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Business Intelligence Success applied to Healthcare Information Systems

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Abstract

In this paper, DeLone and McLean's IS Success Model is empirically tested on a Business Intelligence System applied to Healthcare Information Systems at 12 public hospitals in Denmark. The purpose of the study is to investigate which factors contribute to BI Success. A total of 1351 end-users replied to the questionnaire, and the response rate was 32%. Eight relationships in the model were tested, and four relationships were found to be significant. Our results are as follows: System Quality is positively and significantly associated with Use and User Satisfaction. Information Quality is positively and significantly associated with User Satisfaction but not Use, and User Satisfaction is not significantly associated with Use and vice versa. User Satisfaction is positively and significantly associated with Individual Impact, but Use is not significantly associated with Individual Impact.

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Keywords: IS success; Evaluation; Business Intelligence; Healthcare Information Systems

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1. Introduction

In many organisations, the IT manager's top priority is to handle the increasing amounts of data produced internally and externally and make the data available to analysts and decision makers at all levels of the organisation[1]. This development results from the management's desire to create a data-driven organisation. According to Madsen: 'Data-driven means that information must be consumable and contextual, to encourage action that will modify behaviour over time'[2].The healthcare sector has historically generated a significant amount of data, driven by the demand for record keeping, compliance, regulatory requirements and patient care[3]. Therefore, it is relevant to use Business Intelligence (BI) applied to Healthcare Information Systems (HIS). Parente and Dunbar found that healthcare organisations with Information Systems (IS) have higher total margins and operating margins than those that do not have IS[4].

BI is an umbrella term that includes applications, infrastructure, tools and best practices that enable access to and analysis of information to improve and optimise decisions and performance[5]. Obtaining BI success is complex, and this complexity carries a cost[6]. The investment in BI technologies is expensive, because the implementation includes infrastructure, software, licenses, training and wages[7]. Moreover, the literature indicates that many organisations fail to realise the expected benefits of BI[8–10].

An area with a huge amount of data and high system complexity is the public sector[11]. It is important to point out that the evaluation of IS differs between private and public organisations[12]. Still, most research on IS evaluation has been focused on the private sector[12]. In Scandinavian countries, the healthcare sector, including hospitals, is financed and run by the public sector. Health insurance and private hospitals constitute a small part of the sector. The Scandinavian welfare model is a political model that includes Denmark and other Nordic countries and was developed after the end of World War II. The basic principles of this model imply, on one hand, that all citizens of society have access to social and healthcare services without regard to their social background or origin and, on the other hand, that the benefits are not linked to insurance contributions or other forms of user payment[13]. The health sector has been late to use BI on their data from HIS because the complexity in this sector is much higher than in the private sector[2]. The public hospitals in Denmark use BI with HIS as a data source in combination with other data sources, such as the accounting and payroll system. Most professions have access to the BI system, including secretaries, doctors, care staff, management and administrative staff. Sometimes they have access to data both in the source system and in the BI system; other times the data come only from BI.

There have been many definitions of IS success and also many different measures of IS evaluation[14]. DeLone and McLean's IS Success Model consists of six constructs, including Information Quality, System Quality, User Satisfaction, Use, Individual Impact and Organisation Impact[15,16]. The model can capture the complexity of using BI in a healthcare setting. According to Iivari[17] and Tona et al.[14], it still lacks the empirical test of DeLone and McLean's model, because the author emphasises that an empirical test needs to be performed with different types of IS and in various contexts. Moreover, since there is a lack of research on IS success in a healthcare setting, it is relevant to use DeLone and McLean's model. This paper will therefore empirically test DeLone and McLeans's IS Success Model at 12 hospitals and contribute to the sub-field of 'BI success' and especially 'BI success in hospitals'. Researchers of IS evaluation are concerned with the assessment of interventions in different organisational settings. Therefore, BI serves as a critical means for accomplishing the intervention's expected goals. The remaining parts of the papers are organised as follows. In section 2 the IS Success Model is presented, followed by a explanation of the methodology employed in Section 3. Section 4 presents the results of the survey, which is followed by the discussion. In the final part, the conclusions are presented.

2. IS Success Model

In 1980, at the first International Conference on Information Systems, Peter Keen asked, 'What is the dependent variable?'[18]. To address this issue, DeLone and McLean[15] proposed the IS Success Model based on Shannon and Weaver's three levels of communication[19] and Mason's[20] information influence theory. DeLone and McLean's IS Success Model has its roots in communication theory. IS success is based on several interrelated factors. The IS Success Model consists of six constructs, including Information Quality, System Quality, Use, User Satisfaction, Individual Impact and Organisational Impact. An IS system is characterised by Information Quality and System

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