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SETTING TARGETS RIGHT! HOW NON-RATIONAL BIASES AFFECT THE RISK PREFERENCE OF IT-OUTSOURCING DECISION MAKERS - AN EMPIRICAL INVESTIGATION

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Abstract

During the past 20 years, a rich but diverse body of knowledge has accumulated regarding information technology outsourcing (ITO). Researchers have studied several factors that explain ITO decisions. So far, previous studies resorted mainly to rational efficiency criteria. In recent years researchers started to integrate soft factors into the explanatory models. In many cases, the failure of ITO projects still cannot be fully explained. By expanding ITO research in the direction of behavioral economics, this paper integrates psychological concepts that demonstrate that IT decision makers suffer from non-rational biases. Representing a broad variety of biases, this empirical study focuses on cognitive dissonance and reference point dependency. Using a structural equation model, based on an online survey with 198 participants, we show that IT decision makers use targets of past decisions as reference points. The assessment of target achievement in a subsequent decision can evoke cognitive dissonance that non-rationally affects the risk preferences of the decision maker. Two fictional scenarios demonstrate the practical implications of our study. Setting targets too high can cause non-rational risk affinity, potentially leading to project failure. Conversely, setting targets too low may cause non-rational risk aversion restraining the decision maker to make use of the full performance of a project.

Keywords: IT Outsourcing, Cognitive Dissonance Theory, Prospect Theory, Path Dependence Theory, Reference Point Dependency, Risk Preference, Non-Rational Biases.

1 INTRODUCTION

For more than two decades, a decision about the governance of IT functions, so-called IT outsourcing (ITO) has been one of the central strategic decisions for organizations. Since then, numerous scientific studies have dealt with the topic of ITO from many different perspectives. Due to the steady growth of the ITO market, such studies are still highly relevant for scientists and practitioners (Lacity, Khan and Willcocks 2009).

Initially, IT functions were merely regarded as company resources. It was recommended to outsource everything that brought no competitive advantage or was not part of the core competencies of the firm. This approach was not sufficient to make successful outsourcing decisions because, for example, transaction costs were not taken into account. The integration of comparative production and transaction costs also fell short of exhaustively explaining ITO decisions (Dibbern 2004, Dibbern et al. 2004). Consequently, additional criteria were examined to improve the predictions of ITO success. In this context, hidden costs resulting from ITO were considered. Whereas transaction costs are assumed to be obvious and measurable, hidden costs are seen as a special kind of cost, often underestimated by organizations due to imperfect information. Hidden costs result, for example, from unexpected searching cost for a suitable outsourcing provider, handing over IT functions or monitoring the outsourcing provider (Barthélemy 2001).

Despite all these incremental improvements to the explanatory power of ITO decisions, it can still be observed that a huge number of ITO projects fail (Koh, Soon and Straub 2004, Wang et al. 2008). A commonly provided reason for those failures is that, so far, mostly economic factors of classical theories have been used to explain ITO decisions (Dibbern et al. 2004). That these metrics are not sufficient to describe decision behaviors can be seen in many psychological and sociological studies. Such studies have shown that individuals in decision situations are driven by non-rational factors (Kahneman and Tversky 1979). Based on Simon's 'bounded rationality', we use the term 'non-rational' for behavior that differs from the assumptions of the Homo Oeconomicus (Simon 1957). The observations of non-rational behavior at the individual level can also be transferred to decisions in organizations. Movement in this direction can also be observed in the ITO field (Dibbern et al. 2004). In addition to economic constructs, soft factors are established in the scientific discussion. An example of a soft factor is the Theory of Planned Behavior, which includes the constructs of subjective norm and perceived behavioral control. The former is defined as the influence of the decision maker's social environment. The latter is defined as the decision maker's perceived difficulty of a decision task (Ajzen 1991, Dibbern 2004).

In addition to the restriction that rational metrics have mostly been used to explain ITO decisions, it is common practice to see outsourcing decisions as a single event at a distinct point in time. However, academic literature on strategic organizational decision-making argues that path dependencies between subsequent decisions may appear. Hence, it has to be taken into account that past decisions may influence present decisions (Sydow, Schreyögg and Koch 2009).

