

Explaining the Behavioral Intention towards BI Implementation in Public Administrations – A Principal-Agent Theory Approach

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Abstract. Business Intelligence (BI) is an established instrument to support public administrations in their management tasks by increasing their information level. BI is of special interest in the context of introducing accrual accounting in public administrations as this affects the information level of different stakeholders, leading to a possible decrease for municipal councils. The principal-agent theory can help to explain different behavioral intentions of the stakeholders concerning the introduction of BI. We employ a single qualitative case study to analyze these behavioral intentions. It shows that the introduction of accrual accounting did decrease the information level of the municipal council making the principal-agent problems possible. Furthermore, it shows that BI might be a solution for this problem. Therefore, council members show the behavioral intention to support the BI implementation while administration staff members rather resist it. Based on these findings, we discuss implications for practice and future research.

Keywords: eGovernment, Business Intelligence, Empirical Study, Organizational Change, Principal-Agent Theory.

1 Introduction

Business Intelligence (BI) is an established instrument which can support public administrations in their strategic management tasks. Business Intelligence has been proven a successful instrument to provide the strategic management with information in a useful form. Hence, it can also be an appropriate instrument for municipalities to transform the information provided by accrual accounting in a form which is easily accessible for the political leadership of public administrations [1]. Thereby, it can help to increase the information level in these positions [2].

In the context of introducing accrual accounting BI is an important instrument. In a move towards New Public Management, most German federal states are committing their municipalities to implement accrual accounting until 2012. In the long term, the introduction of instruments like contract management, budgeting and controlling which have been proven successful in the private sector promise higher information

levels for the municipal council [3, 4]. In the short term, the honorary council members are confronted with a new, diminished budget layout they are not used to, leading to a decreased information level. BI presents an instrument, which can provide the council with targeted, individual information and help to overcome this problem.

Principal-agent theory can help to understand different behavioral intentions towards BI implementation in public administrations. Though Business Intelligence could help municipal councils to increase their information level and will therefore be supported by council members, public administration staff might resist the introduction, as they could lose a possible information advantage compared to the council. Understanding behavioral intentions, especially possible resistance, towards BI implementation is crucial for a successful BI implementation process. In this paper we aim to analyze the behavioral intention towards the introduction of Business Intelligence from the perspective of the principal-agent theory, as this theory is very well suited to explain problems arising from information asymmetries and has already been successfully applied in the domain of public administration [5]. We strive to answer the research question of:

In how far can the principal-agent theory aid to analyze and explain the behavioral intention towards a Business Intelligence implementation in public administrations?

In order to answer this research question we employ a single, qualitative and interpretive case study. The remainder of the paper proceeds as follows: In the second section, we discuss the related work, especially the principal-agent theory and its application in the public sector as well as the concept of behavioral intentions. Subsequently, we develop a research model with the underlying hypotheses of this study. After describing the research methodology in the third section, the case data gathered in a municipality in Germany, is presented in Section four. In the fifth section, the findings and implications are discussed and interpreted against the underlying hypotheses. The paper concludes with a summary of the major results.

2 Theoretical Foundation

2.1 Behavioral Intention

Behavioral intention is a key variable to research on technology adoption and diffusion. Information Systems literature has developed a rich body of knowledge explaining the user adaption of information technology (For an overview see[6]). Theory development in adoption and diffusion research, so far, mainly examines individual-psychological variables for explain behavioral intention, revolving around individual-psychological concepts such as ease of use, usefulness, or attitude. However, while the merits of this theory approach lie in its wide-range applicability, explanatory potential in terms of the institutional setting of a behavioral intention situation is neglected. Here, we argue that an analysis of such circumstantial institution have the potential to shed new light on technology adoption and diffusion.

Public sector organizations are characterized by specific and effective institutions. E-government can be regarded broadly as the design, adoption, and assessment of IS in government organizations. This view opens up for an external, customer-oriented perspective as well as for an organization-internal perspective on technology adoption

and diffusion. In the former, behavioral intention has as well been successfully applied as a predictor of technology acceptance, for instance, by [7]. However, we identified that studies focusing on IS adoption within a public organization are rarely to be found [8, 9]. Here, we argue that within the realms of public organizations, institutions are most effective and, too, most specific to the sector of analysis. In that respect, the question arises of which institutional theories bear potential for utilization in e-government adoption and diffusion.

