



**PhD Program in
Management and
Business
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PHD THESIS WORK SUMMARY

**Means of interpretative flexibility:
User workarounds next to information systems**

by

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1. RESEARCH TOPIC

In my dissertation I concentrate on such globally interdependent, embedded information systems (enterprise resource planning, ERP systems), where the users have a little chance to shape and use the system to their own ideas and convenience. As a result of my research I show that in such cases the users realise the interpretive flexibility outside of the system developing and using routines complementing, substituting or bypassing the system.

The focus of my thesis is the period following the introduction of the information system – the complex ERP systems. This period is a changing, plastic period where I identify two different phases following the system introduction. I aim to reveal why the user routines develop next to the system, how they are developed and how they can be used?

Although the existence of these workarounds is a common fact for practitioners, the phenomenon is very understudied in the academic world (Ferneley and Sobreperéz 2006, Pollock 2005). My aim is that through this research we can learn more about their characteristics. On a more general level, I hope that my research findings will contribute to the knowledge about how information systems really work.

It was a long way finding the exact focus of the research question. Originally, I was approaching the phenomenon of workarounds from the direction of success and failure of information system – arguing that workarounds build the bridge between reality and the expected usage of the system. This bridge makes the systems work in everyday life and they are necessary to avoid failure. This concept altered considerably through the discussions related to the viva of my thesis proposal, and also following it. I realized that the question of

success and failure are different from what I am inquiring about. The existing workarounds are rather necessities which complement the system and support the efficient work of users in a strictly regulated and controlled environment.

2. THE FOCUS OF THE RESEARCH

We can consider the period following the system introduction in a static way focussing on single variables like the common variables of *system use* or the *user satisfaction* (DeLone and McLean 1992, 2003), the acceptance of technology by the users (Ventakesh és Davis 2000). These static approaches narrow down the reality too much and therefore, are unable to answer several questions regarding the workarounds existing next to the systems. An important result of the dynamic models is that they acknowledge and calculate the mutual interaction between technology and the human factor of information systems.

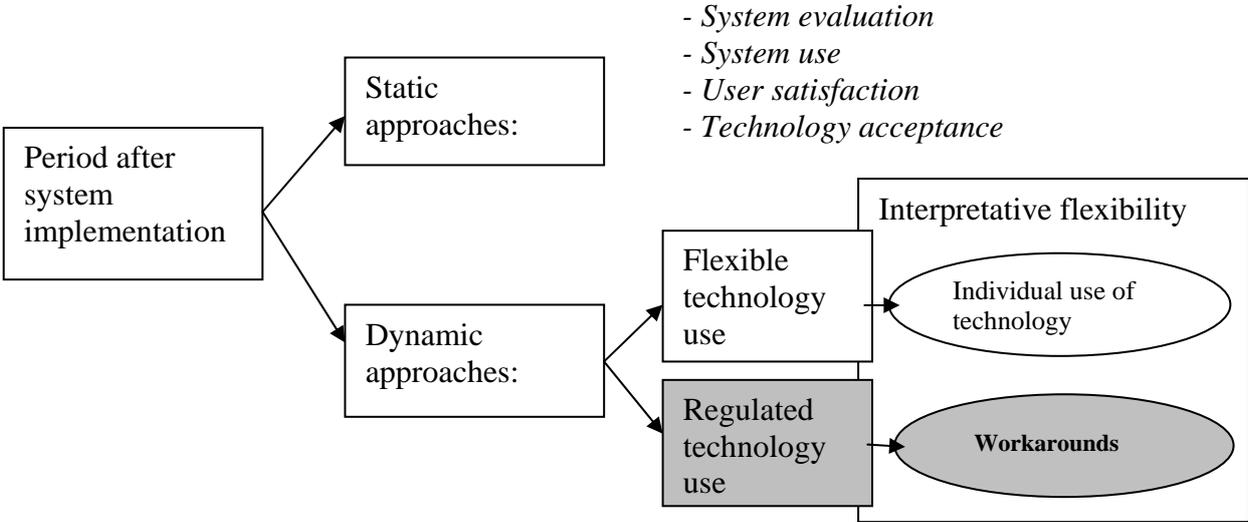
Such research have been done by Orlikowski (2000, 1992) based on structuration theory. According to the structuration theory the real use of the system develops through the continuous interaction of these two factors – during which process the interpretative flexibility plays a central role. This flexibility enables the users to deviate from the originally planned use and to use the technology according to their own cognitive schemes.

