Employee Empowerment with Computer Based Learning: An Empirical Investigation

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Abstract. Enterprises are confronted with frequent changes in their business environment which require quick responses. Thereby, highly skilled and flexible employees play a major role since they are able to respond promptly. To enhance competencies and flexibility, the concept of employee empowerment has been proposed. In this respect, the workforce is given an increased level of autonomy and offered support during their decision-making processes. It is evident that technology can contribute within this context. However, the role of computer based learning with regard to the support of decision-making activities and the acquisition of competencies, especially in combination with increased employee autonomy, has been neglected until now. On the basis of an empirical case study, we find that the usage of computer based learning within employee empowerment initiatives fosters the acquisition of competencies and increases employee flexibility. Additionally, enhanced employee autonomy is found to have a positive moderating effect on both relationships.

Keywords: Employee Empowerment, Computer Based Learning, Problem Solving and Decision Support

1 Introduction

Today, enterprises are confronted with frequent changes in their business environment making it necessary to modify business strategies and processes to cope with continuously and rapidly changing situations [1]. Accordingly, the ongoing need to realize and adapt to environmental changes is one of the key success factors for organizations striving to stay competitive even in turbulent markets and can be facilitated by employee empowerment initiatives [2]. Employee empowerment encompasses activities that aim at increasing the employees' level of autonomy and ensuring that employees possess adequate competencies for conducting their tasks. Thus, these initiatives are supposed to lead to higher motivation and to increased employee flexibility [3]. As a result, enterprises are enabled to react faster on changed market conditions [4].

Especially with regard to the realization of employee empowerment initiatives in the context of information intensive business processes, information systems play an important role [5]. For instance, information systems can support the employees' decision-making processes and provide appropriate means to the employees for ac-

11th International Conference on Wirtschaftsinformatik,
27th February – 01st March 2013, Leipzig, Germany

quiring new knowledge. This enables employees to deal with increased responsibilities and to react more flexible on emerging challenges. Against this background, decision support systems (DSS) seem to be a promising choice to cover these activities: On the one hand, their major task is to provide decision support to decision makers [6]. On the other hand, through the usage of DSS for problem solving and decision support (PSDS), additional competencies can be acquired [7]. In this context, computer based learning systems represent a specific category of DSS: First, they can be used to support decision makers since decision makers may base their decisions on exemplary teaching cases provided within the system [6]. Second, computer based learning is especially suitable for employee empowerment initiatives as employees can apply these systems in order to acquire new knowledge and to enhance their level of competencies [8].

Related research in the field of employee empowerment has already investigated the impact of different employee empowerment initiatives on an individual or organizational level. For instance, employee empowerment has been found to foster innovative behavior [9] and to be strongly connected with employee training and development [10]. However, the role of information systems within this process has been neglected until now. In particular, the impact of using computer based learning for PSDS as an important dimension of employee empowerment has not been focused on yet. Consequently, within this study, we investigate *whether the usage of computer based learning for PSDS can contribute to employee empowerment initiatives*. Additionally, we also examine *whether an increased level of employee autonomy has a positive influence in this context*. To examine these research questions, we conduct an empirical study among employees working in the financial services industry. For that purpose, a research model is developed that takes into account employee empowerment represented by the usage of computer based learning for PSDS as well as the level of employee autonomy. To investigate the impact of employee empowerment, the level of individual competencies and flexibility as well as several control variables are included in the research model. The associated hypotheses are tested based on 105 complete responses from a survey among sales professionals of a large financial institution who used a computer based learning software for PSDS. The results from partial least squares analyses suggest that computer-based learning is appropriate for employee empowerment initiatives when it is used for PSDS in combination with an increased employee autonomy. Thus, we contribute to the literature on employee empowerment with a focus on the application of information systems to support the employees' problem solving processes.

The remainder of this paper is structured as follows. Section 2 provides a theoretical overview regarding employee empowerment, the usage of information systems for PSDS and the corresponding role of DSS and computer based learning. Against this background, our research model is developed in section 3. Thereafter, the study is presented concerning the methodology applied, the operationalization of the constructs and the validation of the research model. Finally, in section 5, our results including their theoretical and practical implications are discussed.

