



# Factors influencing business intelligence (BI) data collection strategies: An empirical investigation

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## ABSTRACT

This paper examines external pressures that influence the relationship between an organization's business intelligence (BI) data collection strategy and the purpose for which BI is implemented. A model is proposed and tested that is grounded in institutional theory, research about competitive pressure, and research about the purpose of BI. Two data collection strategies (comprehensive and problem driven) and three BI purposes (insight, consistency, and transformation) are examined. Findings provide a theoretical lens to better understand the motivators and the success factors related to collecting the huge amounts of data required for BI. This study also provides managers with a mental model on which to base decisions about the data required to accomplish their goals for BI.

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## 1. Introduction

In the last decade, Business intelligence (BI) has evolved as one of the critical applications in organizations to provide useful insight, support decision-making, and drive organizational performance [10,54]. BI has permeated various industries including retail, insurance, banking, finance and securities, telecommunications, and manufacturing [58]. Companies such as Continental Airlines and First American Corporation (FAC) have successfully implemented BI to improve their customer loyalty and increase their return on investments (ROI) [2,19]. There are other organizations, however, that have not been as successful in utilizing BI to increase their profit and achieve their expected performance [31]. Such mixed results have motivated researchers to examine a variety of factors that contribute to the successful implementation of BI [21,28,40,41].

The effectiveness of BI lies in its ability to present business information in a timely manner [18]. Thus, the success of any BI project depends on the data available. Furthermore, research indicates that data consistency and data quality are a major cause of the success or failure of BI initiatives [3,8,24]. Data collection does not refer just to the collection of data for BI applications, but it is also concerned with providing clean, consistent, high quality, and integrated data for BI applications [52,56,82]. Therefore, organizational data collection strategy may form a crucial foundation for BI success and differentiate between organizations that successfully implement BI to realize high

benefits and organizations that are unable to gain high benefits through BI.

The data for BI is generally stored in a central repository known as the data warehouse [22,74]. Data warehousing strategies involve the collection and integration of data for BI purposes [25]. Although research has examined some factors that affect the selection of different data warehousing strategies [12,41], these studies are largely descriptive. There are few theoretically grounded studies that focus specifically on the factors that influence BI data collection strategies. The purpose of this research is to examine the forces that influence an organization's BI data collection strategy. The model developed and tested in this study provides a theoretical lens to better understand the success factors and the motivators related to collecting the huge amounts of data required for BI. The findings of the study also provide managers with insight into how to develop strategies and plans for collecting data that match the purpose of BI. This will further help BI managers and users by providing them with a mental model on which they can base their decisions about the data required to accomplish their goals for BI.

## 2. Theoretical background and hypotheses development

In order to understand the factors that influence adoption of specific data collection strategies during BI implementation we draw on data warehousing research, research on BI implementation, as well as organizational theory and strategic management literature. Some important concepts used in the proposed theoretical model are discussed next.

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### 2.1. Institutional isomorphism

Institutional isomorphism is defined as “a constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions” [23, p. 149]. Institutional isomorphism arises from external influences and the need for legitimacy [23]. It is rooted in the cultural expectations of society and other organizations in the industry within which a firm operates and plays an important role in explaining the influence of external political, social, and technical environments on organizational behavior [44]. It describes the process through which structures such as norms, rules, and routines become authoritative guidelines for social behavior [42,73]. Institutional isomorphism is instrumental in explaining diffusion of technological innovations because organizations often adopt technology to gain legitimacy within the industry [23]. In this context, it is mainly used to explain the role of external pressures in the adoption and assimilation of different information systems in an organization, particularly systems for which the technology is so widespread as to be viewed as ubiquitous [32]. Thus, this lens is appropriate to examine BI strategies because BI technology is wide spread across organizations throughout most industries [58].

Data warehousing is thought to be one of the more recent technologies that is influenced by institutional forces [76]. As managers grapple with the data warehousing technology and how best to make sense of it for their particular organizations, they often look to how others have implemented it and to the best practices of their industry or those suggested by vendors [76]. As data warehousing is considered an underlying foundation of most BI implementations, we consider institutional isomorphism to be an important factor driving BI implementations and influencing BI data collection strategies.