Nevertheless, what happens if the regulated use of the technology does not allow the users to use the technology in the way they intend to? Orlikowski (2000: pp409) emphasizes that the globally standardized and interlinked complex technologies [just as the ERP systems for example – E.B.] allow much less room for users' individual interpretations.

How does the exact process look like if the use of technology is limited by rules and processes? In the case of complex ERP systems, the regular standardized reports and the

previously regularized cross-functional data transaction schemes are limiting the users' freedom considerably. To support these type of work, already the system design allows less flexibility to the users, but the use is also strongly regulated on company level.

Based on my experiences I can state that in this case the importance of user workarounds increases. Practically speaking these “solutions” appearing around the system represent or embody the interpretive flexibility which in more open systems can be realized *within* the system. (Figure 1.)



1. figure: The placement of the research

The research questions about the workarounds I summarize in the table below:

Research question	Explanation	Earlier research
DEVELOPMENT		
Motivation or need behind workarounds	What triggers the development of workarounds? - Are workarounds objective or subjective needs	Kobayashi et al (2005); Gasser (1986); Sobreperez (2007); Petrides et al. (2005);
EXECUTION		
(A) Techniques, tools used (B) Team or individual workaround	What kinds of tools are used outside of the system? What defines whether it is a team or an individual routine;	Indirectly Gasser (1986) discusses, but there is no actual research on this area;
UTILITY		
(A) Productivity at individual level (B) Productivity at organizational level	Individual versus organisational level utility of workarounds Discipline versus opportunism;	Petrides et al. (2005) discuss the benefits and costs of workarounds but they do not evaluate;

1. table: The summary of the research questions

3. THE EPISTEMOLOGICAL STANCE OF THE THESIS AND THE METHODS USED

Johnson and Duberley (2000), or Mumford (1985) both emphasize the importance that the researcher – mainly a young researcher writing the PhD thesis – chooses a paradigm for the research which

- Can be easily aligned with his or her individual beliefs;
- Can be easily aligned with the research, and
- Provides potentially answers to the research questions.

The chosen approach should be part of an existing research tradition within the domain of information systems, as this way it strengthens the credibility of the research for the audience (Trauth and O'Connor 1990).

To identify the right paradigm fitting this thesis, we have to consider two characteristics of the research question.

(1) On the one hand I research the **process of the social construction** of two given information systems. I aim to reveal the mechanisms in this socio-technical system which are **informal and embedded in the situation**. At the same time the workarounds developed are from one perspective useful while not welcome from an other.

(2) On the other hand the research aims to reveal the **informal routines**, solutions which are developed by the users (individually or jointly) to complement or bypass the system.

For answering such type of research questions, the interpretive paradigm offers the best fit (Lee 1991, Drótos 2001).

Identifying with Hacking's (1999) approach I would like to emphasize that I do not agree with the extremely interpretive approach where the outside world omitted from social construction does not even exist. This is confuted by several facts from the history of science.

I rather agree with the approach where the objective reality exists but the majority of it can be only experienced through subjective meanings, discourses and illustrations (Hacking 1999: pp48).

Since the scholars of the field of information systems are getting distanced from the purely engineering approaches and consider more and more the social processes and human behaviour, also the research methods and techniques from the related sciences. As a result of this process, the **qualitative research techniques** became widely accepted and legitimate.

One of the most widely used interpretive research method with considerable tradition in the field is the **case study method** (Lee 1989; Chen and Hirshheim 2004). The case study method is a research strategy aiming the understanding of the processes and connections in a given environment (Eisenhardt 1989: pp534).