2 Theoretical Background and Related Research

The following section outlines the theoretical groundings of employee empowerment as a well as the usage of DSS for PSDS as an important enabler of employee empowerment. In this context, the usage of computer based learning as one category of DSS that supports PSDS and subsequently employee empowerment is discussed.

2.1 Foundations of Employee Empowerment

Empowering employees is defined as giving the workforce more power and flexibility in doing their tasks in order to achieve their work-related goals [3], [11–14]. Overall, the objective of employee empowerment initiatives is seen in increasing the employees' intrinsic motivation, enhancing their individual competencies and to lead to higher satisfaction and, consequently, to better work results [4], [15], [16]. In some work, employee empowerment is seen as a continuation of classical employee involvement initiatives [17]. For that purpose, an appropriate organizational structure building on a low level of centrality and shared authority is required [5]. However, employee empowerment usually encompasses actions beyond solely increasing the employees' participation in the decision-making processes. Most important, employee empowerment initiatives also foster the employees' skills since adequate skills are a prerequisite to make proper decisions [5]. For that purpose, employees are trained to develop the required competencies.

Since [11] identified a lack of empirical research within this context, different studies exploring the role of employee empowerment on an individual as well as an organizational level have been conducted. On an individual level, employee empowerment has been found to increase managerial effectiveness and innovative behavior of employees [9]. Additionally, empowering employees has also been shown to increase individual work performance and job satisfaction [14]. Another stream of research has examined the effects of employee empowerment on an organizational level. One main finding in this area is that employee empowerment initiatives are strongly related to employee training and development activities [10]. Furthermore, it has been provided evidence that employee empowerment initiatives foster organizational effectiveness and performance [18].

Overall, the application of technology plays a major role within employee empowerment initiatives [5]. For example, employees' decision-making capabilities as well as their work-related skills can be supported and fostered by appropriate information systems. Consequently, first evidence has been provided that information systems enable employee empowerment [19]. However, to the best of our knowledge, the impact of information systems that support the employees' decision-making processes in the context of employee empowerment initiatives as well as the effect of increased employee autonomy during the application of such information systems has not been theoretically conceptualized and empirically analyzed yet.

2.2 Employee Empowerment through Systems for Problem Solving and Decision Support

As described above, technology plays a major role in employee empowerment initiatives encompassing the support of employees during their decision-making processes and the enhancement of their problem solving capabilities [5]. Thereby, decision support systems represent a category of information systems that is especially suitable to accompany these tasks: Being considered as systems addressing individual or organizational decision-making and providing appropriate tools, they focus on the support of decision makers [20], [21].

In this context, a DSS is defined as a system that provides support during the different phases of the decision-making process [22], i.e. the intelligence phase, the design phase, the choice phase and the implementation phase [6], [22], [23]. Within these phases, individuals identify specific problems necessitating decision making (intelligence phase), understand these problems as well as search for appropriate solutions (design phase), select a particular course of action (choice phase) and implement the solution (implementation phase). In this context, DSS provide support for *semi-structured* as well as *unstructured* problems [22], whereas a problem is denoted as *structured* if each phase of the decision-making process can be supported by means of algorithms and standardized procedures. In contrast, if none of these phases can be supported in this way, the problem is considered to be *unstructured*. Otherwise, the problem is denoted as *semi-structured* [24]. Consequently, DSS might be considered as appropriate tools within employee empowerment initiatives, especially for employees dealing with semi-structured and unstructured problems.

There are many studies investigating the factors connected to decision support system acceptance as well as the individual and organizational impact of decision support system usage. For example, [25] as well as [21] provide extensive literature reviews. Additionally, several authors focus on specific types of DSS like web-based decision support systems [26] or specific factors influencing DSS usage [27]. Nevertheless, the impact of utilizing these systems for PSDS in order to foster employee empowerment has not been investigated yet. The same applies to the impact of autonomous usage of these systems within the context of employee empowerment initiatives.