The current study contributes to the scientific discussion at these points: *We adapt two non-rational determinants to the field of ITO decision making. These determinants are already known and well-established in behavioral economics. We use those determinants to add explanatory power to the common economic metrics for ITO decisions.*

The non-rational phenomena examined by the present study are reference point dependency and cognitive dissonance. Reference points are used by decision makers because they do not see the absolute result of a decision; rather, decision makers see the derivation from a reference point. Results can positively or negatively differ from a reference point (Kahneman and Tversky 1979). This meets our definition of non-rationality, as the Homo Oeconomicus would rather take the absolute value to compare decision alternatives. Cognitive dissonance occurs if results of a past decision fall short with the expectations tied to it. The decision maker then perceives a subjective malaise (Festinger 1957). In

our terms this is non-rational as subjective feelings should not influence the decision maker in the evaluation of decision alternatives.

In our study, we chose the expected targets tied to a decision in the past as reference point for several reasons. First, the result of an ITO decision can be easily measured by the degree of target achievement (Schniederjans and Cao 2006). A positive or negative deviation from the reference point can be seen as the delta between the expected targets of a decision in the past and the measured target achievement at present. Second, the targets of the decision to outsource specific IT functions, for example, the application development or the operation of a data center, are mostly homogeneous. Several studies have identified the main targets of ITO decisions. Those targets normally only differ in their weighting from one ITO decision to another (Cullen, Seddon and Willcocks 2008, Dahlberg and Nyrhinen 2006, Schniederjans and Cao 2006).

Based on the chosen reference point, we investigated how different degrees of target achievement from a past ITO decision affect the decision maker's intended risk preference in a subsequent ITO decision regarding the same IT functions. Previous studies on risk in ITO decisions merely show which risks exist with outsourcing IT functions and which consequences can result from different risks (Rouse and Corbitt 2003). So far, no analysis can be found on how past decisions influence the risk preference of decision makers. However, studies in other fields of IT decision making research show that the risk preference of managers has significant influence on the decision and its performance (Lumpkin and Dess 1996, Shim, Chae and Lee 2009). Hence, the specific research questions to be answered in this study are the following: *Do IT decision makers see the degree of target achievement as a reference point in subsequent outsourcing decisions? Do negative deviations from this reference point result in cognitive dissonance? Is the decision maker's risk preference affected by the target achievement of a previous decision? How may this influence the project performance?*

The paper is structured as follows. First a theoretical foundation is given in section 2. We define the psychological phenomena employed by the current study, and we integrate those concepts in a discussion about subsequent ITO decisions. After that, section 3 builds the theoretical foundations for the research model and the hypotheses. Section 4 describes the methodology and the questionnaire items derived from prior literature. Based on suitable measures we then check the quality of the research model and present the results of the analysis. We conclude in section 5 with the interpretation and implications of the results as well as some limitations of the study.

2 THEORETICAL FOUNDATION

Because we consider subsequent decisions and investigate their interaction, Path Dependence Theory (Sydow, Schreyögg and Koch 2009) plays a major role. Furthermore, we explain the non-rational behavior of ITO decision makers by using theories from psychology, namely, reference point dependency, based on the Prospect Theory (PT) (Kahneman and Tversky 1979), and the Cognitive Dissonance Theory (CDT) (Festinger 1957).

Path Dependence Theory: Despite a long tradition in organization theory, a uniform definition of path dependencies has not been developed. Sydow, Schreyögg and Koch (2009) summarized several assumptions of path dependencies in a meta-study. On the one side, path dependencies are defined as lock-in effects that result from technology adoption. Other authors defined path dependencies as adherence by decision makers to an inefficient course of action. Sydow, Schreyögg und Koch (2009) defined path dependencies as "…a rigidified, potentially inefficient action pattern built up by the unintended consequences of former decisions and positive feedback processes" (Sydow, Schreyögg and Koch 2009). In our study, path dependencies result from the connection between an ITO decision in the past and a new decision about governance of the same IT functions in the present. The factor that builds the connection is the degree of target achievement. Before the decision in the past was made, certain targets were defined for achievement (e.g., cost reduction by 50% or staff reduction by 10%). In a subsequent ITO decision about the same IT functions in the present, the achievement of

these targets can be assessed. Target achievement can fall short of expectations (e.g., only a 25% cost reduction was achieved), exactly meet expectations or exceed expectations (e.g., costs were reduced by 70%). We assume that the degree of target achievement of a decision in the past influences the decision maker's intended risk preference in a subsequent decision. This influence could cause non-rational behavior.

