UNPACKING BUSINESS INTELLIGENCE SYSTEMS ADOPTION DETERMINANTS: AN EXPLORATORY STUDY OF SMALL AND MEDIUM ENTERPRISES

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ABSTRACT: *While extant business intelligence systems (BIS) adoption research focused mainly on adoption of BIS in large-sized organizations, our understanding about the adoption determinants and the process within small and medium enterprises (SME) is still limited. The aim of our research is to identify SME-specific determinants of BIS adoption at firm level that will guide the development and testing of a BIS adoption framework in the milieu of SMEs. By leveraging semi-structured interviews involving BIS experts and adopters, and blending them with comprehensive IT/IS adoption literature we identified instrumental determinant candidates for delving deeper into BIS adoption in SMEs.*

1. INTRODUCTION

Information technologies (IT) and information systems (IS) denote significant investments for firms; investments on which they hope to realize returns in areas such as efficiency and improved decision making (Agarwal & Prasad, 1998). It has been widely noted that technological innovations are a primary driver of organizational productivity, yet, if promising innovations cannot be widely adopted, the benefits resulting from the investment will be curtailed (Zhu, Kraemer, & Xu, 2006). It is therefore imperative for firms to understand the process and determinants of IT/IS adoption and use (Karahanna, Straub, & Chervany, 1999).

In a decision-support milieu, business intelligence systems (BIS) have emerged as a technological innovation offering data integration and analytical capabilities to provide

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stakeholders at various organizational levels with valuable information for their decision-making (Turban, Sharda, & Delen, 2010). The IS literature has long emphasized the positive impact of BIS-enabled information on decision making, particularly when firms operate in highly competitive environments (Popovič, Hackney, Coelho, & Jaklič, 2012). While a review of the literature from different disciplines shows no scarcity of BIS definitions (Elbashir, Collier, & Davern, 2008; Trkman, McCormack, De Oliveira, & Ladeira, 2010; Watson, 2009; Williams & Williams, 2007; Wixom & Watson, 2010), we adopt in this work the following definition of BIS: 'quality information in well-designed data stores, coupled with software tools that provide users timely access, effective analysis and intuitive presentation of the right information, enabling them to take the right actions or make the right decision' (Popovič et al., 2012). Evaluating the adoption of BIS is vital to our understanding of the value and efficacy of implementation of these systems. Nevertheless, while IT/IS adoption on firm level has been well researched throughout various IT/IS applications, our understanding of factors affecting BIS adoption, as well as the adoption process itself, is rather limited.

Prior studies suggest there are key differences between BIS and other IS in several areas (Popovič et al., 2012). To begin with, the use of BIS is primarily voluntary and the benefits of BIS are more indirect and long-termed compared to operational IS. Secondly, BIS users are typically decision makers at higher organizational levels. Next, the information collected through BIS is more aggregated on the enterprise level and there is more sharing of information. Furthermore, the structuredness of information needs and processes within which ISs are used, and the structuredness of instructions for using the BIS, are considerably lower since the use is usually more explorative whereas the use of operational ISs is more exploitative. Last, but not least, the focus is more on necessary data and their relevance rather than on the technological solution, and this data in the environment of BIS also comes from external sources, and not only from the processes themselves. Against this backdrop we sturdily believe that in order to fully understand the determinants (and their effects) on BIS adoption it is necessary to undertake an integrative view, which will consider prior IT/IS adoption studies and further develop them to address the specifics of BIS.

While prior research in the field of BIS has primarily focused on large-sized firms (Popovič et al., 2012; Wixom & Watson, 2010; Yeoh, Koronios, & Gao, 2008), studies delving deeper in the milieu of small and medium enterprises (SME) are still scarce. Due to their inherent characteristics, namely less financial and human resources, greater risks, tighter cooperation with partners (Eikebrokk & Olsen, 2007), and due to their importance in a country's economic development, technological advancement, and job creation (Ayyagari, Demirguc-Kunt, & Maksimovic, 2011; Fink, 1998), we consider that exploration of BIS adoption factors in these organizational entities can significantly add to the existing body of knowledge in this topical area of BIS research.

We augment the extant BIS research efforts by conducting an exploratory study of BIS adoption determinants in SMEs milieu. Specifically, we aim to answer the following research question: *what are firm-level determinants of BIS adoption in SMEs?* Our work

focuses on the quest for determinants influencing IS adoption on the firm level (how firm adopt new technology) as opposed to determinants that are representing influential factors of acceptance on the individual level (i.e. on user/employee level within the firm) considered within Technology Acceptance Model (TAM) (Davis, 1989), Theory of Planned Behavior (TPB) (Ajzen, 1991), and Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003).

The rest of the paper is structured as follows. The next section delves deeper into the determinant candidates and their appearance in literature. This is followed by the explanation of methodology employed and an analysis of findings from the qualitative research regarding the suitability of identified adoption determinants' candidates within BIS milieu. Lastly, the paper concludes with a discussion and conclusion.

2. THEORETICAL BACKGROUND

While there is no lack of technology adoption theories and models at individual level (e.g. Ajzen, 1991; Davis, 1989; Venkatesh, Morris, Davis, & Davis, 2003), IT/IS adoption at firm level has received lesser attention. Within this field, two prominent theoretical foundations are commonly employed, namely Diffusion of Innovation (DOI) theory and Technology, Organization and Environment (TOE) framework (Chong, Ooi, Lin, & Raman, 2009). DOI (Rogers, 1995) exposes three sets of factors that influence a firm's IT adoption intent, namely *individual - leader characteristics* (attitude toward changes), *internal characteristics of organizational structure* (centralization, complexity, formalization, interconnectedness, organizational slack, size), and *external characteristics of the organization* (system openness). On the other hand, TOE framework (Tornatzky & Fleischer, 1990) encompasses *external task environment*, *organization*, and *technology*. The environment context includes industry characteristics and market structure, technology support infrastructure, and government regulation. The organization context includes formal and informal linking structures, communication processes, size, and slack. The technology context consists of availability and characteristics of technology. Derived from TOE framework and developed in the milieu of IT adoption in SMEs the Iacovou model (Iacovou, Benbasat, & Dexter, 1995) offers, along with DOI and TOE, a valuable foundation for our study. The Iacovou model puts forwards three sets of small enterprise-specific factors, namely *perceived benefits of IT innovations*, *organizational readiness* (financial resources, IT resources), and *external pressures* (competitive pressure, trading partner power) (Iacovou et al. 1995).

When addressing a specific IT/IS adoption milieu, it is important to combine various theoretical models and relevant constructs to achieve a reliable insight of the adoption phenomenon (Oliveira & Martins, 2011). Prior IT/IS adoption studies have not considered BIS milieu as the adoption phenomenon, thus leaving a research gap in this topical area. Through a comprehensive literature review, which provided nearly 70 determinants from various IT/IS adoption studies, we sought to expand our understanding of the BIS adoption phenomena through collecting relevant evidence about BIS-specific determinants and by establishing the list of BIS adoption factors candidates.

To frame the breadth and depth of our theoretical foundations we considered the works appearing in 11 instrumental journals from the researched field in the past decade. The first 8 journals (i.e. MIS Quarterly, Information Systems Research, Journal of the Association for Information Systems, Journal of Management Information Systems, European Journal of Information Systems, Information Systems Journal, Journal of Strategic Information Systems, and Journal of Information Technology) appear in the Association for Information Systems list of IS journals (Members of the Senior Scholars Consortium, 2011). To this list we added 3 more journals that are deemed important on a broader range of the research context (i.e. Information & Management, Decision Support Systems, and Management Science). All of the chosen journals are considered of top quality according to the Academic Journal Quality Guide (Harvey, Kelly, Morris, & Rowlinson, 2010). As the researched topic is a part of the rapidly changing IT/IS research field, we focused on the volumes for the past 10 years.