2.3 Application of Computer Based Learning for Problem Solving and Decision Support

The application of DSS for PSDS is strongly connected with the acquisition of additional knowledge since learning is seen as a contribution of DSS usage [7], [28]. Especially during the intelligence phase of the decision-making process, computer based learning systems can provide support to decision makers and are thus also considered as a specific category of DSS [6]. In this context, computer based learning systems provide the background knowledge that is necessary to identify situations requiring decision-making and enable the employees to cope especially with unstructured and semi-structured decisions [6]. Therefore, computer based learning systems offer the

possibility to acquire knowledge supported by electronic means. This encompasses the application of technologies like web based trainings or virtual classrooms [29]. As a result, the usage of computer based learning systems is connected with an increased learning flexibility since employees often have the possibility to decide to learn where and when they want to [29]. Additionally, users of computer based learning can individually determine their speed of learning [30].

Against this background, computer based learning seems to be an adequate instrument for supporting employees' decisions, increasing their level of competencies and, consequently, for employee empowerment initiatives. However, to our knowledge, the usage of computer based learning for PSDS and its relation to employee empowerment has not been analyzed empirically before.

3 Research Model and Hypotheses

Grounded on the theoretical foundations presented above and in order to examine our research questions, we conceptualized a research model as depicted in Figure 1 to empirically validate the impact of information system (i.e. computer based learning) usage for PSDS related to employee empowerment initiatives and the resulting effect on individual employee flexibility.

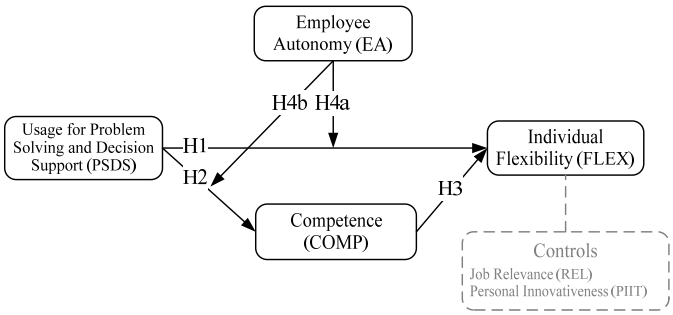

Fig. 1. Structural Model

Since the application of information systems is considered to enable employee empowerment [19], a variety of systems can be used within employee empowerment initiatives. In particular, the application of computer-based learning systems facilitates employee empowerment due to two reasons. On the one hand, computer based learning plays an important role within the employees' decision-making processes when it is applied for problem solving and decision support [5], [6]. On the other hand, employees use computer-based learning to acquire the competence that is necessary to do their tasks [8].

Within the research model, employee empowerment is represented by two constructs: As described above, computer based learning systems are strongly related to the support of individuals' decision-making processes and subsequently, they represent a means to empower employees [5], [6]. Consequently, we choose the application

of computer based learning systems for PSDS as starting point of our research model. Additionally, another important factor of employee empowerment initiatives is represented by the level of self-determination employees are confronted with when doing their tasks [3], [11–14]. In our study, this is represented by the autonomy employees have when using computer based learning. The individual results of these employee empowerment activities are represented by the level of competence the employees acquire as well as through the flexibility the employees have to react on new situations. In the following, we provide the hypotheses for our research model and the rationale behind them.

Effect of Employee Empowerment Initiatives applying Computer Based Learning on the Level of Individual Flexibility. In comparison to learning scenarios which require personal attendance, computer based learning applied within employee empowerment initiatives offers the possibility to learn without place and time constraints [29]. For example, computer based learning can be used even when traditional forms of education are not available: If this form of learning is used for PSDS, users should be able to find solutions to their problems quicker compared to waiting for the next ordinary classroom session with personal attendance. As a result, the usage of computer based learning is supposed to offer employees a high level of flexibility [31]. Thus, we hypothesize: *Hypothesis H1: Increased usage of computer based learning for PSDS leads to higher employee flexibility.*

Effect of Employee Empowerment Initiatives on the level of competence. When using computer based learning, employees make use of web-based trainings or virtual classrooms that enable them to browse through different contents. Additionally, employees are able to use built-in tests to train their daily work situations. These different possibilities foster learning and consequently – when employees are able to apply the knowledge – build up competencies [32]. Against this background, we hypothesize: *Hypothesis H2: Increased usage of computer based learning for PSDS leads to a higher level of competencies.*