### 2.2. Competitive pressure

Competitive pressure is defined as “the degree of pressure that a company feels from competitors within the industry” [90, p. 70]. The competitive pressure under which an organization operates is a driving force behind innovative strategies in an organization [11,35]. Competitive dynamics research suggests that there are different ways in which firms address competitive pressure [63,75,14]. Faced with competitive pressure, firms undertake competitive action that could be either tactical action or strategic [14]. Strategic actions are characterized by long time horizons, large expenditures, and great deviations from the status quo, such as major facility expansions or introduction of new products/services [14,15,55]. Firms may implement BI which is a competitive action to address competitive pressure within their environment and to stay ahead of the competition within their industry sector [14]. Competitive pressure increases the uncertainty within the external environment and thereby increases the necessity to implement new information systems to deal with this uncertainty [27,78]. Organizations adopt and implement technologies such as ERP, EDI, data warehousing, and other computer based inter-organizational technologies in response to competitive pressure [11,35,37,64,66]. Research indicates that competitive pressure is very influential in the adoption of data warehouses – an underlying technology for BI [37]. Faced with competitive pressure firms may reexamine their current strategy for managing data in their data warehouses and implement different strategies to leverage their data and stay ahead of competition. Therefore, competitive pressure can provide insight into organizational data collection strategies.

### 2.3. BI purpose and its relationship with institutional isomorphism and competitive pressure

The overarching purpose of BI is to support decision-making [54]. This is, however, more fine-grained than overall decision support [18]. We define the purpose of BI as “the primary reason that an

organization initiates a BI project.” Three general purposes for which an organization may undertake a BI initiative are to gain insight, to provide a single version of the truth, or to enable organizational transformation [47,80,81].

One reason organizations implement BI is to gain better insight into its business processes, strategies, and operations [47]. Companies rely on BI to make sense of the transactional data collected by ERP and other data intensive applications [35] in order to provide decision makers with a better understanding of underlying trends and dependencies that affect the business [47]. Such understanding is posed to enable more informed decision-making and empower employee decision capabilities [17].

The second reason organizations implement BI is to achieve a single consistent view of business information [81]. Enterprise data are constantly changing especially when organizations go through mergers and acquisitions [25,59]. Therefore, obtaining a single consistent version of business information is important for aiding in strategic and tactical decision making and for managing business process efficiently [26]. Obtaining a single version of the truth with regard to enterprise information helps in achieving high quality data and better data analysis [3,26]. Having a single view of enterprise wide information also facilitates the development of new applications and saves time for users [81]. It also facilitates communication among different stakeholders within the organization because they have access to the same information [54]. Finally, the third key purpose of BI is to enable organizational transformation. Here, the purpose of BI is to enable change to the existing business model of an organization and to support the implementation of a new business model to take advantage of external market [80,84].

Organizational reasons for adopting technology may be influenced by a variety of factors including institutional isomorphism and competitive pressure. Adoption decisions are likely to be framed and justified differently, depending on the main driving forces influencing them. In the case of BI implementation, institutional isomorphic pressures are likely to take a variety of forms. Failure to implement a technology such as BI that has a high perceived value can be interpreted as a sign of incompetence [69]. Furthermore, failing to implement BI to support decision-making may cause business partners, competitors, customers, investors, and other stake holders to question the decision-making ability of the firm and thereby the legitimacy of the firm because it does not adhere to the norms of its industry [1]. This may push organizations to adopt BI without a full understanding of how BI can benefit their particular organizations. In such cases, organizations are likely to view BI implementation as adoption of industry best practices and adopt generic justifications of BI offered by organizations promoting BI, such as BI system vendors, consultants, or industry associations [44]. Some of the most commonly stated and promoted benefits of BI implementation include achieving consistency among data and gaining insight into business operations. Therefore, these benefits are likely to be most cited as key justifications and goals for BI projects that are driven by isomorphic pressures.

In addition, regulatory and industry associations agencies represent a source of coercive isomorphic pressures because they require the firms in certain industries to get better control of their data and to provide better information to the agencies. For example, compliance mandates arising from the Health Insurance Portability and Accountability Act (HIPAA) and Sarbanes-Oxley Act (SOX) require companies to ensure accurate reporting [88]. Organizations initiate BI projects to effectively utilize large volumes of data and to comply with regulatory mandates such as SOX [71]. The process of implementing BI can result in improved data quality, better data consistency and a single version of the truth [26,70], all of which are helpful in complying with regulatory mandates and industry based pressures [48]. Thus institutional isomorphism is also likely to result in implementing BI to gain greater consistency of information and data across the organization. Therefore, we hypothesize the following:

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