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Product-Service Systems across Life Cycle

Organizational transformation towards Product-Service Systems – empirical evidence in managing the behavioral transformation process

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Abstract

One of the major challenges facing today´s manufacturing industry is to differentiate from competition in a highly globalized world. As a consequence to the increasing competitive pressure, many companies transform their product centered business models towards service based business models to differentiate from competition. However, the transformation is often underestimated regarding its complexity and its management challenges to behavioral change. As a consequence lots of transformation initiatives fail. Besides difficulties in structuring the magnitude of changes in processes and structures, many transformation managers do not perceive the risk of employee resistance against changes, which is one of the key factors causing the failure of transformation. The objective of this paper is to enhance the existing body of research on manufacturer´s organizational transformation towards Product-Service Systems. More detailed, the objective is to develop new knowledge to support the management during the decision-making process in the way how and by means of which instruments the change of behavior can be supported when transforming from a manufacturer to a solution.

We developed a reference framework which structures and defines the relevant dimensions of behavioral change. The identification and validation of the success factors build the second component of our research. We conducted an empirical investigation in the German manufacturing industry and got 79 data sets. Structural equation modelling was applied for the analyses and the validation of the hypotheses. By this analysis we linked management practice with employee behavior and transformational success variables. On the basis of the gained insights decisions can be made concerning the successful transformation from manufacturer to a solution-oriented service provider.

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Keywords: organizational transformation; behavioral management; servitization; success factors; integrated solutions; service based business model

1. Introduction

In order to succeed under the threat and pressure of global competition, companies have increasingly recognized the chance to transform their former product centered business models towards more customer orientated service based ones [1, 2]. The development and delivery of integrated solutions facilitating a more unique value proposition and superior market differentiation will be key capabilities for the future competitiveness of manufacturing companies [3].

The transformation process towards a solution business comes along with a fundamental change of business models, structures, processes as well as behavior [4]. A major part of the initialized transformation results cannot be achieved because the behavioral management challenges are frequently underestimated. Especially the employee resistance to change often causes failure in transformation processes [5]. During the production era most employees participated in the business process as sales employee or production resource. The development towards an integrated solution provider results in fundamental changes in roles and tasks in the process of value generation. Thus, employees need to recognize and understand their new roles in order to satisfy the customers' requirements [4].

Findings from both, research as well as practice, indicate that a major cause for failure of change initiatives is the inadequate consideration of the employee's behavioral adjustment [6]. As a result employees struggle with adapting

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new behavioral patterns and changing routines [7]. Moreover, fear and distrust are prevailing emotions towards change [8]. Hence, to achieve sustainable change the behavior and mind-set of the employees needs to be altered to reduce the internal resistance against the change [9]. Those affected by the transformation must understand why the change process is necessary and how every single employee can contribute to its successful implementation. Moreover, employees need to be prepared for these new challenges [10]. Considering the tremendous relevance of employees' behavior for a successful transformation process this paper is focusing on the effect of instruments to influence behavior and the behavioral change during the transformation towards a solution-oriented service provider. The results will advance theory and practice by the development and empirical validation of new knowledge concerning the decision-making process in the way how and by means of which instruments the change of behavior can be supported when transforming from a manufacturer to a solution. Wrong decisions regarding the choice and investment in management instruments can be avoided and the overall change success can be enhanced. Therefore firstly we analyzed the relevant literature in terms of relevant elements for the integrated research model that is developed in chapter 2. Secondly chapter 3 focuses on the methodology of structural equation modeling and the design of an empirical study to validate the integrated research model and underlying hypothesis. Chapter 4 shows the results of the empirical investigation in the German manufacturing industry. Finally chapter 5 deals with an in-depth debate about the contribution of this work.

2. Theoretical foundation and state of research

To enhance the existing body of research and the success rate of management practice it is necessary to link instruments which influence behavior, the behavioral change process as well as the change success. Therefore in this chapter the state of research as well as the existing gap in theory will be addressed. The selection is a result of an extensive literature research. Therefore a comprehensive literature database was evaluated systematically using text mining and content analysis with respective search strings. The database includes in total approximately 1,300 sources. Primarily publications were taken into account that have been evaluated with A +, A or B within the VHB-jourqual-ranking. As a result of the following three subchapters it can be clearly pointed out that there is a gap in the existing literature and management practice. The research question how behavior can influence influenced to achieve the transformation towards a solution provider has not been answered yet.