To further narrow the focus of our research within the pool of selected academic outlets we looked for the following keywords when deciding on inclusion of individual works: *business intelligence*, *adoption*, *innovation*, *SME*, *management information systems* and *decision support*.

The literature review that followed the above-explained procedure returned an ample number of determinant candidates (69) that were hard to manage. For better understanding and further analysis, determinants were organized in groups that were further mapped to TOE framework contexts. In the paragraphs that follow we provide more detailed information about the identified determinants. Determinant candidates and their presence in previous adoption research are summarized in groups in Tables 1 through 3.

We begin with the ***environmental context*** of the TOE framework (Tornatzky & Fleischer, 1990). Within this context we organized the identified determinant candidates in 8 groups. *Linked firm* represents vertical linkages to connected firms; these may be important when the parent firm can use its size advantage to experiment with innovations and then transfer it to the subsidiaries, or it may even require its subsidiaries to use certain type of IT and/ or IS (Premkumar & Roberts, 1999).

Competitors is the group that reflects competitors' pressures to adopt an innovation. Intense competition can steer a firm to look at new ways of doing business (Ifinedo, 2011), whereas mimetic pressures may further cause a firm to change over time to become more like other firms in its nearby environment (Liang, Saraf, Hu, & Xue, 2007).

Customers is the group within environmental context representing clients' pressures towards adopting an IT-enabled innovation (e.g. Ifinedo, 2011; Mehrtens, Cragg, & Mills, 2001), as well as a firm's own desire to provide enhanced customer services with the help of new IT-enabled innovation (Daniel & Grimshaw, 2002).

Furthermore, a group of determinants regarding *industry & market* characteristics also influences technology adoption. It consists of market complexity (Buonanno et al., 2005);

industry pressures, which is related to the efforts of industry associations to proclaim standards related to innovation and encourage adoption (Chwelos, Benbasat, & Dexter, 2001), and expectations of market trends as environmental adoption factor, that can force firms (similar as competitors pressure) into adopting innovation (Chong et al., 2009).

Various influences on adoption can also be induced by business *partners*. Dependency on trading partner is the first factor candidate from this group. It captures the potential power of a trading partner to "encourage" innovation adoption (Chwelos et al., 2001). Trading partner power is also a significant variable in external pressure context (Iacovou et al., 1995). A firm that depends of the trading partner can be influenced to adopt an innovation. Influence strategy, like rewards and threats can be exercised with various strengths (Chwelos et al., 2001). New technologies can also improve transactions and relationships between business partners (Ifinedo, 2011). That is why sometimes business partners influence adoption of innovation in observed company. The expectation held by one firm that another will not exploit its vulnerabilities when faced with the opportunity to do so (Venkatesh & Bala, 2012), is the next BIS adoption factor candidate, expressed as the relational trust. To increase some of the effects of the innovation, companies need to grow cooperation with trading partners in community. In some cases the bigger is the community, larger are benefits of the innovation (Zhu, Kraemer, Gurbaxani, & Xu, 2006). Trading partner readiness can be adoption factor in cases when the observed firm is motivated and ready to adopt an innovation, but is unable to adopt due to unready trading partners (Chwelos et al., 2001).

To move on, *regulators* surfaced as another environment-related group of determinants that influences adoption in the way of legal barriers, which are defined as the lack of institutional frameworks and business laws governing the use of innovation, which can be a barrier for diffusion of innovation (Zhu, Kraemer, Gurbaxani, et al., 2006) or in the way of government regulation (Tornatzky & Fleischer, 1990) or regulatory environment (Zhu, Kraemer, & Xu, 2006). Another variable pertinent to this group is government support, viewed as "assistance provided by the authority to encourage the spread of IS innovations in businesses" (Ifinedo, 2011).

Special group of partners are *providers* of the innovation. Their external support as the next candidate refers to the availability of support for implementing and using an innovation. Some authors stated, that the increased outsourcing and third party support have an important impact on adoption. Organizations are namely more willing to risk trying innovation if they have adequate vendor or external support for the innovation (Premkumar & Roberts, 1999). Vendor support is one of two predictors with the highest predictive power of IT innovation adoption in information systems and computer science by Basole, Seuss, and Rouse (2013). By Jeyaraj, Rottman, and Lacity (2006) external information sources is one of the best IT adoption predictors. Furthermore, providers' marketing activities about innovation can significantly influence IT adoption. Three main factors that are important in this case are the targeting of the innovation, its communication, and the activities the provider undertakes to reduce the perceived risk of the potential customer (Frambach & Schillewaert, 2002).

Beside above described groups from the environmental context we identified additional determinants that do not universally fit within the earlier described groups. Thus, we included these determinants into a distinct group named *Broad*. To begin with, social influence, namely the perception of the public, prospective investors, and other stakeholders as to the attractiveness of a firm adopting the innovation (Tung & Rieck, 2005), is one of the determinants from this group. The usefulness of innovation sometimes depends on the amount of usage of the innovation (critical mass) in environment (Ling, 2001). Cultural differences that exist between different countries may affect the organisation's ability to adopt and utilise innovation (Ling, 2001). To this group are belonging also coercive and normative pressure (Liang et al., 2007) and other determinants from broader environment.

*Table 1: BIS in SME adoption determinant candidates from **environmental context** and references to prior works*

DETERMINANT CANDIDATE	SME STUDIES	GENERAL AND OTHER STUDIES
1.1. Linked firm		
1.1.1. Vertical linkages / Supply chain integration	Buonanno et al. (2005); Premkumar and Roberts (1999)	Tsai, Lee, and Wu (2010); White, Daniel, Ward, and Wilson (2007)
1.2. Competitors		
1.2.1. Competitors pressure	Chwelos et al. (2001); Daniel and Grimshaw (2002); Grandon and Pearson (2004); Iacovou et al. (1995); Ifinedo (2011); Li, Troutt, Brandyberry, and Wang (2011); Ling (2001); Premkumar and Roberts (1999); Quaddus and Hofmeyer (2007); Thong (1999)	Bose and Luo (2011); Chong et al. (2009); Frambach and Schillewaert (2002); Gu, Cao, and Duan (2012); Hsu, Kraemer, and Dunkle (2006); Hwang, Ku, Yen, and Cheng (2004); Jeyaraj, Balser, Chowa, and Griggs (2009); Oliveira and Martins (2010); Soares-Aguiar and Palma-dos-Reis (2008); Tung and Rieck (2005); Zhu, Kraemer, and Xu (2006)
1.2.2. Mimetic pressures		Liang et al. (2007); Teo, Wei, and Benbasat (2003)
1.3. Customers		
1.3.1. Customer's pressure	Daniel and Grimshaw (2002); Ifinedo (2011); Mehrtens, Cragg, and Mills (2001)	
1.3.2. Enhanced customer service	Daniel and Grimshaw (2002)	Jeyaraj et al. (2009)

1.4. Industry & market		
1.4.1. Expectations of market trends		Chong et al. (2009)
1.4.2. Industry & market complexity	Buonanno et al. (2005)	Tornatzky and Fleischer (1990)
1.4.3. Industry pressure	Chwelos et al. (2001); Grandon and Pearson (2004); Thong (1999)	Jeyaraj et al. (2009); Tung and Rieck (2005)
1.5. Partners		
1.5.1. Dependency on trading partner	Chwelos et al. (2001); Grandon and Pearson (2004)	
1.5.2. Network effects		Zhu, Kraemer, Gurbaxani, et al. (2006)
1.5.3. Partner power/ pressure	Caldeira and Ward (2002); Chwelos et al. (2001); Daniel and Grimshaw (2002); Grandon and Pearson (2004); Iacovou et al. (1995); Ifinedo (2011); Ling (2001); Quaddus and Hofmeyer (2007)	Hsu et al. (2006)
1.5.4. Relational trust		Chong et al. (2009); Venkatesh and Bala (2012)
1.5.5. Trading partner readiness	Chwelos et al. (2001)	Oliveira and Martins (2010); Soares-Aguiar and Palma-dos-Reis (2008)
1.6. Regulators		
1.6.1. Legal barriers		Hsu et al. (2006); Zhu, Kraemer, Gurbaxani, et al. (2006)
1.6.2. Regulatory environment / Government support	Grandon and Pearson (2004); Ifinedo (2011); Ling (2001); Quaddus and Hofmeyer (2007)	Bose and Luo (2011); Hsu et al. (2006); Tornatzky and Fleischer (1990); Tung and Rieck (2005); Zhu, Kraemer, and Xu (2006)
1.7. Providers		
1.7.1. External support	Caldeira and Ward (2002); Y. Lee and Larsen (2009); Premkumar and Roberts (1999); Quaddus and Hofmeyer (2007)	Hong and Zhu (2006); Hwang et al. (2004)
1.7.2. Supplier marketing activity		Frambach and Schillewaert (2002)