2.2 Principal-Agent Theory

Principal-agent theory – also known as agency theory – is concerned with a general agency relationship between two parties. One party (the principal) concludes an agreement with another party (the agent), in the expectation that the agent will subsequently choose actions that lead to outcomes desired by the principal [5]. The relationship between both parties is governed by an imaginary contract specifying what the agent should do and what the principal must do in return [10, 11]. In such relationships, a series of problems arise. The principal-agent problem occurs when (a) the principal and the agent have partly differing goals and (b) it is costly for the principal to receive accurate information about the actual behavior of the agent. Situation (a) is usually referred to as a goal conflict. Situation (b) results in the parties' different information levels and thus leads to an information asymmetry [12]. Two issues have been identified in the literature as typical for an agency relationship. The *moral hazard* phenomenon arises when some outcome-influencing actions of the agent are too costly to be observed. The agents might then be personally motivated to take different actions than they would take if they were observed by the principal [13]. Usually, there exist some unobservable, uncontrollable outcome-influencing factors, which vary in time. As the agents prefer less effort to more, they are able to mask their own *shirking* with random variations of those factors [14]. The *adverse selection* issue refers to a situation when the agent's skills (characteristics) are not observable. The principal is then likely to hire lower skilled agents who falsely claim the requisite skill level [15].

In the literature, two main measures have been identified which increase the probability that the agent will behave in the interests of the principal. First, outcome-based contracts, i.e. co-aligning the preferences of the agent with those of the principal through allowing the former to participate in the outcome, can effectively curb agent opportunism [16]. Second, when information systems informing the principal about the agent's behavior are implemented, the agent is more likely to behave in the interests of the principal [17].

2.3 Principal-Agent Theory in Public Administration

In the domain of public administration – or synonymously public bureaucracy – exist an extensive chain of pairwise principal-agent relationships. They can be identified between citizens and politicians, politicians and public administration heads, and public administration heads and their staff [5]. Between politicians and public administration staff exist information asymmetries. Niskanen [18] argues that the combination of informational monopoly and knowledge about legislative needs allows bureaucrats to

prepare budget-output packages that are presented to politicians as take-it-or-leave-it proposals. As public administration staff is usually paid salary, which is due to governmental regulations, there is no opportunity to bind them directly to the (monetary) results of their efforts. Moreover, the outcome is hard to measure [5]. Hence, there exists a principal-agent problem with its dangers of moral hazard and adverse selection [19].

In the move of New Public Management (NPM), a trend arose in the domain of public administration to implement some mechanisms originating from the private sector [3]. Costs, which had been previously aggregated, pooled, or not measured at all, are increasingly categorized and analyzed. This process is referred to as *accountingization* [4]. In particular, most German federal states committed their municipalities to move from cash-basis accounting to accrual accounting. Although the principal (politicians in the city council) does not pay the agent (public administration staff) direct commission on the realized outcome, the agents have to commit themselves on a specific outcome level they aim at.

Business Intelligence (BI) systems are information systems that support decision-making through aggregating data, and enabling to analyze and disseminate the relevant information among decision-makers [20-22]. In the domain of public administrations, such systems can be implemented in order to inform the principal about the outcome realized by the agent [1]. Waterman and Meier [2] state that eliminating the information asymmetry through implementation of information systems can increase administration efficiency if the principal and the agent establish a cooperative relationship and support each other.

2.4 Research Model

The principal-agent theory provides a theoretical framework for our analysis of the behavioral intention towards BI implementation in public administrations. We study the information balance between the city council (principal) and the public administration staff (agent) before and after the move from cash-basis accounting to accrual accounting. This change was required by federal state law and took place for the studied case in 2003. Furthermore, we study the expectations and intentions of both sites towards a possible introduction of BI. The main elements of our research and their relationships are presented in Figure 1. The time dimension is visualized vertically while the horizontal axis is used to present causalities between certain events, the information level of both involved parties and their behavioral intention.