Effect of the Level of Competence on the Level of Individual Flexibility. High levels of competence are seen as a prerequisite for employees to be able to adequately sense and respond to changes in the business environment and, consequently, for enhanced employee flexibility [2]: On the one hand, adequate skills are necessary to detect situations requiring for decisions [6]. On the other hand, the familiarity with adequate instruments and techniques for responding to these situations is also necessary to cope with these situations [2]. Thus, we hypothesize: *Hypothesis H3: A higher level of work-related competencies leads to higher employee flexibility*

Moderating Effect of Employee Autonomy. Extending employee autonomy in decision making processes is a key part of employee empowerment initiatives [5]. In this context, computer based learning can be used to provide employees with a higher level of autonomy since it offers the possibility to choose place and time of learning in a flexible manner. If companies decide to provide employees with this higher level

of autonomy, the users will apply the system when they need support during their decision-making processes [33]. As a result, a positive moderating effect both on the acquisition of new competences as well as on the level of individual flexibility is expected. Against this background, we hypothesize: *Hypothesis H4a: Higher levels of autonomy positively influence the positive relationship between the increased usage of computer based learning for PSDS and the level of individual flexibility.*

Hypothesis H4b: Higher levels of autonomy positively influence the positive relationship between the increased usage of computer based learning for PSDS and the level of employee's competencies.

Control Variables included in the Research Model. We also include two control variables into our research model to ensure reliability of results. On the one hand, we control for job relevance [34] since the usage of a computer based learning system that is relevant for the employees' tasks might also cause enhanced individual flexibility. Additionally, we also control for the personal innovativeness in the domain of information technology [35] because employees being more innovative may also be more flexible in responding to new challenges.

4 Data Set and Methodology

To validate our research model, we use the partial least squares (PLS) method which is a components-based structural equation modelling technique [36]. We choose PLS, because it has several advantages: PLS requires few distributional assumptions about the data and is able to handle measurement errors in exogenous variables [37]. Additionally, PLS can handle small data sample models [37]. Thus, we use SmartPLS [38], an implementation of the PLS algorithm, for the calculation of our results which are presented in the following subsections.

4.1 Measures Securing Content Validity

To secure content validity, existing measures from previous empirical studies were derived and adapted to the context of our study. For that purpose, a linkage to computer based learning was included into the measures where necessary. As a consequence, our measures cover the specific aspects of computer based learning within the context of employee empowerment initiatives. For instance, we focus on competencies acquired by computer based learning instead of competencies acquired through other paper-based teaching materials. In our study, we only use reflective constructs which are represented by a set of indicators that are presented in table 1. The indicators are measured on a 7-point Likert scale, ranging from "strongly disagree" to "strongly agree".

4.2 Data Collection and Sample Profile

The study aimed at users of computer based learning systems in an enterprise context. As we wanted to investigate the effect of employee empowerment on employee flexibility, we only included employees who had used a computer based learning system before and who, as a consequence, could assess their level of competence and flexibility after having used the system. We conducted our survey within the financial services industry among employees that have to give advice to customers and who have been given the opportunity to use computer based learning in form of an asynchronous web based training in order to acquire knowledge about different financial products. In June 2010, 310 employees were invited to participate in the survey by filling out the questionnaire online. After one week, a reminder was sent to non-respondents. In total, 129 responses were returned, indicating a response rate of 41.6 percent.