2.1. Instruments to influence behavior

This paragraph focuses on instruments which have been identified as being relevant for the behavioral transformation process in order to influence employee behavior. The identified control instruments include communication, goal setting, personnel development and participation. Their theoretical derivation and importance for managing behavior during the transformation process from producer to solution provider are presented below.

Firstly, communication is a frequently discussed success factor for an efficient process of transformation. According to Performance Management Institute's report on organizational change (2014), 50 percent of failures in change projects are related to ineffective communications [11]. Employees resist companies' transformation as they are unsure and disoriented [12]. Furthermore, unclear or delayed communication leads to different interpretations concerning the transformation targets and their implementation. As a consequence, lacking knowledge and comprehension result in misunderstandings which cause confusion and frustration among the employees, waste resources and repress employee initiatives because of lacking knowledge and comprehension [13]. By using effective and target-oriented communication, resistance during transformation processes can be removed [14]. Communication raises the motivation of employees if the transformation project is communicated adequately and if they are informed about intermediate results during the transformation process [15]. In this case the importance of mutual or multilateral communication is particularly emphasized. Typical design possibilities for multilateral communication include workshops and team meetings [16]. Moreover, so-called change councils which are composed of representatives of the divisional management as well as the top management, help to push strategic change [17]. Thereby, obtaining feedback is an important instrument of mutual communication within the context of organizational transformation [16].

Secondly, goal setting comprise the desired future states. In the context of company transformation Hahn (1994) states that "employees are asked by means of targets (…) to perform activities using certain resources in order to achieve the intended future states" [18]. Furthermore, Evers and Körfer (2015) point out that for this process of change operatives, so called sub-targets, have to be negotiated that have to be achieved within a predefined period [19]. Goal-setting should be carried out in a way that aims are explicitly and clearly expressed, clearly measurable, accepted by the team and achievable in a certain period of time [20]. Consequently, achievable goal setting helps to keep up staff motivation over a long-lasting transformation for the simple reason that with each achieved target success can be noted [21].

A third important instrument to influence behavior are personnel development measures in order to qualify the staff for the implementation of the upcoming transformation and the establishment of new behaviors. Fundamental changes of processes, structures and employee roles require changed or partly completely new competences [22]. During the transformation process lack of training with regard to the required competences may lead to dissatisfaction of the staff and thus to resistance [23]. According to Azhari et al. (2014) it is important to give scope for further trainings. Personnel development in transformation projects is not only important on employee level but also on management level. Managers are often not qualified to successfully lead a transformation project because other competences are required in comparison to classical leadership challenges [12, 24]. Due to the complexity of transformation projects the qualification of those, who manage these projects is of particular importance

[25]. Bjurklo et al. (2009) examine the important role of competencies within their competence-based framework [26]. Enhancing the competencies of employees by helping them to understand customer needs and value-in-use for the customer is seen as a key capability in the transition from products to service.

Fourthly, the active participation of affected employees leads to better practice-oriented solutions and to a higher degree of identification with the company as well as with the transformation project [16, 24]. The study "Influence of participation in strategic change" by Lines (2004) confirms a positive correlation between participation and success of transformation [27]. Participation of managers and employees who are affected by the change is very important: the fewer employees are integrated within the change, the greater the reluctance towards changes [17]. To sum up, employees are more motivated the more they participate in a change and if they are in the position to co-design change [15].

2.2. Behavioral change

To successfully implement an organizational change initiative, a shift in actual thinking and behavioral pattern of the organization members is required. This is due to the fact that organizational change is primarily achieved through adaptive behavior of individuals [28]. While some employees welcome change in their organization and exhibit supportive behavior for the change process others are skeptical and refuse to support the process [29]. The underlying cause for different reactions of employees is based on their individual perception of advantages and disadvantages coming along with the change. This leads to certain attitudes and reactions towards the change [30]. A central impediment of change consists of employees´ resistance to change. Change retardant attitudes or behavior play a crucial role in unsuccessful change processes [31].