1.8. Broad		
1.8.1. Coercive pressures		Liang et al. (2007); Teo et al. (2003)
1.8.2. Critical mass	Ling (2001); Quaddus and Hofmeyer (2007)	
1.8.3. Cultural differences	Ling (2001)	
1.8.4. Normative pressures		Liang et al. (2007); Teo et al. (2003)
1.8.5. Social influences		Tung and Rieck (2005)

The next dimension of the TOE framework is the ***Organizational context*** (Tornatzky & Fleischer, 1990). The first group of determinants explaining internal influences on the firm's adoption is firm *characteristics*. Quaddus and Hofmeyer (2007) are suggesting organization characteristics, such as business type, product type, etc. Next, widely used as adoption factors are also the size of the firm, often identified through the number of employees in a firm (Rogers, 1995) and the age of the firm (Bruque-Camara, Vargas-Sanchez, & Hernandez-Ortiz, 2004). Greater extent of adoption should be linked to the likelihood that firms being longer on the market have more contact with the IT used in the sector. Global scope, as next in this group, is suggested as a geographical extent of a firm's operations in the global market (Zhu & Kraemer, 2005). Firms may face increased costs when they expand into heterogeneous markets, hence firms with greater global scope may have greater needs to adopt some of the IS innovations as they can help to reduce some of the transaction costs (Zhu, Kraemer, & Xu, 2006). Next, desire to expand its market reach can influence a firm to adopt innovation too (Daniel & Grimshaw, 2002). To move on, a degree of functional extension refers to the number of strategic functions, directly managed within the firm (Buonanno et al., 2005) as the opposite to outsourcing and can influence on adoption. Furthermore, firms with higher level of diversification in terms of products, markets and technologies will have a greater need for coordination and control of activities (Buonanno et al., 2005), which can lead to greater need of IT innovation adoption. As management of information flow is a crucial issue for firms with branch offices that need to be remotely controlled (Buonanno et al., 2005), we are adding presence of branch offices as last BIS adoption factor candidate in this group.

Among the *collaboration* group internal processes, communication processes which firms use to communicate knowledge and stimulate technology adoption can be important adoption factors, whereas lack of experiences and knowledge about communicating information about new systems to employees hinders the adoption (Ling, 2001). Communication processes represent an adoption factor in organizational context of the TOE framework (Tornatzky & Fleischer, 1990). Another internal characteristics of organizational structure is interconnectedness; viewed as the degree to which the units in a social system are linked by interpersonal networks" (Rogers, 1995). Frambach and Schillewaert (2002) assert that the higher the degree of information sharing, the more likely organizations are exposed to new ideas and products. Such informal networks may either connect organizations within the industry or organizations in different industries.

Formal and informal linking structures among employees also belong to the organizational context of TOE (Tornatzky & Fleischer, 1990), which can significant affect adoption process. Degree of integration can represent linkages with extensive communication to coordinate activities on one side, or largely hierarchies characterized by bureaucracy with little integration between business functions on the other side (Bajwa, Lewis, Pervan, & Lai, 2005). According to Bruque-Camara et al. (2004) flexibility measures the lack of bureaucracy in the organization. The use of inter-departmental working groups to solve key problems (Bruque-Camara et al., 2004) could be related to the adoption process, as technology innovation is generally a project oriented process. In the view of Hwang et al. (2004) the skills of the project team affect the decision of adopting innovation. Conflict as a measure of the conflict or lack of consensus existing in the organization is the next adoption factor candidate, proposed by Bruque-Camara et al. (2004). Last but not the least, according to Hwang et al. (2004), participation of users in the adoption stage affects the adoption of IS. By Basole et al. (2013) is user involvement the factor with high predictive power of IT innovation adoption in information systems and computer science.

Various *features* of the firm can also be considered as significant adoption factors. For example, understanding of culture is important to the study of information technologies. Culture at various levels (national, organizational, group) can affect success of IT. It also plays a role in managerial processes that may influence adoption (Leidner & Kayworth, 2006). Organizational culture is also one of two predictors with the highest predictive power of IT innovation adoption in information systems and computer science by Basole et al. (2013). Another possible BIS adoption determinant is absorptive capacity, defined as the ability of key organizational members to utilize available or preexisting knowledge (Ramamurthy, Sen, & Sinha, 2008). Another candidate in this group is organizational innovativeness, viewed as the notion of openness to new ideas as an aspect of a firm's culture (Venkatesh & Bala, 2012). Next, external characteristics of the firm are beside individual (leader) characteristics and internal characteristics of organizational structure another group of adoption factors in DOI theory. They refer to system openness (Rogers, 1995). Also, existing systems can play important role in adoption processes. According to Gu et al. (2012) higher levels of satisfaction with existing systems are negatively associated with adoption. On the other hand previous experience in using IT may also foster adoption of new technologies and result in extensive IT adoption (Bruque-Camara et al., 2004). Another candidate that could influence BIS adoption process is the propensity to change (including change, related to the new IT) of the members of the organization (Bruque-Camara et al., 2004). Similar factor is the intention to take IS/IT training (to increase/change level of knowledge) to achieve IS/IT success (Caldeira & Ward, 2002).

Another important group of determinants is related to the *management* of the company. Leaders attitude toward changes is an individual characteristic that represents a part of DOI theory (Rogers, 1995). Same or closely related factors are also present in other studies, like Ifinedo (2011) where "management support" is stated as engagement of top management with IS implementation, which plays a crucial role in influencing other organizational members to accept it. Decision-making in SMEs is often a part of the top management, therefore similar factor can be expressed as "top management support" (Premkumar & Roberts, 1999), which

is one of the top predictors of IT innovation adoption in IS and computer science fields (Basole et al., 2013). Centralization is another adoption factor derived from DOI theory. It is a part of internal characteristics of organizational structure and reflects the degree to which power and control in a system are concentrated in the hands of a relatively few individuals (Rogers, 1995). It was used also in other researches like Bajwa et al. (2005), where it is expressed as degree of centralization or concentration of decision-making activity. The next representative of DOI's internal characteristics of organizational structure is formalization, which is the "degree to which an organization emphasizes its members following rules and procedures" (Hameed, Counsell, & Swift, 2012; Rogers, 1995). Managerial complexity, as next candidate determinant, is the level of complexity and attendant risk associated with making process changes and the organizational adjustments necessary to accommodate the new innovation (Zhu, Kraemer, Gurbaxani, et al., 2006). In some cases it can be expressed as managerial obstacles, which refer to the lack of managerial skills for managing organizational adaptations (Zhu, Kraemer, & Xu, 2006). Power relationships are in Caldeira and Ward (2002) explained as possible conflict between managers which can emerge during the process of adoption, because of different perspectives of roles and responsibilities, or as differences of opinion on priorities, etc. Risk propensity is a decision maker's consistent tendency to take or avoid choices that are believed to be risky. It is organizational-level variable denoting the extent to which a firm is willing to take risks (Li et al., 2011). High level individual to promote the innovation within the firm (Hameed et al., 2012) is called project/ product champion. Adopting organization will have a higher adoption level if they appoint a project champion with innovation related background, which has been also involved in similar projects before (Chong et al., 2009).

