the study highlights the potential for information reuse for learning purposes, affirming that a more thoughtful design can substantially amplify the system's overall success.

Keywords
Re-use, information retrieval, information system, public sector

1. Introduction

Given the escalating prevalence of information and communication technology (ICT), ensuring the usefulness of systems for workers becomes paramount, addressing both primary and secondary use [1]. Research indicates that the challenge in employing ICT in public organizations lies in operating effectively within an era of vast data and information, stemming from a deficiency in appropriate management approaches, governance structures, and policy frameworks [2]. This challenge extends to the use and design of information systems (IS), shaping how information is stored, structured, and retrieved. A successful IS design hinges on high user satisfaction, fostering greater or novel intentions to use the system [3].

This study explores the usage of an information technology (IT) system in a large public sector authority in Sweden, focusing on functionality and how it relates to its users. Rather

than the technical specification of the system, we focus on the information stored in the system and current and future opportunities for its use. Some of the information in the system is regarded as records, that is "information created, received and maintained as evidence and as an asset by an organization or person, in pursuit of legal obligations or in the transaction of business" [4, p.4]. A general requirement of authoritative and accountable records is that they should have authenticity, reliability, integrity, and usability, and they must be possible to locate, retrieve, present, and interpret as long as they are of relevance to their stakeholders [4]. An IS is, in the majority of cases, made with a known user in mind, and as Petter, DeLone, and McLean [5] argue, there can be several variations of usage. Still, to be able to increase the quality of an IS, it is important to find methods to elucidate different use situations and many potential users [6]. This paper, based on an ongoing case study, aims to investigate variations of use and how the consideration of different forms of use can contribute to increased IS success. Finally, the results capture the system users' conceptions of the IT system, which is useful in learning how to enhance the system's success.

2. A conceptual Framework

2.1. The Information Systems Success Model

Given the increasing development of different IS, there is also an increasing interest in measuring the outcome of the invested IS and, thus the success of the information systems. The measurement of success has changed from measuring speed and accuracy to a more subjective measurement of the strategic and social impact of the system [7]. The Information System Success Model by DeLone and McLean (D & M success model) is a framework consisting of a taxonomy with six interrelated and interdependent dimensions [3]. The six dimensions: systems quality, information quality, service quality, use (and intention to use), user satisfaction, and net benefits can be used to investigate what constitutes information system success [3]. Various approaches to IS success studies have aimed to measure success in different contexts (e.g. e-commerce and e-government systems et cetera) to evaluate IS. However, a successful IS needs to possess certain criteria, and as Elpez and Fink [8] argue: "[...] it is expected that it becomes a key component in achieving the organization's mission", and [...] more narrowly, improve productivity and facilitate service delivery" [8, p. 219]. The six interrelated dimensions include the measurement of each dimension. When measuring information systems' success, the quality dimensions of the model need to be measured or controlled since the quality affects "use" and "user satisfaction". All dimensions interrelate and in a causal sense, being satisfied will lead to increased use and intention to use, as well as result in "net benefits" of some sort depending on the context. It can also result in negative benefits which can lead to decreased use [5]. According to DeLone and McLean, use comes in many different shapes, and they argue that use can be "mandatory versus voluntary, informed versus uninformed, effective versus ineffective" [3, p. 23]. In the updated model, "intention to use" has been added to the dimension "use" where the latter is described as a behavior and "intention to use" as an attitude. Still, as DeLone and McLean argue, use, whether intended or not, is difficult to