In particular, we analyze the information level of both principal and agent before 2003 (cash-basis accounting) and at present (accrual accounting without BI) and compare them. We formulate the following hypothesis:

H₁: The implementation of accrual accounting leads to less information for the city council (principal).

As we assume that the implementation of the accrual system does not decrease the information level of the public administration staff, we expect to find an information asymmetry for the benefit of the agent. Further, we analyze the information level of both involved parties in the case of a BI implementation (accrual accounting with BI) and pose the following hypothesis:

H₂: The implementation of BI would lead to more information for the city council (principal).

Again, as the public administration staff members deal with the original information on a daily basis, we assume that an information system implementation cannot change their information level. Hence, we expect a decrease of the information asymmetry after a BI implementation. As this fact has substantial consequences for both principal and agent, we formulate the following propositions:

H₃: Due to the expected improvement of the information supply, the city council (principal) shows the behavioral intention to support BI implementation.

H₄: Due to the expected loss of information privileges, the public administration staff (agent) shows the behavioral intention to resist BI implementation.

H₃ and H₄ concern the behavioral intentions of both principal and agent towards the implementation of a BI system. In particular, we assume that the principals support such a move in the hope to improve their own information level and be able to influence the agent's actions. On the contrary, the agents resist an implementation as they fear to lose their information privileges.

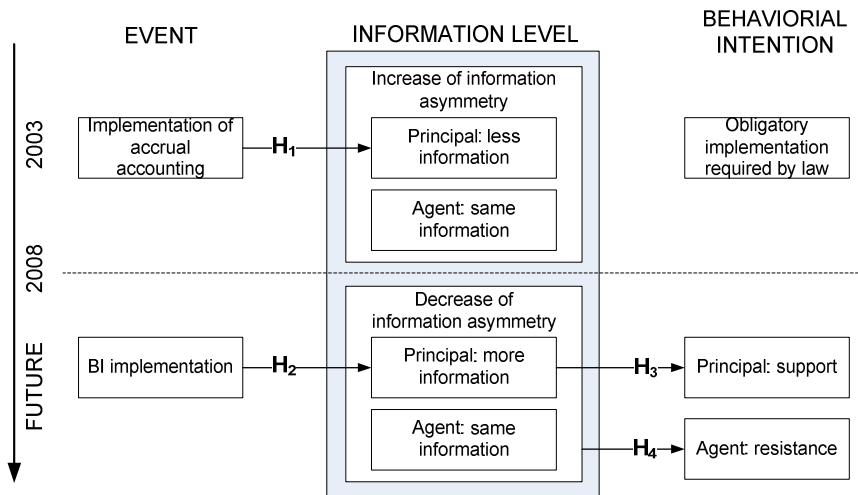


Fig. 1. Research Model

3 Research Methodology

Methodology selection. Case studies are a well established method in qualitative IS research methodology. They study contemporary events in their natural surroundings using multiple methods of data collection. The researcher exercises no experimental control over the studied phenomenon and therefore does not influence analyzed developments or behaviors [23-25]. Hence, case study research is well suited to analyze temporal, organizational developments like the implementation of accrual accounting

in German municipalities as this is a currently ongoing process. Literature distinguishes different types of case studies including single case studies. Single case studies are, amongst others, applicable in situations where a revelatory case or a leading case example is studied, which provides valuable insights for future similar cases [23, 25]. This condition holds for an ongoing process like the introduction of BI in public administration in combination with accrual accounting. Single case studies have been applied successfully in eGovernment research [26].

Case selection. To answer our research question we employed the case of a municipality in Lower Saxony, Germany. This municipality has about 12,000 inhabitants, about 27 full time staff members in the core administration and a municipal council consisting of 26 honorary members. This case is especially suited for our research since (1) due to its size, the studied municipality is representative for a large number of public administrations in Germany, and (2) this municipality has already implemented accrual accounting and has introduced an ERP system in this process, thereby providing the technological basis BI systems can build upon. Hence, the presented case constitutes a leading case example for other municipalities facing the same challenges in the future.