Last group of determinants in Organizational context is related to the *resources* of the company. Slack, defined as the degree to which uncommitted resources are available to an organization (Rogers, 1995), is a part of DOI as well as a part of TOE framework. As BIS exercise higher levels of voluntariness of use (Popovič et al., 2012) and are, as such, more sensitive for availability of resources, slack could be an important factor of BIS adoption. According Hameed et al. (2012) IS department size means existing IT function and dedicate IT personal within the organization. The size of IT function is tightly connected with the time and labor needed in adopting new technology (Hwang et al., 2004). Firms that do not possess the IT/IS expertise may be even unaware of new technologies or may just not want to risk the adoption of these innovations (Premkumar & Roberts, 1999). Similar variable is also IT-staff skills (Bruque-Camara et al., 2004). Professionalism of IS unit is one of the best predictors of IT adoption according to Jeyaraj et al. (2006). Similar to IT expertise, but broader factor is organizational readiness as availability of the needed organizational resources (not only physical assets, but also human knowledge of IS) for adoption (Ifinedo, 2011). Hameed et al. (2012) define it as level of awareness, resources, commitment and governance for adoption. Development competencies is factor candidate that refers to ability of the firm to developed IS/IT knowledge in-house or have IS/IT knowledge readily available from associated IS/IT enterprises (Caldeira & Ward, 2002). A data environment that is not properly managed is likely to face problems relating to quality, reliability, security, availability, integrity, and standards. Such an environment would pose greater challenges for introducing innovation (Ramamurthy et al., 2008).

Table 2: *BIS in SME adoption determinant candidates from* **organizational context** *and references to prior works*

DETERMINANT CANDIDATE	SME STUDIES	GENERAL AND OTHER STUDIES
2.1. Characteristics		
2.1.1. Degree of functional extension	Buonanno et al. (2005)	
2.1.2. Global scope / Expansion of market reach	Daniel and Grimshaw (2002)	Hsu et al. (2006); Soares-Aguiar and Palma-dos-Reis (2008); Zhu, Kraemer, and Xu (2006)
2.1.3. Level of diversification	Buonanno et al. (2005)	
2.1.4. Organization characteristics	Quaddus and Hofmeyer (2007)	
2.1.5. Organization age	Caldeira and Ward (2002)	Bruque-Camara et al. (2004)
2.1.6. Presence of branch offices	Buonanno et al. (2005)	
2.1.7. Size	Buonanno et al. (2005); Hameed et al. (2012); Y. Lee and Larsen (2009); Ling (2001); Premkumar and Roberts (1999); Thong (1999)	Bajwa et al. (2005); Bose and Luo (2011); Bruque-Camara et al. (2004); Frambach and Schillewaert (2002); Gu et al. (2012); Hsu et al. (2006); Hwang et al. (2004); Oliveira and Martins (2010); Ramamurthy et al. (2008); Rogers (1995); Soares-Aguiar and Palma-dos-Reis (2008); Tornatzky and Fleischer (1990); Zhu, Kraemer, and Xu (2006)
2.2. Collaboration		
2.2.1. Communication	Ling (2001)	Bruque-Camara et al. (2004); Chong et al. (2009); Tornatzky and Fleischer (1990); White et al. (2007)
2.2.2. Conflict		Bruque-Camara et al. (2004)
2.2.3. Interconnectedness / Social network		Frambach and Schillewaert (2002); Rogers (1995); White et al. (2007)

2.2.4. Linking structures / Degree of integration / Flexibility	Ling (2001)	Bajwa et al. (2005); Bruque-Camara et al. (2004); Frambach and Schillewaert (2002); Tornatzky and Fleischer (1990)
2.2.5. Participation of users		Hwang et al. (2004)
2.2.6. Working groups / Skills of project team		Bruque-Camara et al. (2004); Gu et al. (2012); Hwang et al. (2004)
2.3. Features		
2.3.1. Organizational absorptive capacity	Ling (2001); Thong (1999)	Ramamurthy et al. (2008); Tsai et al. (2010); White et al. (2007)
2.3.2. Organizational culture	Ling (2001)	Gu et al. (2012)
2.3.3. Organizational innovativeness		Frambach and Schillewaert (2002); Jeyaraj et al. (2009); Venkatesh and Bala (2012)
2.3.4. Previous experience in using IT		Bruque-Camara et al. (2004)
2.3.5. Propensity to change / IS/IT training	Caldeira and Ward (2002)	Bruque-Camara et al. (2004)
2.3.6. Satisfaction with present state		Gu et al. (2012); Hong and Zhu (2006)
2.3.7. System openness		Rogers (1995)
2.4. Management		
2.4.1. Centralization	Hameed et al. (2012)	Bajwa et al. (2005); Rogers (1995)
2.4.2. Formalization	Hameed et al. (2012)	Rogers (1995)
2.4.3. Leaders attitude toward changes / Management support / Organizational commitment	Caldeira and Ward (2002); Hameed et al. (2012); Ifinedo (2011); Ling (2001); Premkumar and Roberts (1999); Quaddus and Hofmeyer (2007); Thong (1999)	Bruque-Camara et al. (2004); Chong et al. (2009); Hwang et al. (2004); Ramamurthy et al. (2008); Rogers (1995); Tsai et al. (2010); Tung and Rieck (2005)
2.4.4. Managerial complexity / Perceived obstacles	Thong (1999)	Hong and Zhu (2006); Soares-Aguiar and Palma-dos-Reis (2008); Zhu, Kraemer, Gurbaxani, et al. (2006); Zhu, Kraemer, and Xu (2006)

2.4.5. Power relationships	Caldeira and Ward (2002)	
2.4.6. Project champion	Hameed et al. (2012)	Bose and Luo (2011); Chong et al. (2009); Gu et al. (2012); Hwang et al. (2004); White et al. (2007)
2.4.7. Risk propensity	Li et al. (2011)	
2.5. Resources		
2.5.1. Development competencies	Caldeira and Ward (2002)	Gu et al. (2012)
2.5.2. IS department size	Caldeira and Ward (2002); Hameed et al. (2012)	Bajwa et al. (2005); Hwang et al. (2004)
2.5.3. IT expertise	Caldeira and Ward (2002); Hameed et al. (2012); Li et al. (2011); Premkumar and Roberts (1999); Thong (1999)	Bruque-Camara et al. (2004); Hong and Zhu (2006); Soares-Aguiar and Palma-dos-Reis (2008)
2.5.4. Organizational data environment		Ramamurthy et al. (2008)
2.5.5. Organizational readiness	Grandon and Pearson (2004); Hameed et al. (2012); Ifinedo (2011); Ling (2001); Mehrtens et al. (2001); Quaddus and Hofmeyer (2007)	Ramamurthy et al. (2008); Tsai et al. (2010)
2.5.6. Slack	Li et al. (2011)	Hwang et al. (2004); Jeyaraj et al. (2009); Rogers (1995); Tornatzky and Fleischer (1990)

Finally, we look at the ***technological context*** of the TOE framework (Tornatzky & Fleischer, 1990). Here we are investigating the determinants through two groups. The first group, i.e. *innovation*, is exploring the influence of BIS characteristics on its adoption. Literature highlights complexity (Chong et al., 2009) or perceived ease of use (Grandon & Pearson, 2004) as pair-wise opposite views, or decision makers' knowledge and expertise (Rogers, 1995) to depict how innovation is perceived as relatively difficult to understand and use. Other determinants pertaining to this group are expected or perceived benefit of innovations (Chwelos et al., 2001; Iacovou et al., 1995; Mehrtens et al., 2001; Venkatesh & Bala, 2012; Zhu, Kraemer, Gurbaxani, et al., 2006), relative advantage (Ifinedo, 2011; Premkumar & Roberts, 1999), and internal needs (Hwang et al., 2004). Perceived benefits and cost can also be found as top predictors of IS adoption with high predictive power (Basole et al., 2013). Especially for small businesses the cost of IT/IS is still a big deterrent to adoption, and therefore firms evaluate the cost relative to the benefits before adopting a new technology (Premkumar & Roberts, 1999). Financial resources, as an organizational readiness factor in Iacovou et al. (1995), is tightly connected to the cost of an innovation

and thus warranting its inclusion, as the related factor to cost, in the study. Furthermore, perception of strategic value, depicting how innovation can help with strategic activities of the firm, i.e. help with operational support, managerial productivity, and strategic decision aids (Grandon & Pearson, 2004), is another relevant construct. Perceived risk is the next possible factor representing the degree of risk (technical or other risk) associated with adoption or use of the innovation (White et al., 2007). Lastly, process compatibility, emphasizing the degree to which innovations are perceived as being consistent with existing methods for executing their mission (Venkatesh & Bala, 2012).

