2009

On the Leverage of User Participation in Business Process Transformation – Learning from Case Studies in the IT-Service Sector

Jan vom Brocke  
*University of Liechtenstein, jan.vom.brocke@uni.li*

Bettina Thurner  
*University of Liechtenstein, bettina.thurner@hochschule.li*

Follow this and additional works at: [http://aisel.aisnet.org/amcis2009](http://aisel.aisnet.org/amcis2009)

Recommended Citation

[http://aisel.aisnet.org/amcis2009/706](http://aisel.aisnet.org/amcis2009/706)
On the Leverage of User Participation in Business Process Transformation – Learning from Case Studies in the IT-Service Sector

Jan vom Brocke
Hilti Chair of Business Process Management
University of Liechtenstein
jan.vom.brocke@hochschule.li

Bettina Thurnher
Institute of Information Systems
University of Liechtenstein
bettina.thurnher@hochschule.li

ABSTRACT
There is a strong common sense about the importance of user-participation for business process transformation: changing processes means changing the way people do their work. Hence, involving users early enough in order to get their support and input appears to be vital for business transformation. Or – the other way around: in case people are resistant to change, it is very likely that economic targets will not be met and quite often projects even turn out to fail. However – in spite of this intuitive understanding – little academic evidence is to be found on the leverage of user participation. Hence, with this study we set out providing some more evidence for the leverage of user participation in business process transformation. In the context of five case studies, we were able to compare transformation projects with different degrees of user participation and also to relate this to the results of these projects. In addition to the level of acceptance mobile tools introduced in the project we were also able to study the impact on KPIs.

Keywords
Mobile Business Processes, User Participation, Mobile Technologies, Process Change

INTRODUCTION
Since the early eighties information systems have changed the way organizations conduct business. Concepts such as business process reengineering (Hammer & Champy, 2001), change management (Luecke, 2003) and workflow management (van der Aalst, van Hee, 2004) have been widely discussed in order to capture the various facets of business transformation. One contemporary issue is the use of mobile technologies (Basole, Rousse, 2007), particularly increasing the flexibility and customer-related actions. One area, we can study this is the upcoming area of IT-Service Management (Fitzsimmons, J. & Fitzsimmons, M. 2007). Mobile solutions facilitate process changes from former paper-based to electronic data supported processes. The introduction of mobile-tool supported processes promises increasing data integrity (reducing multiple data recording activities), just-in-time information (access to knowledge-databases for service support purposes) and reduced processing time for accounting (e.g., creating invoices based on service technician reports immediately after service task completion). In addition, mobile tools offer greater flexibility to people as they are not restricted to certain places when conducting their business processes (e.g. by reading or writing data).

We refer to business processes as a timely-logical structure of activities fulfilling a certain business task (Becker, Kahn; 2003). Processes may well be structured into sub-processes detailing certain activities and thus describe the entire business of a corporation or business unit. Whereas mobility – in general – refers to the level of geographic independence of mobile workforce (Wang et al., 2005), the term mobile business processes (MBP) refers to any business process which is (partly or completely) executed mobile and can therefore not be fully supported by the use of stationary IT (Gump & Pousttchi, 2005). The term mobile-integrated business processes (MIBP) refers to any MBP that is fully supported by mobile IT (Pousttchi & Thurnher, 2006). A mobile-integrated business process is defined by the integration of mobile workforce via mobile technology into company business processes and IT-Systems (Pousttchi & Thurnher, 2007). Technological and organizational change of process workflows requires additional effort in order to overcome adoption and transition barriers. User participation (UP) can ease and facilitate this change.
Following this understanding, we see that introducing mobile business processes essential has an effect on the way people conduct business and needs to be taken into account. Whereas people, for example, were used to taking notes on paper and later transferring them into the system when back to the office, they are now capable of accessing the system directly. However, at the same time new practices have to be learned. In addition, also the level of autonomy might be restricted as employees feel monitored by having their actions tracked. Hence, technology acceptance among end-users turns out as a critical success factor for implementing mobile business processes (vom Brocke et al., 2008). One way of supporting technology acceptance is user participation, as we know from studies in the field of desktop-based systems. Whereas usability studies on mobile device and application usage are manifold (e.g. Nielsen, 1993; 2003; Poustchi & Thurnher, 2006; 2007) specific studies focusing on the improvement of business process through mobile workforce integration are still rare (Basole & Rousse, 2007, Wang & Cheung, 2004; Wang et al., 2005). In particular, empirical case studies providing a business case of mobile tool deployment are limited by number and application domain (Gebauer & Shaw, 2004; Wang & Cheung, 2004). Hence, in former work, we started to conduct a series of case studies in order to further analyze change projects of introducing mobile business processes (vom Brocke et al., 2008 a-c). In the course of these studies we subsequently observed the role of user participation and already found some sort of evidence for a positive influence of user participation on the project outcome. In the work presented in this paper, we can report on a closer analysis of selective key performance indicators (KPIs) and their derivation according to different levels of user participation.