Table 1. Indicators used within the measurement model

Competence [9]	**Employee Autonomy [9]**
COMP1: Resulting from the use of computer based learning, I have the ability to do my job.	*EA1:* I have significant autonomy in determining how I use computer based learning.
COMP2: Resulting from the use of computer based learning, I have the capabilities to perform my work activities.	*EA2:* I can decide on my own how I use computer based learning.
COMP3: Resulting from the use of computer based learning, I have the skills necessary for my job.	*EA3:* I have considerable opportunity for independence in how I use computer based learning.
Individual Flexibility [39]	**Job Relevance [34]**
FLEX1: Resulting from the use of computer based learning, I am able to react timely on new Situations.	*REL1:* In my job, usage of computer based learning is important.
FLEX2: Resulting from the use of computer based learning, I have the flexibility to respond to new challenges.	*REL2:* In my job, usage of the computer based learning is relevant.
FLEX3: Resulting from the use of computer based learning, for me, it is simple to respond to new challenges.	*REL3:* The use of computer based learning is pertinent to my various job-related tasks.
IT use for problem solving and decision support [40]	Personal Innovativeness in the Domain of Information Technology [35]
PSDS1: I use computer based learning to improve the efficiency of the decision process.	*PIIT1:* If I heard about a new information technology, I would look for ways to experiment with it.
PSDS2: I use computer based learning to help to make explicit the reasons for my decisions.	*PIIT2:* Among my peers, I am usually the first to try out new information technologies.
PSDS3: I use computer based learning to analyse why problems occur.	*PIIT3:* I like to experiment with new information technologies.

For conducting our evaluation, we excluded responses of employees whose last access on a computer based learning system was dated back too far, which encompasses all users who have not accessed the system for three years. As a result, we finally included 105 responses within our study, whereas 64 of these respondents were male, 39 were female and the remainder didn't state their gender. Considering the age, there are no respondents who are younger than 20 or older than 60 years. 33 respondents are 20-29 years old, 38 persons belong to the group of people being 30-39 years old, 19 persons are 40-49 years old and 15 respondents are 50-59 years old.

4.3 Validation of the Measurement Model

For validating the measurement model, content validity, construct reliability, and construct validity have to be investigated. In subsection 4.1, content validity was already addressed. The internal consistency of the measurement model is concerned by the investigation of *construct reliability* [41]. Construct reliability measures whether items yield consistent results meaning that they are free from structural error. For evaluating construct reliability, we calculated the average variance extracted (AVE), the composite reliability (CR), and the Cronbach's alpha scores. Thereby, AVE measures the amount of variance that a construct captures from its indicators, relative to the amount due to measurement error [37], CR measures the internal consistency of the Indicators [37] and Cronbach's alpha represents an alternative measure for estimating internal consistency assuming that all indicators have equal weights [37]. For each score, there are existing thresholds which should be exceeded to ensure that the measurement items are consistent among each other. AVE should be greater than 0.5 [42], CR should be higher than 0.7 [43] and Cronbach's alpha should exceed the level of 0.7 [44]. As depicted in table 2, all reliability scores are above the recommended thresholds indicating internal consistency.

Table 2. Means, standard deviations (SD), average variances extracted (AVE), composite reliabilities (CR), Cronbach's alphas (Alpha), and correlations among constructs (off-diagonal elements), square root of AVEs (diagonal elements)

	Mean	**SD**	**AVE**	**CR**	**Alpha**	**COMP**	**FLEX**	**PSDS**	**EA**	**REL**	**PIIT**
COMP	4.634	1.336	0.860	0.949	0.919	0.927					
FLEX	4.658	1.375	0.898	0.963	0.943	0.839	0.948				
PSDS	4.821	1.363	0.848	0.944	0.911	0.690	0.714	0.921			
EA	5.618	1.109	0.828	0.935	0.890	0.379	0.378	0.394	0.910		
REL	4.925	1.257	0.772	0.911	0.853	0.717	0.728	0.769	0.391	0.879	
PIIT	4.674	1.625	0.790	0.920	0.867	0.185	0.160	0.062	0.277	0.140	0.889