The second group of the technological context is discussing technological *readiness* to adopt an innovation. Within this group, standards uncertainty, depicted as inability to forecast accurately whether innovation and associated technologies will be stable over time and able to deliver the intended outcomes (Venkatesh & Bala, 2012), appears as a noteworthy adoption factor. Next, technology availability (Tornatzky & Fleischer, 1990) surfaces as a relevant adoption factor that refers to the availability of external technologies, relevant to the firm. Some studies, like Caldeira and Ward (2002), extended this availability factor with the need of having good enough quality for the respective purpose. Another factor pertaining to this group measures how existing technology fits socio-economic system of the firm (Bruque-Camara et al., 2004). Moreover, technology integration, viewed as degree of interconnectivity among back-office IS with databases inside the company and those externally integrated with suppliers enterprise systems and databases (Zhu & Kraemer, 2005), is also deemed important. Factors that express internal technology ability to adopt new technology or the degree to which a firm has necessary technology infrastructure to adopt, are also widely used in adoption studies. Tornatzky and Fleischer (1990) include this variable within technology characteristics. Other authors use this or similar variables in their models as technology readiness (Venkatesh & Bala, 2012; Zhu, Kraemer, & Xu, 2006), IT sophistication (Chwelos et al., 2001) or IT resources (Iacovou et al., 1995). In Iacovou et al. (1995) IT resources belong to the organizational readiness aspect of the model. Lastly, observability of the innovation, referring to the extent to which relative advantage or gains of innovation are clear (Ling, 2001) and trialability of the innovation, considered as the degree to which innovation can be pilot tested or experimented (Ling, 2001), are the two determinants completing our literature review.

Table 3: *BIS in SME adoption determinant candidates from* **technological context** *and references to prior works*

DETERMINANT CANDIDATE	SME STUDIES	GENERAL AND OTHER STUDIES
3.1. Innovation		
3.1.1. Perceived ease of use / Complexity	Grandon and Pearson (2004); Ifinedo (2011); Li et al. (2011); Premkumar and Roberts (1999)	Chong et al. (2009); Frambach and Schillewaert (2002); Y. W. Lee and Kozar (2008); Ramamurthy et al. (2008); Rogers (1995)

3.1.2. Expected benefits / Relative advantage	Caldeira and Ward (2002); Chwelos et al. (2001); Daniel and Grimshaw (2002); Grandon and Pearson (2004); Iacovou et al. (1995); Ifinedo (2011); Li et al. (2011); Ling (2001); Mehrtens et al. (2001); Premkumar and Roberts (1999); Quaddus and Hofmeyer (2007); Thong (1999)	Chong et al. (2009); Frambach and Schillewaert (2002); Gu et al. (2012); Hsu et al. (2006); Hwang et al. (2004); Y. W. Lee and Kozar (2008); Oliveira and Martins (2010); Ramamurthy et al. (2008); Tsai et al. (2010); Tung and Rieck (2005); Venkatesh and Bala (2012); White et al. (2007); Zhu, Kraemer, Gurbaxani, et al. (2006)
3.1.3. Innovation observability	Ling (2001)	White et al. (2007)
3.1.4. Innovation trialability	Ling (2001)	White et al. (2007)
3.1.5. Perceived risk		White et al. (2007)
3.1.6. Perception of strategic value	Grandon and Pearson (2004)	
3.1.7. Process compatibility	Grandon and Pearson (2004); Ifinedo (2011); Ling (2001); Premkumar and Roberts (1999); Thong (1999)	Chong et al. (2009); Frambach and Schillewaert (2002); Y. W. Lee and Kozar (2008); Venkatesh and Bala (2012); White et al. (2007)
3.1.8. Cost / Financial resources	Caldeira and Ward (2002); Chwelos et al. (2001); Grandon and Pearson (2004); Hameed et al. (2012); Iacovou et al. (1995); Y. Lee and Larsen (2009); Premkumar and Roberts (1999)	Bose and Luo (2011); Chong et al. (2009); Hong and Zhu (2006); Hwang et al. (2004); Jeyaraj et al. (2009); Y. W. Lee and Kozar (2008); Tung and Rieck (2005); Zhu, Kraemer, Gurbaxani, et al. (2006)
3.2. Readiness		
3.2.1. Standards uncertainty		Venkatesh and Bala (2012)
3.2.2. Technology availability / Quality of software available in the market	Caldeira and Ward (2002)	Tornatzky and Fleischer (1990)

3.2.3. Technology fit		Bruque-Camara et al. (2004)
3.2.4. Technology infrastructure	Ling (2001)	Bajwa et al. (2005); Soares-Aguiar and Palma-dos-Reis (2008); Tornatzky and Fleischer (1990)
3.2.5. Technology integration		Hong and Zhu (2006); Oliveira and Martins (2010); Zhu, Kraemer, and Xu (2006)
3.2.6. Technology readiness	Chwelos et al. (2001); Hameed et al. (2012); Iacovou et al. (1995)	Bose and Luo (2011); Chong et al. (2009); Gu et al. (2012); Hsu et al. (2006); Oliveira and Martins (2010); Tornatzky and Fleischer (1990); Venkatesh and Bala (2012); Zhu, Kraemer, and Xu (2006)

The above comprehensive literature review provides a solid foundation to proceed with further narrowing of the determinants to suite our research goals. In order to do so, we explored, through a qualitative survey, which of these determinants are deemed relevant for the milieu under study.

3. IDENTIFICATION OF FIRM-LEVEL BIS ADOPTION DETERMINANTS IN THE MILIEU OF SME

To develop a more nuanced understanding of the literature-derived determinants, data was collected through 10 face-to-face semi-structured interviews by one of the researchers. The interviews were carried out through a 2-phase approach, which permits in-depth exploration of the research question. Informants were selected through criterion sampling among 4 SMEs identified as BIS adopters (i.e. incumbents of decision makers having adequate knowledge about BIS adoption within the firm), and 6 BI professionals from the field, all sufficiently familiar with BIS adoption phenomenon in SMEs to adequately discuss the subject. We mostly considered experiences in BIS adoption and use, work position and also broader experiences in IS/IT utilization. All of the informants were from the different companies located in European Union and mostly operating internationally. Detailed information about the informants is depicted in Table 4.