In order to explain the phenomena of reluctance to change and how user participation can help to foster tool acceptance and thereby process change we introduce the theory of reactance. We then give an overview of our research design, present major findings and discuss these results in the light of limitations. Finally we draw a conclusion and indicate future research opportunities. We start off with the next section explaining the theory of reactance and its applicability to the phenomenon of user participation within change processes.

THEORY OF REACTANCE

The theory assumes that there are "free behaviors" individuals perceive and can participate and change at any given moment (Brehm, 1966; Brehm, 1981). For free behavior the individual must have the relevant physical and psychological abilities to partake in it, and must know that he/she can engage in it at the moment or in the near future. "Behavior" includes any imaginable act. More specifically, behaviors may be explained as "what one does (or does not)," "how one does something," or "when one does something."

![Figure 1. Model Reactance and Counter Measure](image)

Reluctance and resistance towards change is perceived to be a natural human behavior. Change is usually regarded as something threatening and unpleasant. Only for good reasons or "benefits" e.g., less cumbersome work procedures employees are willing to change their working procedure (Brehm, 1966; Brehm, 1981).

Against the background of the theory of reactance user participation offers the potential that end-users change their attitude towards a change process from being a “victim” with no choices and duty for obedience towards an “actor” with the possibility and freedom to actively impact and create his/her future work procedures. This might lead to positive acceptance of process change and measurable KPI improvement (see Figure 1.).

Within the theory of reactance the role of the “change agent” becomes of importance. A change agent in this context is a “facilitator” for change e.g., an end-user who is already convinced that mobile technology is of use and reduces complexity. The change agent can operate as an opinion leader among a stakeholder group e.g., all end-users and thereby foster compliance. Silvia (2005) found out that…”that a communicator may be able to increase the positive force toward compliance by increasing his or her credibility. Also increasing the positive force and decreasing the negative communication force simultaneously should increase compliance” (Silvia, 2005, p. 279).

Hence, taking the theory of reactance as a starting point, we can derive the assumption that user participation may well be a means for fostering the acceptance of the process change. In more detail, we can assume that a higher degree of user participation may lead to a better result in terms of KPIs used to measure the performance of relevant processes. These correlations will now be further analyzed on the basis of empirical cases.
RESEARCH DESIGN

Our work presented in this paper is based on five case studies within the IT-Service sector. Case study research is commonly used to obtain complex details and novel understandings about a specific phenomenon under investigation. This particular allows for examining practice-based problems, since it enables a researcher to capture the knowledge of practitioners which may lead to the generation of theory (Anda, 2003; Benbasat et al., 1987; Creswell, 2002; Eisenhardt, 1989). In this section we will describe the research design of our study in more detail, concerning (a) the selection of cases and (b) the process of studying them.

Case Study Selection

While there is no “ideal” number of cases which should be investigated in case study research, Eisenhardt suggests conducting four to ten case studies: “With fewer than four case studies it is often difficult to generate theory with much complexity and its empirical grounding is likely to be unconvincing, unless the case has several mini-cases”. With more than ten cases it becomes difficult to cope with the complexity and saturation degree is already achieved (Eisenhardt, 1989). Within this paper 5 case studies have been undertaken. Taking all of these cases from the same industry domain (technical customer service provision), we intend to deliver rather representative findings, which indeed are limited to our field of research.

The primary factor for the selection of the case study companies was the extent to which the mobile worker has been executing his/her operative tasks outside the office (e.g. at the customer's site). All case study companies have mobile workers who work at least 80% of a 40 hour week at a location outside the office and are disconnected from their desktop systems. Companies varied the company type, number of technicians (users of the mobile solution), the IT-architecture and the degree of user participation:

- **Case Study 1 (Telecom):** Telecommunication Service Provider (12,000 users of mobile device): For the first case study we investigated a mobile dispatching and order handling system of a major European Telecommunication Service Provider. 12,000 technicians have been equipped with standard commercial PDAs. The introduction of MIBP was conducted in iterative steps from the year 2000 until 2006. Legacy systems have been substituted by mobile client-server architecture (although service order generation and handling are still conducted on separate information systems for private and business customers). Main tasks of the field technicians include installation, maintenance and repair of telecommunication products (e.g. telephone systems for land line communication).