In order to improve behavioral intervention methods it is necessary to understand behavioral change and its formation [32]. To identify and understand behavioral determinants, several studies have been conducted. For instance, the study of Michie et al. (2005) focus on the determinants of behavior in social systems, namely knowledge, attention, skills, social role, professional role, identity and emotions. This study also indicates that self-standards correspond with social and professional roles, identity as well as knowledge [33].

In order to achieve the desired goals of a transformation project, all the roles and structures need to be aligned with these goals [34]. A role within the transformation context refers to the position that is consciously or unconsciously occupied by participating or concerning organization members occupy in the change process. This role includes formally assigned tasks by the leader of the transformation [35]. The clarity of one's role is increasing one's willingness to participate in the organizational change effort. Kim et al. (2011) ascertain that information about the change content as well as the clarity about roles in the change process is central determinants of behavioral change [29]. Furthermore, studies about behavioral change determine that awareness of change and commitment to change have to be fulfilled before the desired behavior can be executed [36, 37].

In addition to the knowledge components, awareness and understanding of one's role, commitment represents the third determinant of behavioral change. Generally, commitment of an employee refers to the emotional attachment to, the identification with or the binding to an organization or individual parts of the organization such as values, objectives and roles [38]. However, commitment may also result in certain initiatives, such as a change process. Depending on the focus of the investigation different terms for commitment are used, such as occupational commitment, organizational commitment or change commitment. Within the context of change, commitment is more than just a positive attitude to change. Change commitment can be described as the intention to support and the willingness to actively foster the change process as well as the development of positive perceptions, values and attitudes facilitating behavior [38]. Moreover, it is an important factor for employees supporting the process of change [39].

A fourth determinant of behavioral change are competences. Competences have been acquired by a person through physical and mental action and have solidified over time [40]. These goal-oriented and organized action processes are learned through practice and allow the execution of behavior with minimal effort [41]. The quality level of competences depends on both the person and the context. Therefore, appropriate competences for supportive behavior are indispensable in a change process [42]. Competences are composed of skills, qualifications and accomplishments of an employee. Competences have been evolved in the course of a persons' personal life and depend on talent, practice and the set of previously acquired accomplishments, knowledge and experience [43]. Radical organizational change increases the required set or level of competences of organization members [44]. An employee requires competences to adapt quickly and to deal with emotions. For this reason, an employee requires particular competences to change, to learn and to take initiative. Thus, conflicts can be resolved during the change process [45]. For a successful transformation it is necessary that employees acquire or develop new competences in order to come up with new solutions in an environment of changing challenges [46].

2.3. Change success

The success of change can be measured on an organizational as well as on an individual level. A key component of the change success is the change efficiency. Change efficiency can be measured in terms of whether the project was completed within the planned budget and time schedule. Additionally it should be examined whether the change led to the desired overall goals [47].

Furthermore, from a behavioral perspective the manner how the change process was supported by the employees has an impact on the change success. The concept of resistance to change of individuals has been widely studied in research and builds a second component of change success. Resistances can be expected in almost every change process. Each

employee reacts differently to changes in the organization. Equally, their adoption and acceptance of these changes is very heterogeneous [48]. Since long-lasting employee resistance can interrupt the whole process, the management of resistance to change is a major factor in order to achieve a change success [49].

The transformation from product centered business models towards service based business models is accompanied by a fundamental shift of employees' attitude from product orientation to service orientation. Hence, the service oriented perspective is inherently more customer oriented [50]. Service orientation manifests itself in employees' behavior: service oriented employees make constructive and creative suggestions for service improvements; they proactively help customers and offer services actively to their customers [51].

2.4. Integrated Research Framework

The theoretical foundations of behavioral change and change success as well as the instruments to influence behavior have been integrated into an interdisciplinary research framework. In summary, it can be stated that studies about change management and about change supportive behavior, theories about behavior change as well as expert consensus about behavior determinants in change processes identify the behavioral determinants knowledge, commitment and competences. In line with the theoretical foundation of behavioral change the behavioral branding approach focuses on these three determinants for behavioral marketing [52, 53, 54]. Moreover, researchers often differentiate between knowledge of the urgency of change (perceived need for change) and the understanding of one's own contribution to the success or the self-efficacy respectively (understanding of one's role) [36]. Consequently, our framework considers two separate constructs of knowledge. Firstly, perceived need for change and secondly understanding of one's role. Together with commitment and acquisition of competences the dimension behavioral change consists of four elements.