My research fields for the collection of empirical data are **two companies**. Both companies are Hungarian subsidiaries of large multinational companies and the decisions regarding the selection and introduction of the ERP systems were made at group level.

My main data sources during data collection were **observation** and **semi-structured interviews** with users of the ERP systems.

4. THE MAIN CONCLUSIONS OF THE RESEARCH

In this following chapter I briefly summarize the main conclusions drawn based on the data analysis.

4.1 Excel empire

This spreadsheet management software is the number one tool what users turn to if they need to get an overview, or send out or confirm large number of orders. Based on users' explanation Excel tables can be managed much easier. I identified two reasons behind it:

Firstly, the filtering and data sorting, as well as the possibility of adding notes makes the daily work easier to follow.

The other important reason was the speed: all users agreed that the ERP system is slow, restarting the computer is often necessary, and the applications from the central server are often not available. Excel, on the contrary, is always available...

Altogether, the freedom of use and the speed are the areas where Excel has an advantage over the ERP systems. This requirement was mentioned with high priorities at the procurement and customer service departments of both companies.

Once Excel is so flexible, easy-to-use, why is the cheaper Excel not enough to run the company processes instead of the expensive ERP software? This provocative question can be answered best with the help of Howard's (2005) article. The author identifies five main risk areas in working with Excel spreadsheets:

- Error potential: referring to a PriceWaterhouseCoopers study, the author claims that 90 per cent of the Excel spreadsheets contains errors. He estimates the cost of these mistakes between 1000 and 10 000 USD per decision per month;
- Data security: serious data security functions do not exist in Excel, and the few existing are not used;
- Auditing: it is problematic to follow the changes in the spreadsheets;
- Spreadsheets as enterprise resources: Even though Excel spreadsheets are used to make significant decisions, it is not treated according to its importance (lack of processes using it, or the user trainings for example);
- Data maintenance: there is no sufficient mechanism for the maintenance of data;

4.2 The risks of workarounds

The essence of the risk connected to the workarounds is the duplication of the processed data outside of the system. Firstly the data outside of the ERP system neither between employees nor between functions does not communicate with each other, does not refresh and is not secure. Secondly, the financial calculations, reports and the invoicing are using the data in the system.

Both general managers and both IT managers (completely independently from each other) emphasized that one source of the issues is also that the users' knowledge of the system is incomplete, and therefore, they do not oversee what the consequences of their actions are in an other functional area.

In the next two chapters I discuss what the managers of both companies do in order to reduce the risks coming from the use of workarounds.

4.2.1 Rules of use

In the case of both companies it was obvious how the managers try to control the routines co-existing to the system. One managerial tool for it was what I labelled "rules of use" (in Hungarian I use the term "discipline of use" but in English it has a negative connotation).

The managers of both companies achieved using different management techniques that the base data in the system are *as accurate as necessary*.

In the case of data processes external to the system, a process was developed and managed which ensures that the modified or externally calculated system data is re-entered in the system and through that the base data of the system is update when necessary.

Accordingly, an important pillar of the usability of the ERP system is that the material processes are indeed accurately and reliably followed in the ERP system. In both companies I could identify several managerial measurements, that is, different checkpoints, which were introduced simply to protect the integrity of the data in the ERP system.

4.2.2 Phases after system implementation

As immediately after introduction several tasks and functions are not available within the system, an imperative managerial reaction is the continuous development of the ERP system. In this regard I identified two distinct phases in both companies.

The first phase, following immediately after system implementation, has a transitional project characteristic. Issues and problems with the system, deviations from processes, user solutions are widely accepted – the information system is not yet stabilised.

During the second phase, which might only start after 3-5 years, the developments are not urgent anymore neither are the risks of tricks and user solutions gruesome. Characteristic to this phase is, that it is no longer transitional, the development activities are strongly regulated. The initial difficulties have been solved already, the local company processes are developed within the system (paying significant amounts and spending a lot of time and energy on their development).