measure. An IS is, in most cases, made to be used by a known user, and according to Petter, DeLone, and McLean [5], there can be several variations of usage. However, to be able to increase the quality of an IS, it is important to find methods to elucidate different use situations and many potential users [6].
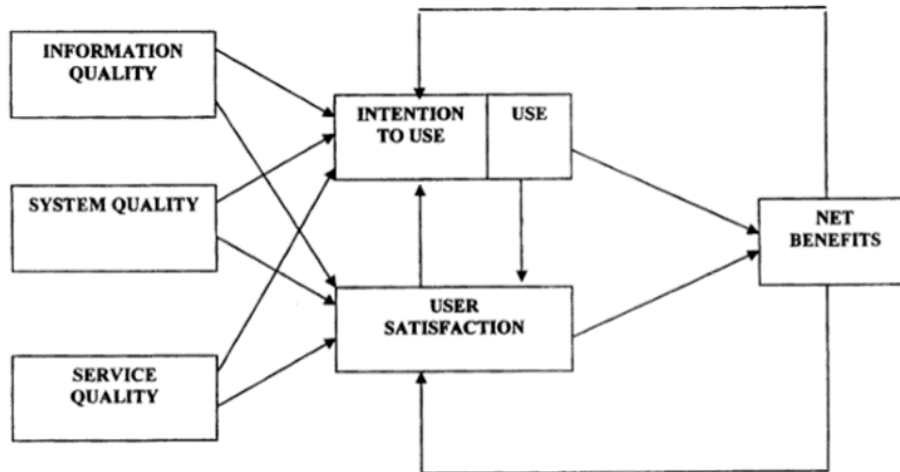
Figure 1: D & M IS Success Model. (3, p.24).

The net benefits capture the balance of positive and negative impacts from the IS system and are the most important success measurement but must be interrelated and understood with the measurement of the quality dimensions [3]. As Delone and McLean have illustrated in Figure 1, the net benefits are directly affected by the use/the intention to use, and the user satisfaction of the system. Further, the net benefits affect the user satisfaction and the intention to use the system. This means that poor systems quality (a negative balance of the net benefits) will lead to user dissatisfaction and a lower intention to use, lowering the actual use, while high user satisfaction from a positive balance of the net benefits leads to an increased intention to use.

The D&M IS Success Model works as an analytical lens since it highlights the difficulties of measuring use. By exploring the variations of use with archival concepts, this paper aims to contribute to the consideration and understanding of these variations and how they can contribute to increased IS success.

2.2. A Records' Perspective on Use and Re-use

In the context of designing recordkeeping systems, Borglund and Öberg argue the importance of considering the use as well as who the user might be. In their study, they used a temporal structure of primary and secondary purposes of the use of records in four case studies of Swedish organizations [1]. This dichotomy of use originally stems from Schellenberg's [9] taxonomy of values adhered to records, intended as a tool for the appraisal of how long records should be preserved. According to Schellenberg, records have a primary value for the organization that creates the records, and they should be preserved

as long as they are needed for the organization to perform its business. However, they have also secondary "values that will exist long after they cease to be of current use, and because their values will be for others than the current users" [9, p. 238]. A division between "now and then" that more or less overlaps creators and "the others" could thus be recognized.

A more nuanced picture is presented by Shepherd and Yeo [10] and Yeo [11] who categorize the motivations for the use of records into business, accountability, and cultural purposes. Those could appeal to different kinds of users, both the creating organization and others, although there is an emphasis on business and accountability purposes for the records creators and cultural purposes for other users. The temporal movement between user categories is, however, downplayed. External users might demand access to records at an early point in time according to freedom of information or data protection legislation, and the organization might keep and re-use records for the purpose of corporate memory. This is in accordance with the Swedish public sector where citizens within certain limits have the right to access records as soon as they are created or captured. To define all other purposes than business and accountability as "cultural", is, however, too comprising.

Sundqvist [12] has identified several purposes for use: material to ascertain benefits and rights; operational purposes to perform activities, accountability purposes to control one's own or others' fulfillment of duty, and, finally, knowledge-enhancing or self-realization purposes. The actual use is then performed as fact-finding, re-construction of actions and events or decision-making processes, verification of things that happened, regaining experience, learning from previous actions, or exemplifying phenomena. The use and re-use of records are thus manifold concepts. The distinction between primary value and secondary value cannot be reduced to simple dichotomies such as "now and then", "creators and others" or "business and culture". Schellenberg's model has been explored and revised by Menne-Haritz [13], who rather makes a distinction between primary and secondary purposes. The primary purpose is the reason records are created, to perform accountable business processes, and secondary purposes are the reasons why they later are used, regardless of when and by whom. The reason for using records could be that they, according to Yeo [14], have affordances. Those are not fixed properties, but potentials that could be realized in different ways in different circumstances. When new questions arise, or new problems need to be solved, records could be utilized in new ways.