The dimension of change success is structured in the elements change efficiency, resistance to change and solution orientation. The integrated research framework combines three dimensions with four, respectively three, elements each shown in Figure 1.

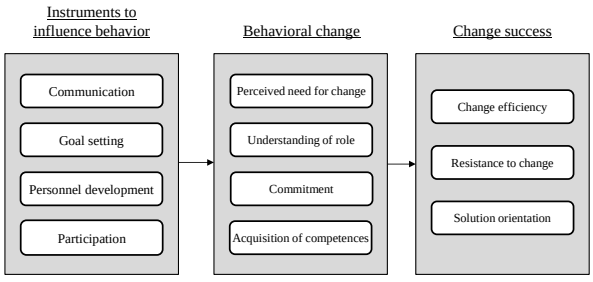

Fig. 1. Integrated research framework of behavioral transformation

The behavioral transformation model in Figure 1 was transposed as follows: The research model build the basis to model a graphical representation of the underlying variables and hypothesis by the use of SmartPLS as a modeling tool. In the following chapter 3 the methodology and approach is specified.

3. Methodology and Study Design

3.1. Structural Equation Modeling

We choose structural equation modeling and the PLS algorithm in particular as this approach is widely agreed to analyze complex interrelations and conduct exploratory research. In particular PLS is recommended to analyze limited data sets in contrast to lithrel or amos. A general great advantage of structural equation modeling is that more complex relationships between various variables can be determined in one model as in the classical regression model. In addition, not only manifest variables are taken into account, but also latent variables [55].

The connection of the individual dimensions of the instruments to influence behavior, behavioral change and the change success variables were examined by means of partial least squares analyses. Statistical analyses of the causal model derive that the predictive power of the model can be demonstrated. The underlying structural equation model is shown in Figure 2.

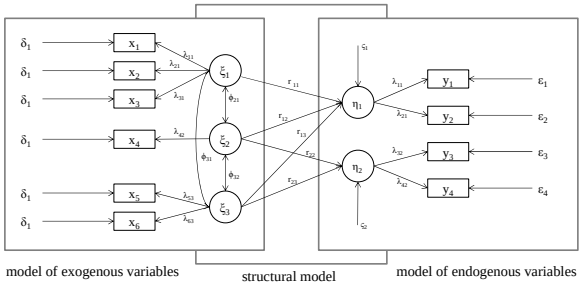

Fig. 2. Underlying structural equation model

The visualization in figure 2 corresponds with the terminology and visualization used by Backhaus (2001). These have been established as standard for several analytical methods and tools of causal analysis [56]. The data evaluation followed the pattern of development and examination of hypothetical constructs as well as the proceeding of the linear regression analysis, using the software package SPSS 20.0 and the software package SmartPLS. For scale analyses exploratory factor analysis was used. The extraction of the dimension for the behavioral change instruments was achieved with a main component analysis. Cronbach's Alpha was used as a measurement for construct reliability [57, 58]. Each construct was measured by a set of items. If an item had a Cronbach's Alpha smaller than 0.7, the item was removed until the requirement of alpha being at least 0.7 was met for each construct. Next, the remaining items were subjected to an exploratory factor analysis. Analyses followed the recommendations given by Ringle (2004) [55].

3.2. Study Design

Based on the presented integrated research framework, an empirical study was conducted by the end of 2015. Before the

main survey was conducted, a first interview questionnaire was used as a pre-test, examining the clearness of the questions. In these pre-test 18 experts of the German manufacturing industry participated. Interview partners were managing directors of the producing industry or heads of the service departments within their companies. A 5-point Likert scales was used for the measurement of the constructs in the written questionnaire. Thereby two agreement grades and two disaffirmation grades as well as a neutral category were implemented into the questionnaire [59]. The written questionnaire was accompanied by an online survey whereby 450 potential participants were contacted in total. Corresponding to a rate of return of 18 percent, 79 questionnaires were completed and could be considered in the evaluation. Approximately, 50 percent of these questionnaires were answered by service leaders. The other 50 percent of the questionnaires were filled out by the general managers, sales directors as well as product managers. The participating companies, which operate in the sector of machinery and plant construction, were characterized by a wide range in their total sales volume as well as their workforce.