In the below table I summarize the characteristics of these two phases.

Aspect	First phase	Second phase
Phase starts	Immediately after introduction	Maybe only after 3-5 years
Characteristics of workarounds	Numerous, acknowledged, haphazard, might concern basic system data	Limited in number, ingrained, well-known, low-risk
System developments	Several parallel projects, many of them urgent/critical. Need for system development is broadly accepted fact, and development projects do not need complex approval;	Administrative guided process, more difficult to start a project, less critical. The fewer, larger projects aim rather comprehensive system developments
Top managers	Top management involved in more development projects	System development activity rarely draws top managers' attention
Users	Low satisfaction, initial resistance	Users are used to the system, complain about low speed of the system
Expected role of IT manager	Mediates and co-ordinates between the developers, the users and the management. Needs to be understanding and available	Creates concepts for system development and vision of the system; prepares cost-benefit analyses, Manages the development process administratively
Data risk	High data risks	Low, known and managed risks

2. table: Characteristics of the two phases after system implementation

4.3 Local IT-guru

In both companies I could observe the presence of (non-IT professional) users who are more skilled with the system. These users understood well the logic of the system, they used the functions logically, not mechanically, they even discovered new possibilities. In many cases they were the power users testing new system functions or developments. It was interesting to observe that the system interpretation and use of these local IT gurus influence the use and

system interpretation of the other users. Orlikowski et al (1995) give a detailed overview of the roles and types of IT gurus in the literature. From these roles I experienced in both research sites that (1) this is an informal role (2) they understand the requirements of the different user groups and (3) share their tricks and solutions with the other users.

4.4 Classification of the identified workarounds

According to my initial research goal, I developed a typology for the identified workarounds based on their relation to the ERP system. I identified three basic types: the bypassing, the substituting and the complementing workarounds.

- We talk about **bypassing workaround** in case the user builds further external process steps on the task step developed next to the ERP system.
- In case the system has the given function built-in, but for some reason the users still take that process step external to the system, we talk about a **substituting workaround**.
- It is a **complementing workaround** if the ERP system does not have the given function built-in or it is not available and therefore the users need to find a solution outside to the system and afterwards they return to the system.

As a consequence of the developed classification, the term “*workaround*” might not be the best term as it emphasizes the idea “around” and therefore, does not include all the bypassing, substituting and complementing categories. Based on this logic, the central term needs to be modified and the best term seems to be the term **co-system routines**.

5. MAIN CONCLUSIONS OF THE THESIS

My goal was to reveal the process during which a less flexibly used system, like the ERP systems in focus, and its users shape each other in the period following system implementation. Although excellent researchers drew valuable conclusions regarding information systems where the users had the possibility to use the system as they wanted to, this research shows that if the use of the technology is strongly regulated, the interpretive flexibility will be realised outside of the system, next to it. My research enriches the term presenting a new side of interpretive flexibility.

As scientific results of my research I have shown that the period following the implementation of the system, the workarounds next to the system have a high significance which is decreasing over time.

I identified two phases following the system implementation: the first, more risky and elementary phase, where users might transform basic data outside of the system. In this phase we find active system development and customization involving internal and external system developers.

In the second phase the external steps do not risk directly data integrity, only those workarounds prevail which are harmless and serve the comfort of users. The system development projects of this phase are rather comprehensive and do not regard the handling of base data.

Another result of my research is the classification of workarounds, based on what I propose the new term: co-system routines. I also analyse and evaluate the risks related to these co-system routines.

Earlier research does not include neither the viewpoint nor the role of managers and decision makers connected to the co-system routines. To my knowledge, this is the first research dealing with this viewpoint bringing new insights.

I hope to contribute to the further spreading of the interpretive research tradition on Hungary through publishing a research using the latest theoretical and methodological results of this paradigm.