3. Method

In this paper, we present an ongoing qualitative case study of the user experiences of an IT system in a large public authority in Sweden. The specific users described in this paper are project managers of pedestrian and bicycle path projects. The system serves a dual purpose: managing the work process and providing visual representations. Within different stages of the process, specific points link to various documents and information that require creation. Project managers who have the ultimate responsibility for a project run the project through the operational processes and use the system to create and share information.

The overarching aim of the case study is to explore how existing information and records are being created and how previously created or current information within the system can be used or reused for other purposes. The empirical data consists of nine semi-structured

interviews with project managers. The respondents are located in different parts of the country, with similar educational backgrounds but have been employed for different lengths of time. The interviews focused on project managers' use of the specific IT system and how they use the system for information retrieval when creating new projects. The questions asked during the interviews targeted how the system is used, how project managers search for information within the system, and how they search for similar projects. The interviews are analyzed by using the D&M IS Success Model as a lens together with the archival concepts of 'primary' and 'secondary' purpose of use. The approach intends to highlight the potential additional success of the IT system when considering variations in the use of information.

4. Results and discussion

4.1. The Use and Re-use of the Information and System

The primary use of the IT system is for business and accountability purposes: aggregating information and documents to ensure that the project will be as time- and cost-effective as possible. The specific IT system contains more than six thousand projects including pedestrian and bicycle path projects. When interviewing project managers on how they use the IT system, an interviewee argued that when creating a new project, it is mandatory to study similar projects to be able to guarantee that the planning and the realization of the project will be as time- and cost-effective as possible. However, as an interviewee stated:

"Since the system only functions as a workspace during the life of the project, it will close and you won't be able to access it, you must make some kind of written request and justify why I should have authorization for an archived project, and it is almost a bit like Fort Knox" (Respondent 7).

Even though these previous projects can contain knowledge that could aid project managers when creating new projects, the IT system is intended to make the work process more efficient rather than give access to and allow reuse of the information and knowledge gained from other similar projects. The ability to search for similar projects is limited due to insufficient structure of metadata, and the user of the system needs to know the project number or the name of the project manager, i.e., that the project exists within the system. When a project has ended, all its documents remain in the system but since the IT system is created to simplify a current workflow that supports individual structures, there is a deficient opportunity to search for similar projects. The inscribed value of simplifying the workflow and less light shed on the searchability of the information and documentation that is created affects the use and the intention to use the system for other purposes.

An interviewee described each project as an isolated island difficult to access: "What happens in the projects stays in the projects and we have great difficulties accessing and retrieving the information" (Respondent 5). Instead, in their mandatory process of studying similar projects and lessons learned, the project managers create social networks that can assist in the search for comparable projects. One interviewee argued: "If you don't have a

project that you know about, you need to get that first to be able to enter a project and retrieve the information" (Respondent 5).

This is also argued by another interviewee: "Even though the information is documented in the vast majority of cases, it is not possible to access it without knowing someone who worked on the project" (Respondent 8). When asked about information retrieval, another interviewee added that project managers need to build their own infrastructure of people to be able to find the information that they need: "This thing about finding the information, you can't go to this [the system] and sit down and search, it doesn't work, it doesn't" (Respondent 8). In this sense, to meet the limitations of the IT system the project managers create an external system of social relations to enable them to find and reuse information from previous projects. The system can achieve the primary use of storing information but fails to meet the secondary purposes of retrieving information for reuse and learning. As Elpez and Fink [8] argue, a successful IT system is a key component in achieving the organization's mission. The organization's mission in this context is not only to create a pedestrian and bicycle path that can be maintained with long durability, but the mission is also to create it in the most time- and cost-effective way possible. This could be interpreted as asking what function the IS will have in this specific context. Despite the known and regulated use of the system by project managers, new requirements or emerging needs may impact their intention to continue using the system over time.