In comparison to construct reliability, where the measurement within a construct is an issue, the evaluation of *construct validity* refers to the wider, out of the construct validation of its measures [41]. Construct validity includes convergent validity and discriminant validity [45]. Through *convergent validity*, the internal consistency of the indicators assigned to the latent variables should be measured. As follows, it has to be tested if the assumed relationship between the indicators and the latent construct can also be observed in practice. In this context, significant inter-indicator and indicator-to-construct correlations are seen as evidence of convergent validity [46], which is shown since the loadings of the reflective constructs are above the threshold of 0.707 that is recommended by [37]. These results provide confidence that there exists more shared variance between the construct and its indicators than error variance [43]. As a result, the adequate use of the measurement items is shown. Additionally, *discriminant validity* assesses if indicators of latent variables that should theoretically not be related to each other are also not related to each other in practice. Therefore, the correlations between the constructs should not be high and the Fornell-Lacker criterion should be fulfilled, i.e. a construct must share more variance with its assigned indicators than with any other construct [42] which is assessed by analyzing the inter-construct correlations and the AVE scores. Thereby, the square root of the AVE should exceed the inter-construct correlations of the respective construct [42]. As table 2 shows, the square root of the AVE is higher than the inter-construct correlations which indicates discriminant validity.

4.4 Validation of the Structural Model

Since construct validity and construct reliability have been shown, we feel confident to estimate the parameters in the structural model to validate the structural model and to test the proposed hypotheses. Therefore, PLS path modeling was used. As PLS does not directly provide significance tests, the non-parametric bootstrap re-sampling method was conducted to provide confidence intervals for all parameter estimates. Additionally, we used a procedure proposed by [36] to estimate the moderating effect of employee autonomy. As a first step, we standardized the indicators to reduce multicollinearity. The standardized indicators of the predictor and moderator variables were used in the next step to generate product indicators which reflect the latent interaction variables. At last, the PLS procedure was applied to estimate the dependant variables of individual flexibility and competence.

The results of the estimation are depicted in table 3. Thereby, we compare three nested models for the dependent variable individual flexibility in order to check the robustness of our results (Model 1: baseline model with the control variables only; Model 2: Model 1 + main effect; Model 3: Model 2 + moderated mediaton). Since these models are fully nested, the difference of the explanatory power (measured by the squared multiple correlations R^2) can be compared.

As can be seen due to significant path coefficients, H1-H4b are supported at least at a 10 percent significance level whereas 2 out of 5 hypotheses are significant at a 5 percent level of significance. Thus, the survey data supports the hypothesis that the

usage of computer based learning for PSDS has a positive impact on the level of individual flexibility (H1) and competence (H2). Additionally, the positive impact of competence on flexibility (H3) is demonstrated. Finally, the moderating effect of employee autonomy is confirmed, too (H4a and H4b).

Considering the path coefficients, the moderating effect of employee autonomy as well as the relationship between the usage of computer based learning for PSDS exceed the minimal level of 0.1 [47]. Additionally, the path coefficients of H2 and H3 exceed the level of 0.2 suggested by Chin (1998) as well. Thus, the path coefficients can be regarded as meaningful.

Table 3. Empirical results; * $p < 0.1$, ** $p < 0.05$ (two-tailed)

Relationships		**Model 1** *(Control Model)*	**Model 2** *(+ Main Effect)*	**Model 3** *(+ moderated Mediation)*
C1:	REL → FLEX	0.72**	0.37**	0.15*
C2:	PIIT → FLEX	0.06	0.08	0.02
H1:	PSDS → FLEX	–	0.45**	0.18*
H2:	PSDS → COMP	–	–	0.63**
H3:	COMP → FLEX	–	–	0.56**
H4a:	PSDSxEA → FLEX	–	–	0.11*
H4b:	PSDSxEA → COMP	–	–	0.12*
R^2 (FLEX)		0.54	0.61	0.76
ΔR^2 (FLEX)			+ 0.07	+ 0.15
R^2 (COMP)				0.54

The explanatory power of the structural model can be determined by the squared multiple correlations (R^2) of the dependant variables. According to [37], R^2 values of 0.19, 0.33 or 0.67 are classified as weak, moderate or substantial. Against this background, the explained variance of the dependant variable competence (0.54) can be described as moderate, whereas a substantial amount of variance of the dependant variable individual flexibility (0.76) is explained.

4.5 Discussion

Related to the research questions, it can be stated by now that the usage of computer based learning for PSDS can contribute to employee empowerment since it fosters the employees' level of competencies. Taking into account the background of our study, computer based learning systems are thus adequate to enable employees to acquire the knowledge necessary for dealing with semi-structured and unstructured problems. In the specific case of this study, the users of the computer based learning software were thus able to acquire product-related knowledge that offers them the flexibility to deal with customer requests and to deal with new and unexpected challenges.