Table 4: *Informants' characteristics*

	Project Role	Company Type	Company Size	Work Position	Years Holding Position	Working With BIS (Years)
1	Expert	IS development	Middle enterprise	Product manager for BIS	10	14
2	Adopter	Engineering and production	Middle enterprise	Head of IT sector	2	1
3	Expert	Education	Middle enterprise	Assistant professor for business informatics	2	12
4	Expert	IS implementation and support	Small enterprise	IS implementation senior adviser	7	17
5	Adopter	Advertising	Small enterprise	Director of the company	14	1
6	Adopter	Distribution and service	Middle enterprise	Head of IT and controlling	5	4
7	Expert	IS development and implementation	Middle enterprise	BI unit manager	7	9
8	Expert	IS implementation and support	Small enterprise	Director / ERP implementation & support specialist	4	9
9	Adopter	Sale and distribution	Middle enterprise	Work coordinator	7	4
10	Expert	IS implementation and support	Small enterprise	Director / ERP implementation & support specialist	7	5

3.1. First phase – Identification of BIS-related determinants

The first phase of interviews was conducted in January and February 2014. An interview guide was purposefully constructed to permit comprehensive exploration of the factors impacting BIS adoption, especially in a small or medium sized company. All interviews were recorded with the consent of the participants for later analyses and lasted on average nearly 50 minutes.

This phase consists of two parts. In the first, unstructured part informants were asked questions without seeing the results of our literature review, i.e. a list of determinant

candidates. In the second (structured) part informants were asked questions about determinant candidates which we extracted from the literature review. We decide for this approach to ensure innate response in the beginning of the interviews.
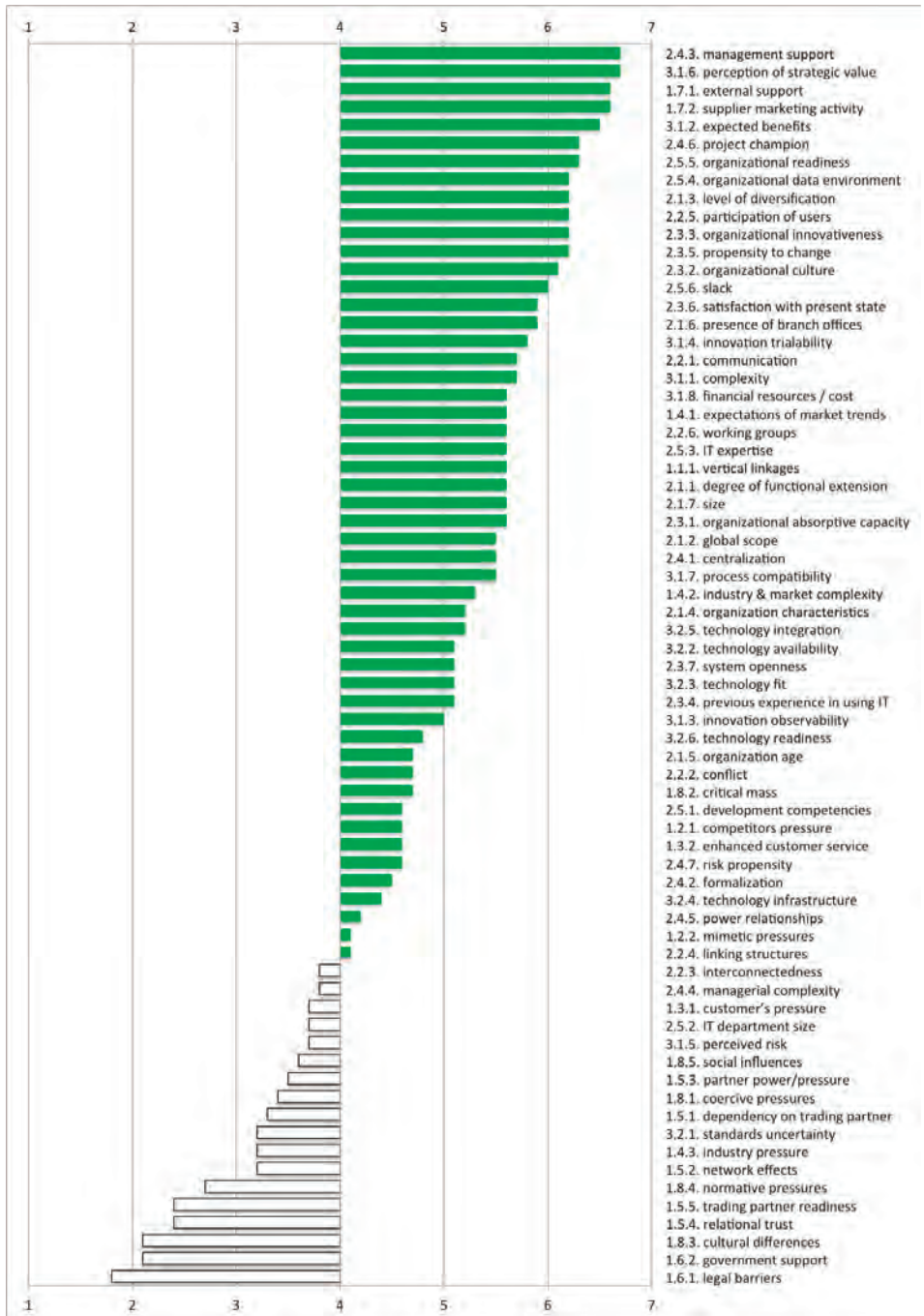
In the unstructured part informants were first asked to point out the factors that are, in their opinion, the most important for BIS adoption in SMEs (experts), or which factors prevailed in their decision about adopting BIS (adopters). In the next step informants were asked to express their level of agreement about the influence of previously expressed factors on BIS adoption. For this a 7-point Likert scale was employed, where 1 reflected complete disagreement about the influence of a specific determinant whereas 7 was linked to full agreement about the influence of a determinant. A more profound analysis of the unstructured part gave us 10 determinant candidates for the second phase of interviews. For inclusion in the second phase, each determinant had to be emphasized by at least 2 participants and needed to be graded highly (at least 6 out of 7) on employed Likert scale.

The structured part of the interviews resulted in the identification of 17 determinant candidates (13 additional and 4 matching results of unstructured part). In this part, informants were asked to express their agreement about influence of factors, which we previously discovered from the literature review. A 7-point Likert scale, as in the unstructured part, has been used here as well. The 17 emphasized determinant candidates are those, which reach the average grade of 6 ("I strongly agree that given determinant influenced") or higher among all participants, or/and were stated as "one of the most important" during explanation of given grade by at least 2 participants. To achieve reliable results without favoritism of firstly listed factors, each interview had begun at different factor (interval of 7 was used). Results of the analysis of structured part are presented in Figure 1.

Besides the 23 candidate determinants suitable for inclusion in the next phase of research, additional characteristics of BIS adoption in SMEs were identified. To begin with, the majority of determinants that were labeled as influential come from organizational context (i.e. *level of diversification, organization characteristics, presence of branch offices, size, participation of users, organizational culture, organizational innovativeness, propensity to change, satisfaction with present state, management support, project champion, organizational data environment, organizational readiness, professional competence* and *slack*). Next, *external support* and *supplier marketing activity* were emphasized as dominant determinants of the environmental context, whereas *complexity, expected benefits, innovation trialability, perception of strategic value, cost* and *BIS is a part of ERP feature* are the significant determinants linked to the technological context. Moreover, this phase also revealed that *government support, legal barriers, normative pressures, trading partner readiness, relational trust among trading partners* and *cultural differences among countries* are not deemed as influential factors in BIS adoption decisions within SMEs.