4.2. Discussions and analysis

Sundqvist [12] identified various purposes for use, including material purposes to ascertain benefits and rights, operational purposes for performing activities, accountability purposes to oversee one's own or others' fulfillment of duty, and knowledge-enhancing or self-realization purposes. These purposes are closely linked to the concept of 'intention to use,' serving as goals and motivators for using the system. Interviews with the project managers show the tension between the mandatory study of similar projects and the limitation of the IT system to do so. As an example, each project is unique due to the geographical aspects of the environment (e.g. various mud soil, rocks, mountains, surrounding buildings, arable lands, ground frost, marshlands, surrounding streams et cetera), which shows a need to search and find comparable projects. As an interviewee stated: "There is certainly a huge gain in retrieving the information that was produced about a specific problem in another project" (Respondent 6).

Different purposes to use affect the intention to use the system. What affects the project managers to use the system for information retrieval is the uniqueness of the specific aspects of geography, yet it is also to be able to carry out a project in the most time- and cost-effective way possible. When the system does not respond to this need, the solution is the social networks that work as the search engine of the system and respond to the question of where the specific information to solve a specific problem can be found. In this specific case, the negative net benefits, of not being able to reuse the information within the system have resulted in different solutions embedded in social networks. Building a network of social relations to share knowledge takes time and experience which makes it difficult for newly hired project managers. There is a risk of becoming trapped due to the combination of inadequate system functionality for retrieving information from the IT

system, lack of experience, and insufficient contacts for knowledge sharing. From the analytical lens of the success model, the current net benefits can be enhanced by applying the archival perspectives highlighting a secondary use to re-use information for learning purposes. In this sense, the overall success of the system can be enhanced by adding several net benefits related to information retrieval.

Use and reuse are manifold concepts, and as DeLone and McLean [3] argue, there are many variations of use. In comparison with records' affordances [14] the aggregation of information from different projects to reconstruct events or learn from earlier experiences to develop new projects, the information can be used in new ways to solve new problems. The IT system explored is designed to aid in the workflow of the project managers where each project has a starting and a finishing point. Still, as this ongoing case study has found, there is a mandatory part of their workflow where project managers need to search for similar projects to gain information about specific problems in specific areas. The challenges with the use of ICT in E-government development highlight the importance of information structure and understanding the interactions between users, potential users, and their use of the IT system. As Borglund argues, "the key to success is proactivity" [6, p. 53], considering new uses, and potential users of the system and the information that the system contains. Over time use can change or add additional purposes expanding what it includes, and thus expanding what is considered successful.

By splitting the concept of 'use' into a 'primary' and a 'secondary' use, we add an understanding of 'use' as a function of time. Regarding the IT system used in the described case, the primary use is to store important information from the projects to support the organization for business and accountability purposes. A secondary purpose is to retrieve requested information for re-use and to learn when carrying out a similar project later. Yet, in many cases the saved information needs considerable rework to be useful for new re-users which knowledge producers rarely have the resources and incentives to do. This leads to secondary use becoming diminished due to the lack of capacity and understanding of secondary and future use. To summarize, it is important to include both primary and secondary purposes in the intention of use of the IT system to not risk loss of possible system success.

5. Conclusions

In this paper, we present the findings from an ongoing case study where we have investigated variations of use and how the consideration of different forms of use can contribute to increased IS success. We find that user intentions change over time from storing to retrieving information for re-use and learning purposes, but the system primarily supports the first. When an IT system fails to adapt to new user needs, it results in detrimental effects on system performance. Consequently, user satisfaction decreases, and the intention to use the system diminishes. In times of escalating development of ICT, it is important to explore how the utilization and functionality of IT systems unfold over time contributing to different purposes of use satisfying different interests and intentions. This paper illustrates essential insights for information system design by considering additional

purposes of the use of the system and the information it contains for the system's overall success.

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