Data collection and analysis. For the collection of data about information asymmetries and intentions towards the implementation of a BI system multiple methods were applied. Core of the information collection were 12 semi-structured interviews of an average length of 42 minutes, 6 with members of the administration (including 5 department heads) and 6 with members of the municipal council, conducted in July 2008. Those interviews were based on an interview guideline derived from an initial stage of analysis of strategic documents of the municipality alongside with literature from the fields of principal-agent theory, eGovernment and BI. Those concepts were further refined in a joined workshop with staff members of the municipality's administration as well as members of the municipal council. The interview guideline contained questions about the current information level, changes of the information level due to the introduction of accrual accounting as well as expected influence of the introduction of a BI system on the information level and their behavioral intention towards such an implementation. The interviews also contained a free part, which allowed for an open discussion of further issues concerning the items brought up in the interviews. All interviews were tape-recorded and transcribed afterwards resulting in 84 transcribed pages and 54,883 words. The transcripts were then analyzed by two researches who were not involved in the interviewing process, each searching independently for text passages supporting or dissenting with hypotheses (Qualitative Content Analysis). The findings were then discussed and consolidated with the support of a third researcher.

4 Results

4.1 Accrual-Basis Accounting and Information Level

"The studied municipality moved from cash-basis accounting to the accrual system as required by state law. We experience a changed information level. Many

colleagues, who have already been in the council for many election periods, miss the old transparency, those detailed budget items. One could look for an item and ask how the money was spent.” (Councilor III)

As the honorary councilors do not work with the operational systems, the main problem seems to be the new budget layout, which provides less information. The councilors got used to the old cash-basis budget over the years and stress they were able to find detailed information about single budget items and make further inquiries about expenditures. As the accrual-basis budget gives an aggregated overview, they are not able to see detailed information about singular cash flows.

„One often has the feeling that it is the administration staff that has an overview rather than the council members, who only occasionally deal with the budget.“ (Councilor I)

The city council members feel they are presently less informed and think that the administration staff has gained information advantages from the move to accrual accounting, because of their daily experience with the operational systems.

„I think the council members‘ reception is that they used to be better informed, because they were able to deal with the matter better.” (Administration staff A)

The administration staff shares this view. The staff members think the city councilors used to have more information and were able to handle it better.

4.2 BI and Information Level

The intended implementation of a Business Intelligence (BI) solution would lead to a better information supply for the city council members.

„I hope that we receive more information. This is what a BI system is ultimately for. [...] I think that the council will be strengthened.” (Councilor IV)

The councilors expect to receive more information from the BI system and hope for a change in their information supply. They see an opportunity to strengthen their position.

“Certainly, the position of the council will be strengthened insofar as we will be able to contribute to the decision-making process ourselves. At the moment, we get something we can vote on, we can ask for additions, but we don’t have the information to actively play a part in the decision-making process from the very beginning.” (Councilor II)

At present, the city council members miss the opportunity to actively pull information in an autonomous way. As the new budget layout provides less detailed information, such inquiries seem necessary. The decision-making process is currently usually triggered by the information pushed from the administration staff and the councilors would welcome more autonomy. The alternative to independently pull information from the BI system would let them initiate decision-making processes themselves.

“When we implement a BI system there will be targeted reports that the council is actually interested in. [...] It will be a benefit for the council members.” (Administration staff B)

The administration staff members see an advantage of the BI system for the council members. Such a structured solution would increase the precision of the information supply so that more information reaching the councilors would actually satisfy their information needs.

4.3 Behavioral Intention towards BI Implementation – Principal (City Council)

As some of the city council members have already gained professional experience with BI solutions, the council seems to support the implementation in the municipality.

„I am shaped by my professional experience and in the beginning you are skeptical, because you are the one to do the work, but today you clearly appreciate the transparency and the alignment of goals and measures.“ (Councilor III)

The councilors praise BI as providing more transparency and leading to better and easier decision-making. Apparently, there are differences between the council and the administration staff on two main issues concerning the intended BI implementation.