To gain a comprehensive understanding of BIS adoption determinants in the context under study, participants were asked, both following the unstructured part as well as following the structured part of the first phase, to provide their view about which (if

Figure 1: *Average grades of informants' evaluation of determinants candidates influencing BIS adoption in 1st round of interviews*

2.4.3. management support
3.1.6. perception of strategic value
1.7.1. external support
1.7.2. supplier marketing activity
3.1.2. expected benefits
2.4.6. project champion
2.5.5. organizational readiness
2.5.4. organizational data environment
2.1.3. level of diversification
2.2.5. participation of users
2.3.3. organizational innovativeness
2.3.5. propensity to change
2.3.2. organizational culture
2.5.6. slack
2.3.6. satisfaction with present state
2.1.6. presence of branch offices
3.1.4. innovation trialability
2.2.1. communication
3.1.1. complexity
3.1.8. financial resources / cost
1.4.1. expectations of market trends
2.2.6. working groups
2.5.3. IT expertise
1.1.1. vertical linkages
2.1.1. degree of functional extension
2.1.7. size
2.3.1. organizational absorptive capacity
2.1.2. global scope
2.4.1. centralization
3.1.7. process compatibility
1.4.2. industry & market complexity
2.1.4. organization characteristics
3.2.5. technology integration
3.2.2. technology availability
2.3.7. system openness
3.2.3. technology fit
2.3.4. previous experience in using IT
3.1.3. innovation observability
3.2.6. technology readiness
2.1.5. organization age
2.2.2. conflict
1.8.2. critical mass
2.5.1. development competencies
1.2.1. competitors pressure
1.3.2. enhanced customer service
2.4.7. risk propensity
2.4.2. formalization
3.2.4. technology infrastructure
2.4.5. power relationships
1.2.2. mimetic pressures
2.2.4. linking structures
2.2.3. interconnectedness
2.4.4. managerial complexity
1.3.1. customer's pressure
2.5.2. IT department size
3.1.5. perceived risk
1.8.5. social influences
1.5.3. partner power/pressure
1.8.1. coercive pressures
1.5.1. dependency on trading partner
3.2.1. standards uncertainty
1.4.3. industry pressure
1.5.2. network effects
1.8.4. normative pressures
1.5.5. trading partner readiness
1.5.4. relational trust
1.8.3. cultural differences
1.6.2. government support
1.6.1. legal barriers

any at all) determinants would be different in the case of a large-firm milieu. In general, informants agreed that differences between BIS adoption in SMEs and large firms exist. More specifically, the *costs* associated with the *resources* of the firm (greater relative influence in the case of SMEs due to mainly limited resources) and *regulatory influences* (smaller impact in the case of SMEs). Also, informants agreed that, due to the size and complexity of business environment, large firms have greater needs for BIS compared to their small and medium counterparts.

3.2. Second phase – Selection of key determinants

Against the backdrop of our first phase of the research, we inquired the informants to rank previously identified determinant candidates, both from the unstructured as well as from the structured part of the first phase. Figure 2 depicts average ranking of determinant candidates in descending order. Candidates with the best average ranking (above 12) on the left side of the chart are considered as being prominent determinants of BIS adoption for SMEs.

Overall, the second phase of the research produced a list of 11 BIS adoption determinants, as shown in Figure 3. Specifically, the results suggest that most determinants fall within the organizational context (6), followed by the technological context (4) and environmental context (1). These BIS adoption determinants will be employed in future confirmatory study where, through a quantitative research, a conceptual BIS adoption model will be tested through a survey of a larger set of SMEs.

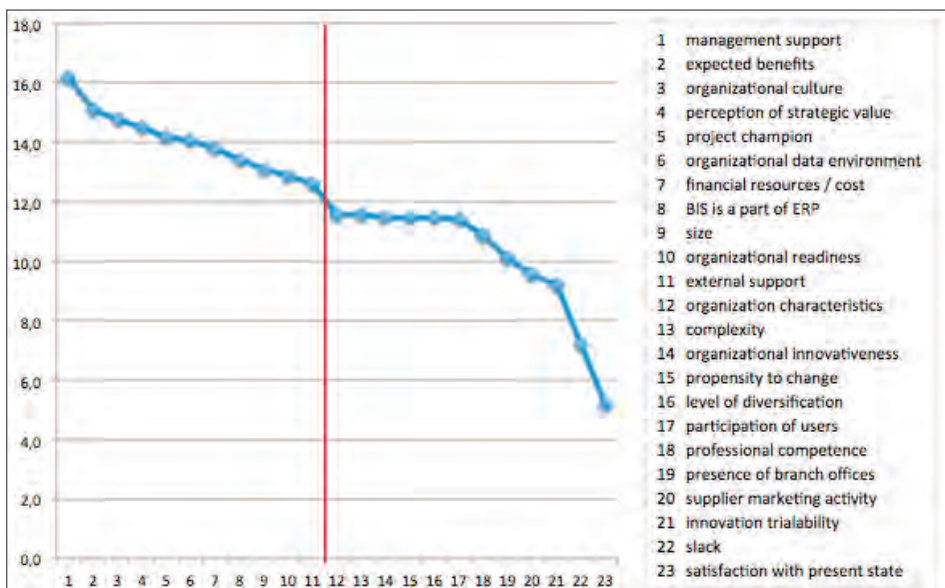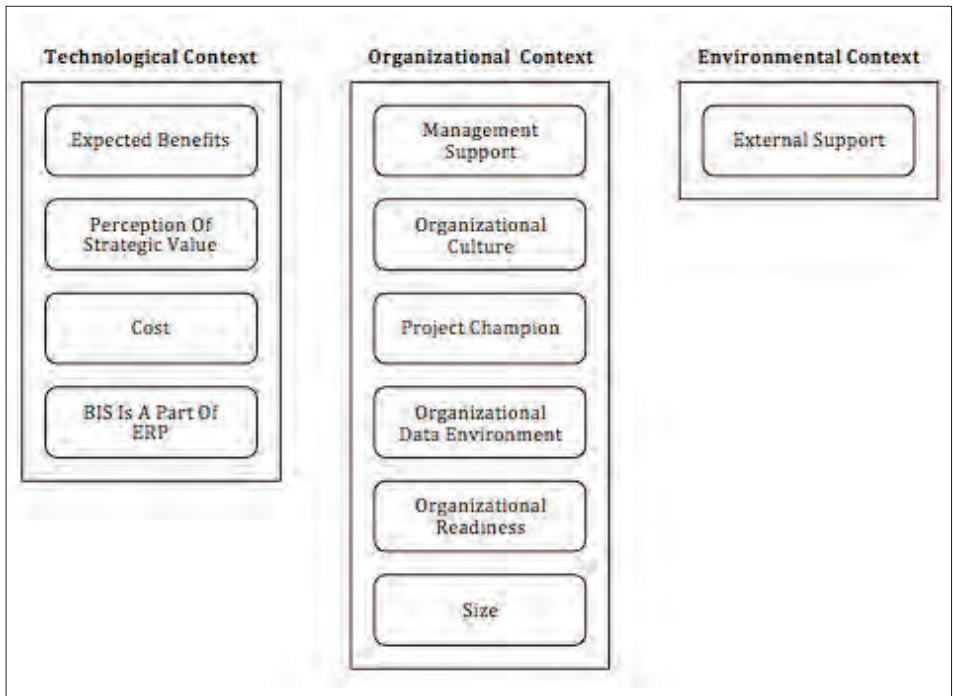Figure 2: *Results of the 2nd phase of the quantitative research*

Figure 3: *BIS adoption determinants within corresponding contexts*

4. DISCUSSION

Our study, qualitative in nature, provides new insights on a current IT adoption research stream, namely BIS adoption within SMEs. To begin with, results suggest that majority of influences on BIS adoption originate in internal characteristics of the firm adopting the technology. The majority of identified determinants of BIS adoption in SMEs, as well as the determinant candidate showing the highest grades – i.e. *management support*, belong to the organizational context. Against the above-presented theoretical background management support, as a determinant, reflects management's engagement in IT/IS adoption. Since BIS are primarily implemented to support decision makers at higher organizational levels (Popovič et al., 2012), generally thus management, we can assume that management's engagement with BIS is even more directly linked to BIS adoption as it is in the majority of other cases of IT/IS adoption. Next, it is observed that environmental context is not considered an important set affecting SMEs' intention to adopt BIS. Specifically, only one of the identified determinants belongs to this set, namely *external support*, where its average ranking is even the lowest among selected determinants. In contrast, technological context is deemed important, particularly the characteristics of BIS as innovation. Among the relevant determinants, our results emphasize expected benefits of BIS, perception of BIS strategic value, BIS-related costs and whether BIS is a part of an ERP solution.