4. Results

For the purpose of this paper we analyzed instruments to influence behavior regarding their impact on behavioral change and change success and thus on the success of the behavioral transformation process from a manufacturer towards a solution-oriented service provider. The substantial significant findings are summarized in Figure 3.

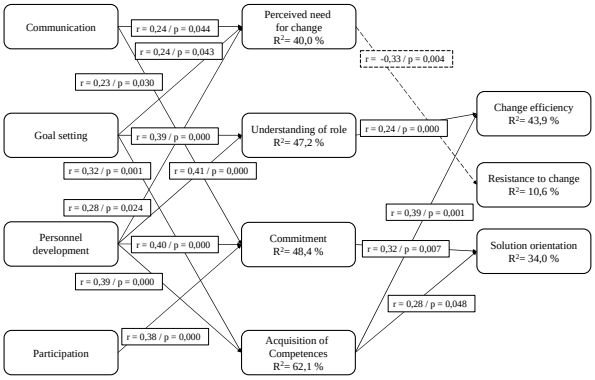

Fig. 3. Direct effects between instruments to influence behavior, behavioral change and change success

Furthermore, personnel development and goal setting affects the understanding of one´s role positively. Thereby more than 47 percent of the variance of the construct understanding of role can be explained. The same effect of personnel development can be observed for commitment and the acquisition of competencies. In total more than 48 percent of variance of commitment and more than 62 percent of variance of the acquisition of competencies can be explained. Additionally, participation has a strong significant positive effect on commitment too. From the success perspective on change, more than 43 percent of variance of change efficiency and 34 percent of variance of solution orientation can be explained. Nevertheless only approximately 10 percent of variance of resistance to change can be explained.

Furthermore we analyzed the total effects of instruments to influence behavior on change success of the transformation towards solution business. All relevant hypothesis regarding total effects and their results are listed in Table 1.

Hypothesis	effect size	t-value	level of significance (p)
H1: strong multilateral Communication leads to an increase of Solution Orientation	0,074	1,879	0,048
H1: clear Targets leads to an increase of Change Efficiency	0,265	5,184	0,000
H3: clear Targets leads to an increase of Solution Orientation	0,090	1,978	0,050
H4: extensive Personnel development leads to an increase of Change efficiency	0,295	4,136	0,000
H5: extensive Personnel development leads to an increase of Solution Orientation	0,263	4,007	0,000
H6: strong Participation leads to an increase of Solution Orientation	0,148	2,562	0,011

Table 1. Total effects of instruments to influence behavior on change success

Following our data analysis, personnel development and goal setting have the biggest influence on change efficiency as well as on solution orientation. As presented in Figure 4 participation shows a significant total effect on solution orientation. Solution orientation is also positively affected by participation on a significant level (p = 0,011). Surprisingly communication as a single means does not have a strong impact on the change success as supposed following the common understanding and existing research. The total effects confirm the importance of goal setting and personnel development as presented in the analysis of direct effects within our research framework.

5. Conclusion

In order to explain the impact of management instruments on behavioral change and change success during the servitization process, our work helps to derive conclusions in which way the behavioral transformation process can be affected. Taking the empirical results on the success factors of behavioral transformation into account, we are able to confirm the basic hypothesis that behavior at the organizational and individual level can be influenced and has a fundamental impact on key success variables of the transformation from a manufacturer to a solution provider. In particular, we found the biggest impact on behavioral change and change success through personnel development and goal setting. Thus, there specific attention should be given to the development of guidelines to design personnel development and goal setting models. Furthermore, concrete recommendations for action as well as testing in case studies help to improve overall change success during the transformation towards a solution-oriented service provider.

Surprisingly, communication has not major impact on change success that was expected. Our research reveals that communication, as a widely agreed instrument in management practice, falls back in relevance if analyzed in joint approach with other instrument to influence behavior as goal setting, personnel development and participation. We recommend a detailed analysis of individual components of multilateral

communication as well as on other change relevant elements of communication to generate more knowledge about the individual effects. Additionally we suggest that empirical evidence should focus on the impact of instruments to influence behavior on economic success factors of the company.

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