„The council sees precisely a decrease of workload. Doesn't the administration staff perceive it so as well?“ (Councilor V)

First, the councilors expect an alleviation of workload for all participants and seem to be surprised that this view is not shared by the administration staff.

„But when they work reasonably, they don't have to be afraid of control. Certainly, a BI system is controlling. But this is what it is for.“ (Councilor IV)

Second, the council members admit a BI solution could potentially give them the opportunity to supervise the administration staff's work. However, they don't seem to see a problem there but rather a normal situation.

4.4 Behavioral Intention towards BI Implementation – Agent (Administration Staff)

The administration staff perceives the two already mentioned problems concerning the intended BI implementation.

“It will be more work for us because of further inquiries that will come. Perhaps, this information is already in the report, but they don't read it. When we have to answer all those inquiries, it will be more work for us.“ (Administration staff C)

The administration staff members fear more workload that would not always be founded and think the councilors would not appreciate this additional work.

“You just know that you will be a bit more controlled through this system.“ (Administration staff D)

The second issue is the arising possibility of work supervision and benchmarking with other positions and municipalities.

“I think no one of us can claim that they never thought: ‘It can also lead to the situation that you are benchmarked with other municipalities and other positions.’“

The opportunity is clearly there. One definitely can't deny it. I am not so anxious myself but my colleagues are, I think." (Administration staff C)

Many administration staff members seem to fear benchmarking opportunities. However, they do not explicate their own fears directly, but refer to other concerned colleagues.

5 Discussion

5.1 Findings

The implementation of accrual accounting without a complementary BI system decreased the information level of the city council. The obligatory implementation of accrual accounting is supposed to provide better information about costs aggregated on their respective so-called products and thus give the city council a more outcome-oriented view of the actual state of their municipality. However, our interviewees confirmed the opposite result of this particular change. The councilors miss the much more detailed old budget layout, which they were used to. In terms of the agency theory, the principal used to be provided with information on the behavior of its agent. Accrual-basis budget layout, as required by German federal state law, does not provide this detailed information any more. The councilors are not able to observe the behavior of the administration staff members. The sole implementation of accrual-basis accounting decreased the information level of the city council. This confirms our hypothesis H₁.

The city council's decreased information level led to an information asymmetry. The administration staff deals with the new accounting system on a daily basis and is forced to understand it. Due to this on-the-job experience, the information level of public administration staff did not change. Hence, an information asymmetry arose between the city council and the administration staff, which gives the latter clear information privileges. The personal interests of the administration staff members are not co-aligned with the outcomes desired by the council. Moreover, the staff has no incentives to handle in the interests of their principal. Staff members are able to initiate decision-making processes by preparing own dedicated voting proposals. Both solutions of the principal-agent problem proposed by the theory, outcome-based contracting and exploring agent behavior using information systems, are not applied. As the administration staff, like every worker, prefers less effort to more, the issue of moral hazard arises. Moreover, the councilors have only limited opportunities to assess the staff members' skills and the quality of their work. This makes the adverse selection issue feasible.

A BI system build on top of the accrual accounting base provides an opportunity to reduce the information asymmetry. The city council expects the implementation of a complementary BI system to increase their information level. A BI system would provide information about current financial expenditures and place them in relation to performance figures and respective goals. This would lead to a coherent view of municipal goals and the related current and scheduled administrative measures. Such system would reduce the information asymmetry and provide the councilors with an instrument increasing the probability that the public administration staff behaves in

the interests of the city council. Both the behavior and the respective outcome of the administration staff would be observable by the city council members. Moreover, as the councilors would have the opportunity to actively pull needed information, they would be able to initiate decision-making processes themselves and don't have to rely on the administration staff's proposals. Our second hypothesis H_2 can be confirmed.

As a BI system would improve the councilors' information level, they show the behavioral intention to support this step. The sole implementation of accrual-basis accounting decreased the information level of the city council members and induced an information asymmetry for the benefit of the public administration staff. The councilors expect that an implementation of a BI system would reduce the information asymmetry and the principal-agent problem of moral hazard on the side of the administration staff. As the councilors expect more transparency and easier decision-making with less effort, they support an implementation of a BI system. Our third proposition H_3 regarding the behavioral intention of the city council towards a BI implementation can be confirmed.