- **Case Study 2 (Utility):** Municipal Utility Company (1,000 users of mobile device): For the second case study we investigated a major German Municipal Utility Company and its mobile service, maintenance and invoicing process. About 1,000 technicians have been equipped with standard industry PDA. MIBP were introduced during a one year project with the support of a specialized consulting company. Typical tasks of the utility technicians are e.g. installation and maintenance of meters for gas or electricity in private, public or industry buildings. Due to special restrictions and the need of managerial control, dispatching remained manual:

- **Case Study 3 (IT Service):** IT Service Provider (40 users of mobile device): In the third case study we investigated an Austrian IT Service Provider for hard- and software installation and maintenance. 40 IT service technicians have been equipped with mobile devices. The system was implemented in cooperation with an Application Service Provider (ASP). That offers the advantage that on the mobile device itself no sensitive data was stored but online connection was necessary for data transmission and retrieval. Field technicians use a browser-based solution on the mobile device in order to receive job descriptions for the current working day which can be rescheduled via an implemented push-mail function. Main tasks of an IT service technician include repair, maintenance and installation of different hard- and software (e.g. repairs of printers, reboot server, and exchange mother board).

- **Case Study 4 (Toll Collection):** Toll Collection and Railway (7 users of mobile device): In this case study we investigated an Austrian Toll Collection and Railway Maintenance Company. This company is responsible for the planning, financing, building and maintenance of the Austrian rail-way and highway system. The road network has a total length of 2,000 km at the time of study conduction (Status: Dec. 2006). Seven field service technicians have been equipped with a mobile tool (MDA III) to replace the former paper based process. The mobile application was also realized together with the same ASP.
• **Case Study 5 (Machine Construction):** Machine Construction Company (3,500 users of mobile device): The case study refers to a large German Machine Construction Company which is a world market leader in the concerning industry domain. In 170 countries worldwide 20,000 employees are employed in over 200 outlets. More than 3,500 service technicians are employed worldwide. Such an immense service network made it necessary to integrate service technicians into company information systems (e.g., Customer Relationship Management - (CRM) and Service Level Management- (SLM) Systems). Prior to mobile tool support customer service calls have been sent to the service technician via mail or fax.

In the following we describe the investigations carried out in each of these case studies leading to a better understanding of the leverage of user participation in business transformation projects.

**Case Study Process**

The interviewees of the case studies have been selected based on their role in the organization and their level of experience with the existing system and processes. Moreover, interviewees have been selected according to their functions within the company.

The average duration of the interviews was 1 to 1.5 hours. In the Telecom Company four persons have been interviewed, in the Utility Company two, in the IT Service Company four and in the Toll Collection Company and Machine Construction Company two persons have been interviewed. The numbers of interviewees varied due interviewee availability within the case study companies. All 5 case studies have been longitudinal studies in the Technical Customer Service domain within different industries and lasted from 6 to 15 months (long-term case studies). For data gathering CEO, CTO, project managers and end users of the mobile application have been questioned with semi-structured questionnaires in face-to-face or via phone interviews. Interviews have been transcribed and fed back to the interviewees in order to reduce possible errors and clarify open points and misunderstandings (Thurnher, 2007).

As an investigation method we applied pre- and post investigation key performance indicators (KPIs) and interviews with employees as well as observation and data capturing via protocols during workshops within a period from 6 to 15 months. In total we investigated the KPIs time to bill, service-level-rate, work-load in the head office, paper-handling time and payback-period in all five case studies. An overview of the various metrics is given in vom Brocke et al. 2008d.

Within the contribution at hand we set out to further analyze the impact of user participation on two of these KPIs, which are (a) tool acceptance and (b) time to bill.

- **Tool Acceptance:** This refers to the degree of tool acceptance among end-users (field technicians) of the mobile application. The ranking was classified from $1 = \text{low tool acceptance}$ to $5 = \text{high tool acceptance}$.

- **Time to Bill:** This KPI refers to the duration (in days) from task completion to invoice submission to the customer.

The next section summarizes the case study findings.

**FINDINGS**

In this section we summarize the research findings. Our results show that both KPIs (a) tool acceptance and (b) time to bill could be influenced positively by means of user participation. These findings will now be described in more detail.

**Levels of User Participation**

In order to learn about the leverage of user participation we distinguished different levels of involving the user in the redesign process. Whereas level one indicates the lowest extend, level 5 represents the highest extend of user participation. In detail, the following levels have been distinguished:

- **Level 1:** Integration only in device selection phase

- **Level 2:** User participation during integration

- **Level 3:** User participation during requirements engineering process
- **Level 4**: User participation during requirements engineering and development phase
- **Level 5**: User participation in all phases of tool development process

Characterizing the different cases, two out of the five companies followed a comparably low degree of user participation whereas three companies implemented an approach of high user participation, two of which even with the highest extend of user participation in all phases of the redesign process. Figure 2 gives a detailed picture of the five case studies.