For practitioners I suggest the below aspects for consideration:

1. It is a source of significant risk if the users manipulate the base system data outside of the system. In this respect the rules of the system use are of key importance. If certain tasks make it necessary, the access, the download and the transformation of system data needs to be regulated and monitored. These type of functions needs to be included in the system as soon as possible.
2. Also a risk factor is the access rights which should be regulated and monitored immediately. This way the dangerous user “solutions” can be avoided, or monitored and kept within borders.
3. Immediately after system implementation it is worth to devote resources to the training of users to they get used to the system and understand the basic system

logic sooner. For new employees it is suggested to put together a manual with a responsible person updating it regularly. This way the new employees do not get inaccurate, biased or misunderstood information about the system.

4. Similarly, in the phase following system implementation, managers need to get involved in the system development efforts to be able to manage priorities. The first step should be understanding the needs and the alignment with the possibilities of the system. This enables to set up priorities according to the business objectives and manage efficiently the numerous parallel system development requirements. If the manager does not get involved, the users might use the situation to push their own interest, or at least influence the speed and order of the development projects.
5. During system implementation the existing co-system routines can reveal a lot about the needs of the users. The IT manager can get the task of collecting and reviewing them, or the decision makers can form cross-functional teams ensuring that users opinions and experiences are involved in the system development process. The co-system routines can show what users really need, keep the development project closer to reality and helps to find the optimal solution.

I think it is important to review how much my thesis meets the academic expectations towards interpretive research. Based on Klein and Myers' (1999) article I developed a table and summarize the seven principles of the authors. These seven principles are the pillars of a good interpretive research. In the second column I evaluate per principle how much and in what way the single principles are represented in my thesis.

Principle	Short explanation	Representation in my thesis
The fundamental principle of the hermeneutic cycle	All human understanding is achieved by iterating between considering the interdependent meaning of the parts and the meaning what they form	Connecting collected data and observed phenomena often with each other, with the organisational context following implementation and with general outside world.
Principle of contextualization	Critical reflection on the historical and contextual background of the research setting	The detailed description of the companies, the ERP systems and the history of their implementation
Interaction between the researcher and the subjects	Critical reflections on how the data were socially constructed through the researchers and the participants	I describe how I got into the research fields, what role I played and I evaluate that my connectedness to the top manager could influence the collected data
Principle of abstraction and generalisation	The collected data needs to be related to general principles and one or two general concepts describing human nature	The concepts of the local IT-guru, the Excel empire, the rules of use and the identification of the two phases following system implementation – connecting to literature
Principle of dialogical reasoning	Sensitivity to the possible contradictions between the theoretical preconceptions guiding the research design and the actual findings	I describe the differences between my expectations before the empirical research. Also confess some changes in my approach. Less room to follow up on how my own approach changed;
Principle of multiple interpretations	Sensitivity to the differences between the interpretations of the participants	Original citations (also telling about the personality) and the connecting presentation of the contradicting citations;
Principle of suspicion	Sensitivity to the possible sensitivity and systematic distortions in the narratives of the narratives of participants	Less explicitly, but implicitly I considered he objectives and the organisational positions of the participants known for me when making sense of the data.

3. table: The representation of the seven principles of interpretive research in my thesis based on Klein and Myers (1999: p72)

Based on the above table, and the evaluation of Klein and Myers (1999) article, my research fulfil the main expectations towards interpretive research.

There are two areas where further improvement is possible. One is the principle of dialogical reasoning. This principle is represented in my research in a personally very interesting way. Preceding the data collection and throughout the write up of the thesis my personal approach and understanding developed and changed considerably. The structure makes it difficult to discuss this process more extensively. In a nutshell essentially I arrived from researching

system failures to inquiring about what exactly happens at user level following the system implementation.

The other principle is the principle of multiple interpretations where more emphasis could be added. I only emphasize the strongly contradicting or contrasting opinions. These are generally the opinions of the IT managers who know the system and it's possibilities more and understand what problems individual users can cause in a distant but related field. They usually had a strong criticism towards the users.

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