Additionally, in combination with another empowerment activity, i.e. with enhancing the autonomy, employees' flexibility can be increased. As a consequence, next to the acquisition of new knowledge, computer based learning systems may also be used to recapitulate knowledge and to find answers for open questions. For instance, in the case of those employees giving advice about specific financial products, a proper computer based learning system offering summaries of the related lessons can be helpful and enhance the employees' flexibility. In this context, it is clear that a related system has to be adapted to the corresponding context. Thus, a system to be used during a customer meeting has to offer enhanced possibilities to search and display contents compared to a system used internally only. In the case of employees visiting customers, it is thus especially recommended that the software applied also works properly on mobile devices.

Furthermore, our results confirm that the system applied and the contents taught have to be relevant for the employees' tasks. Thus, if standardized software packages are used, these solutions should be adaptable to the specific context. In this regard, appropriate computer based learning systems should allow for customizing the functionality and services for supporting the employees' needs and the required information individually. Related to the specific case described in this study, teaching materials shall provide product-related information that is specific to the financial company and shall enable employees to train typical situations occurring during customer meetings in a flexible and situated manner.

According to our results, using computer based learning as a specific category of DSS in combination with granting an increased level of employee autonomy can be recommended in the course of employee empowerment initiatives. As a result, employees experience an increased level of flexibility when doing their tasks which may consequently increase a corporation's ability to sense and adapt to changing situations.

5 Summary and Conclusion

Employee empowerment has been an issue in the management literature for many years. However, the role of information systems within employee empowerment initiatives and the resulting impact on individual employee flexibility has been neglected until now. Thus, grounded on the theoretical background of employee empowerment, we outline that computer based learning systems represent a specific category of DSS that is especially suitable for employee empowerment initiatives.

By means of an empirical study, we find that employee empowerment initiatives lead to an increased level of individual employee flexibility. Thereby, employee empowerment is composed of two main activities. On the one hand, the usage of computer based learning for PSDS leads to an increased level of competence and, consequently, to an increased level of individual employee flexibility. On the other hand, this positive relationship is moderated by another activity being part of employee empowerment: increasing the employees' work-related autonomy.

The implications of our research are threefold. First, we contribute to the literature on employee empowerment by investigating the impact of information systems usage for problem solving and decision support on an individual level. Therefore, we provide a research model to examine the relationship between the application of computer based learning for employee empowerment initiatives and employee flexibility which, to our knowledge, has not been investigated before. Second, we consequently show that computer based learning is an adequate means to empower employees. Thus, corporations should offer the possibility to use computer based learning software to support employees that have to solve semi-structured and unstructured problems. Third, we provide practitioners with the insight how to implement related initiatives. With this respect, we show that the positive impact of the usage of computer based learning for PSDS on employee flexibility can be fostered by an increased level of employee autonomy. As a result, corporations shall implement employee empowerment by the application of computer based learning in combination with an increased level of autonomy in system usage to enhance the employees' flexibility and to adequately respond to changing market circumstances.

This research has been conducted within the financial services industry that can be seen as a knowledge intensive business domain. Thus, we are aware of the limitation that the effect of employee empowerment initiatives within less knowledge intensive domains might be different. Additionally, there are also cases where standardized computer based learning software is not available because of highly specialized tasks (i.e. in research departments) which requires to adapt employee empowerment initiatives. Furthermore, this study examines the effects of computer based learning represented by a web based training that facilitates asynchronous learning. In contrast, other technologies in the area of computer based learning such as virtual classrooms emphasize synchronous learning (e.g. by means of video conferences) and, as a result, offer less flexibility which might also lead to different results.

This study also provides several avenues for further research. To take the limitations into account, the impact of computer based learning in other, less knowledge-intensive domains has to be investigated. Additionally, further research might examine whether the amount of synchronous learning has an impact on the success of employee empowerment initiatives. Finally, it remains an interesting research question whether there are specific short-term and long-term effects of employee empowerment on an individual or organizational level that could be examined with a longitudinal study.

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