![Figure 2. Degree of User Participation](image)

**Impact on Tool Acceptance**

On the basis of these different types of user participation, we analyzed how far the project results might have differed accordingly. For that purpose we conducted interviews and asked for the impact resulting KPI of the various projects. In figure 3, we show the results for the KPI “Tool Acceptance”. Tool Acceptance was measured through interviews with end-users after mobile tool deployment.

![Figure 3. User Participation related to Tool Acceptance](image)
The results give evidence to the assumption that the higher the degree of user participation, the higher the perceived tool acceptance was. On the basis of this, we further analyzed the KPI “Time to Bill”.

**Impact on Time to Bill**

We measured the amount of days saved after the redesign project and recorded this for all the cases. These results are shown in figure 4.

![Figure 4. User Participation related to Time to Bill (mobile-tool supported)](image)

We see that companies with a high user participation have also a faster “time to bill” result. The colored results in table 1 show the cases with most user participation.

<table>
<thead>
<tr>
<th>User Participation</th>
<th>TtB paper-based (days)</th>
<th>TtB mobile tool (days)</th>
<th>Reduction TtB (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telecom</td>
<td>1</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Utility</td>
<td>4</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>IT-Service</td>
<td>5</td>
<td>21</td>
<td>14</td>
</tr>
<tr>
<td>Toll Collection</td>
<td>2</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Machine Construction</td>
<td>5</td>
<td>18</td>
<td>11</td>
</tr>
</tbody>
</table>

**Table 1. Time to Bill before and after mobile tool deployment**

Indeed the findings of this study have to be viewed in the light of certain limitations. The next section intends to discuss these findings and to provide an outlook for future work on the new processes – measured by means of the KPI “time to bill” – could be influenced positively by a high degree of user participation. Comparing the results of the five case studies, companies with a higher degree of user participation.

**DISCUSSION**

Generally, the findings confirm the assumption that a higher degree of user participation may lead to a better result in terms of KPIs of the relevant processes. Hence, we may conclude that, according to figure 1, user participation may well turn out to be a facilitator for business process change.
By changing “victims” into “actors” and in this case allowing the end-users to actively create and design their new working procedure we could observe that companies with a high degree of user participation in the mobile tool development phase experienced higher tool acceptance than companies with little user participation. Moreover, the companies with high user participation could realize business process improvements faster and to a greater extent than companies with a low degree of user participation.

Hence, following this line of thought, we may conclude with a plea for (more) user participation in business transformation. Coming from a rather intuitive understanding we now see some sort of economic justification for user participation as – in our observations – a high level of user participation has in fact led to comparable positive outcomes in terms of KPIs.

However, we indeed have to be aware of the certain limitations of our work. In particular we have not looked at the “cost-side” of user participation yet. Heading towards an economic justification, a more comprehensive analysis is necessary. From a methodological perspective, both the return and the investment of user participation have to be studied on a long-term basis (vom Brocke, Recker, Mendling, 2008).

In such an evaluation also the dynamic effects of process redesign have to be accounted for. As to the time to bill KPI for example, there are indeed learning effects leading to an improvement of the measure over time. So a poor result in our study could well be overcome by means of practice with the new processes. In particular, the speed of learning potentially leading to an adjustment of the results over time would be an interesting focus for future research.

This further development of the setting is also in alignment with the theory of reactance. Change and innovation needs to evolve over time. As end-users gain insights how the new technology can simplify their working procedure acceptance will rise. Acceptance is a major precondition for sustainable change of working procedures. According to the theory of reactance if acceptance is not given a person will always try to avoid the new status quo or try to reestablish the old procedure, even if that is not possible any more (Brehm, 1966; 1981).

Despite the lack of statistical data analysis due to the nature of case study research valuable insights on business impacts of mobile ICT applications for workforce support within real work settings could be gained. We learned that people respond to technological change more positively when integrated and thereby actively partake in technological changes and workflow adaptation.

**CONCLUSIONS**

With this work we studied the impact of user participation on the success of business transformation projects. On the basis of five case studies in the IT-Service sector we found evidence for the assumption grounded on the theory of reactance that a higher degree of user participation also leads to better results in terms of KPIs. Hence, we can conclude with a plea for user participation in transformation projects.

User participation is a success critical factor - not only but particularly - for mobile ICT adoption and acceptance. The user is not only an important source of knowledge. User participate particularly reduces resistance to change and tool reluctance and thus contributes positively to KPIs. A detailed evaluation of KPIs such as the payback period, paper-handling time and workload in the head office still has to be conducted. This will help to also financially validate the value contribution of user participation throughout the entire change process and serve as basis for decision makers.

Indeed we do not consider our work complete. We hope however that we may have contributed a piece to the puzzle of better understanding the role of user participation in business transformation. Therewith, we intended to stimulate research in this direction that we consider to be of great importance to efficiently make use of new technologies in business processes. The discussion already revealed some directions for future research that we would be happy to follow up in the future.

**REFERENCES**