The above discussion leads us to the conclusion that BIS adoption within SMEs is a phenomenon that is mostly driven by the management support, organizational culture, presence of the project champion, organizational data environment and other organizational characteristics and features, but characteristics and expectations about the BIS like expected benefits, perception of strategic value and cost must also be taken into account.

"To align our findings with previous studies we conducted the comparison of our results with the findings from the research of Basole et al. (2013), which examined 472 articles from the field of IT innovation adoption and extracted the most common adoption predictors.

Results are consistent across determinants of expected benefits (perceived benefits, (Basole et al., 2013)), cost, management support (top management support, (Basole et al., 2013)), organizational culture, size (organizational size, (Basole et al., 2013)) and external support (vendor support, (Basole et al., 2013)). All of these determinants are in Basole et al. (2013) denoted as "top predictors of IT innovation adoption". The level of consistency is matched with previous studies by more than a half (6 of 11) of determinants.

When analyzing the determinants that are not consistent with previous findings, one that stood out is the perception of strategic value. One possible explanation for its inconsistency with previous findings lies in the differences between BIS and other IS/IT. BIS are namely typical tool, supporting decision makers at higher organizational levels (Popovič et al., 2012), where decisions about strategies, visions and missions are taking places and, as such, BIS can achieve perception of strategic value.

Next in line of determinants that appeared particular to BIS in SME is the project champion. This can also be linked to specifics of BIS. As the use of BIS is primarily voluntary, and the benefits of BIS are more indirect and long-termed compared to operational IS (Popovič et al., 2012) the adoption effort from internal pressure (Basole et al., 2013) of the (future) users is appropriately poorer. Additional motivation for adoption, which can be provided from project champion, is therefore fairly important for successful adoption of this kind of IS.

Furthermore, organizational data environment is another determinant specific to BIS adoption in SME. This determinant is also mostly related to BIS specifics. BIS are namely IS which utilize data from other - mostly transactional - IS (e.g. ERP). Consequently, BIS can be sensitive to quality of existing data in organization in contrast to some other IS, which purpose is to generate data and are using existing data to less significant extent.

Another BIS in SME specific adoption determinant is organizational readiness i.e. the availability of the needed organizational resources (not only physical assets, but also human knowledge of IS) for adoption (Ifinedo, 2011). This determinant's inconsistency with most common IS adoption determinants can be related to SME specifics. More precisely, is it related to limited resources of SMEs compared to their larger counterparts,

which generally possesses higher amounts of material resources and also more of various human knowledge of IS, at normally higher number of employees.

Last in the group of with previous findings inconsistent determinants is self-evidently determinant BIS as a part of ERP. To the best of our knowledge this determinant appears the first time in our research and, as such, cannot be a part of common IS adoption determinants of prior studies.

Denoted as inconsistency with prior researches can also be determinants that Basole et al. (2013) indicate as predictors with the highest predictive power, but are not selected in our research. Rather noticeable is external pressure, as determinant distinctive for more "open type" IS/IT, e.g. e-business (Oliveira and Martins, 2010). In the case of BIS we can observe a typical "internal" IS. Drawing upon this reasoning we can explain rather poor representation of the environmental context of determinants in our research."

Comparing results with Iacovou model, significant correlation can be defined in the areas of expected benefits (Iacovou's *perceived benefits of IT innovations*) and in organizational context, mostly in *organizational readiness* (i.e. financial resources, IT resources). Low correlation appears in area of external influences (i.e. *external pressures*), which could be attributed to the differences between BIS and Electronic Data Interchange as Iacovou's research environment (Iacovou et al., 1995).

Nevertheless, attention in our research must also be given to the factors that were collected from the unstructured part of the interviews. Most factors (8 out of 10 entering the 2nd phase of interviews) that surfaced in this part correlate with the factors extracted from the literature review directly or indirectly. Most frequently mentioned were management support and expected benefits in various forms, like "easier management", "growth control", "management needs", "managements initiative", "better management", "management effort", "managements sponsorship", "risk control", and "cutting expenses".

Yet, there were also 2 factors, entering the 2nd phase, that were collected from the unstructured part of the interviews and do not correlate with the factors extracted from the literature review. Some informants believe that BIS, that are a part of ERP system of the company, will be adopted more often, quicker and easier compared to other BIS, emphasizing that "*BIS is a part of ERP*" can be considered an important BIS adoption determinant. The roots for the importance of this determinant should be sought within both BIS and SME characteristics. BIS depend largely on the quality of available data; when BIS is a part of an ERP solution, we can expect to have better input for BIS as opposed when it is not sufficiently integrated with the transaction system (e.g. the data might not be readily available, incomplete, in unsupported formats etc.). This, in turn, leads to shorter BIS implementation times and, therefore, lower implementation costs. This is very important for SMEs, as they are relatively more sensible on cost increases compared to their larger counterparts. Also, such integrated solution is more effective in terms of the burden for employees as they need to learn about fewer different systems to achieve their goals (e.g. the learning curve is steeper, there is a single user support

etc.). Since SME have fewer human resources, the above stated characteristics importantly impact the adoption of BIS in SME.

Another determinant candidate further arising from the unstructured part of the interview is *professional competence* of the employees. This phenomenon encompasses all professional competence, knowledge, abilities and skills that are important for the company processes and adoption of innovation. This leads us to the conclusion that human resources, and specially their characteristics, could also be a significant determinant of BIS adoption in SMEs.

The 1st phase of interviews led to the identification of a wide range of factors that might impact BIS adoption in SME. Indetermination about reciprocal value of influential strength among determinants is leading us to the conclusion that 2nd phase of this exploratory research with ranking top determinant candidates from the 1st phase was certainly needed in order to provide a reliable set of BIS adoption determinants for SMEs.

To reach a more complete understanding of BIS adoption determinants for SMEs, an assessment about which determinants would be different for large firms was carried out. In general, it was agreed that differences between BIS adoption in SMEs and large firms exist; the costs associated with the resources of the firm (greater relative influence in the case of SMEs due to mainly limited resources) and regulatory influences (smaller impact in the case of SMEs). Also, it was agreed that, due to the size and complexity of business environment, large firms have greater needs for BIS compared to their small and medium counterparts. A further analysis of this response and further clarification with the informants, we concluded that greater needs rather mean a more varied BIS, namely a BIS with a greater pool of functionalities as result of more complex business requirements. This does not curtail the importance of the BIS for SME, but rather emphasizes the fact that SMEs need a different type of BIS.

On a practical side, we expect that our results, although not yet empirically validated, will assist software vendors and consultants, as they will provide a deeper understanding of the drivers of BIS adoption in SMEs. Based on importance of BIS, the results will be relevant also for individual firms in case they need to foster the use of BIS as factor of success of the company. Managers and BIS specialists can gain a valuable insight into influences that are more or less present among various factors in their adoption process. They can be focused on key factors in their environment and their company, and be more efficient in managing them. Further, they can also be aware which BIS and surrounding IT characteristics are important in order to adopt a BIS.

Last, but not least, it is important to note the limitations of this work. First, for more representative insight into studied phenomenon the sample of included firms could be larger and geographically more dispersed (all interviewees were from the same country). Another limitation is also the fact that this research directly addresses only SMEs whereas large companies are studied just through differences to SMEs, and with limited experiences of interviewees.

5. CONCLUSION

A comprehensive literature review, coupled with the results from qualitative cases, gave us an overview of determinants considered as having noteworthy influence on BIS adoption in SMEs. Through the two-phase approach we pinpointed the candidate determinants for BIS adoption in SMEs to provide a succinct list of determinants for empirical confirmatory testing.

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