As public administration staff members are unwilling to lose their information privileges, they show the behavioral intention to resist BI implementation. The implementation of BI would reveal the actions and the respective outcome to the city council members. This would make their behavior observable reducing the opportunity to shirk. Moreover, as the outcome of their work would be measured and registered, benchmarking would be feasible. This way, not only the actions but also the skills of public administration staff members would be revealed. Both principal-agent issues of moral hazard and adverse selection would be reduced or even eliminated. Public administration staff would be increasingly forced to behave in the interests of the city council. Moreover, the staff members expect an increased workload due to the BI implementation. Consequently, the public administration staff shows the behavioral intention to resist a BI implementation. Our fourth proposition H_4 can be confirmed.

5.2 Implications for Practice

Our findings suggest that the sole implementation of accrual accounting without a complementary BI solution can actually decrease the information level of the city council members. As a result, an information asymmetry between the council and the public administration staff can be induced leading to a principal-agent problem with its issues of moral hazard and adverse selection. The probability that the staff members behave in the interests of the city council, decreases. The additional implementation of a BI system is perceived as reducing the information asymmetry and the probability that the administration staff behaves in the interests of the council increases. We derive the following implications for the practice.

Federal public policy. The implementation of accrual accounting is required by law in most German federal states. However, our study suggests that this step alone is not reasonable and thus not advisable. It should be taken into consideration whether the hitherto optional implementation of a BI system is to be made obligatory and required by law as well.

Local implementation strategy. Local politicians who plan to implement accrual accounting as required by law are advised to consider the synchronous implementation

of a complementary BI system. Otherwise, the information level of the city council is likely to decrease and the administration staff members might not behave in the interests of the principal.

Outcome-based contracting. When accrual accounting with a complementary BI system are implemented, the outcome of the administration staff actions is measurable and observable by the city council. This provides the technical opportunity to implement outcome-based contracting. This way the probability that the administration staff behaves in the interests of the city council is increased.

6 Summary

BI is an instrument, which can help to support strategic management tasks by supplying an easy access to relevant information. This is especially important given the current situation in which many public administrations across Europe implement accrual accounting.

In this paper we employed a single, qualitative case study in a pilot municipality which has already implemented accrual accounting to analyze the behavioral intention towards the introduction of BI of both councilors and administration staff from a principal-agent-perspective. Our findings show that, (1) the introduction of accrual accounting in the municipal administration has led to a decrease of the information level of the studied council due to diminished budget layout. The administration staff, in contrary, shows no such decrease. This leads to a principal-agent situation of information asymmetry. The council can neither observe the administrative staff behavior nor control the outcome of their work. (2) it became clear that BI is perceived as an instrument to address the information asymmetry problem as it can supply additional, interactive information to the councilors in form of easy-to-read reports. Therefore, (3) council members support the introduction of a BI system as it would increase their information level. On the other hand, (4) the administrative staff is not supportive of a BI implementation as it would eliminate their information privilege forcing them to act according to interest of the council.

The main limitation of the presented approach is the application of only a single case. A single case cannot provide generalizable results but allows studying current, leading cases as an outset for theory creation. Nevertheless, the basic conditions of the presented case are similar for a large number of municipalities, in terms of size (less than 20.000 inhabitants) as well as for the existence of a principal-agent relationship between administration and council. To generalize the findings of further case studies have to be conducted, varying the size of the municipality as well as considering other German and also European setting. For practice our findings suggest that the implementation of accrual accounting alone might not sufficient but should be accompanied by BI to ensure no information asymmetries arise. This implies for the federal government level that the implementation of BI could be made obligatory along with introduction of accrual accounting. Politicians on the local level are advised to consider a simultaneous implementation of accrual accounting and BI. Moreover, this should be accompanied by the utilization of instruments like outcome-based contracting to further ensure that the administration staff behaves according to the council's interest.

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