Prospect Theory: The behavior of individuals called reference point dependency is mainly based on the work of Kahneman and Tversky (Kahneman and Tversky 1979). The main proposition of the concept of reference point dependency is that individuals do not base their decisions on absolute values. Rather, individuals evaluate the relative deviation from a certain reference point. A reference point can be considered either as qualitative (e.g., target achievement) or quantitative (e.g., price) value (Kahneman and Tversky 1979). Target achievement shows a large variance in ITO decisions (Koh, Soon and Straub 2004, Wang et al. 2008). Some ITO projects meet the targets better than expected, while a huge amount of projects fall short of target achievement. Hence, target achievement is a suitable reference point for our study because we can expect a good variance of the measurements. The behavioral assumptions derived from reference point dependency were formalized by Kahneman and Tversky (1979) in terms of the PT. Table 5 (right) depicts the expected value function. Based on a reference point in the middle of the graph, the curve is s-shaped and shows a steep and convex shape on the left side. The decision maker objectively experienced a loss compared to the reference point. But the subjective weighting of the loss is not linear. The loss is rather depicted by the convex graph. On the right side, the graph is flat and concave shaped. The objectively measurable decision result was a gain compared to the reference point. Important for our research model is the loss aversion effect. Kahneman and Tversky (1979) proved that individuals tend to weight losses higher than gains. Hence, decision maker display risk affinity in terms of losses and risk aversion in terms of gains (Kahneman and Tversky 1979).

Cognitive Dissonance Theory: Founded by Festinger (1957), CDT assumes that an individual feels cognitive dissonance in terms of a perceived malaise if the results of a decision negatively differ from expectations (Festinger 1957). In our study, cognitive dissonance results from a shortcoming in target achievement concerning an ITO decision in the past. By definition of the CDT, decision makers tend to avoid situations of cognitive dissonance. Nevertheless, if a decision maker experiences cognitive dissonance, he or she tries to resolve it. To do so, a decision maker is poised to take a risk. In terms of the value function of the PT, a decision maker in our study experiences cognitive dissonance if the objectively measured degree of target achievement negatively differs from the reference point. In the case of a positive difference from the reference point, the decision maker perceives, by definition, no cognitive dissonance (Festinger 1957). As the achieved targets are higher than the reference point, the result is compatible with the expectations of the decision maker.

3 RESEARCH MODEL AND HYPOTHESES

Our research model and hypotheses are based on a past study suggesting and conceptualizing research on the topic of the current study (Vetter, Benlian and Hess 2010) as well as the theoretical foundations presented in section 2. Figure 1 provides a map for testing the connection between subsequent ITO decisions. The figure also depicts the assumptions made in section 2 about path and reference point dependencies as well as cognitive dissonance, which will be further described in this section.

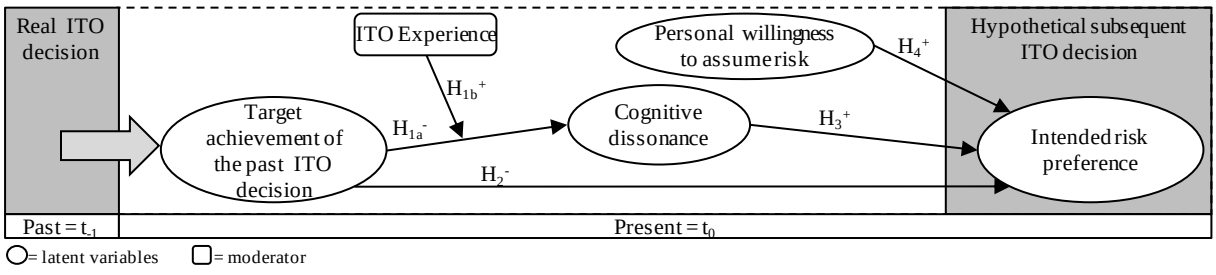

Figure 1. Theoretical Research Model

As a reference point, we defined the degree of target achievement. For a real ITO decision at the time $t_{-1,}$ targets were defined for this project (e.g., cost reduction by x%, staff reduction by y% or transferring z% of the fixed costs into variable costs). The most important targets tied to ITO decisions are identifiable in the body of knowledge from ITO research (Cullen, Seddon and Willcocks 2008, Dahlberg and Nyrhinen 2006, Schniederjans and Cao 2006). Before a subsequent decision in t_0 is made about the governance of the same IT functions, the target achievement of the past decision can be evaluated. The target achievement can fall short of expectations, meet expectations or exceed expectations. Based on this information, the decision maker has to make a new decision on the governance of the IT functions in t_0. This connection between the target achievement of a decision in t_{-1} and a subsequent decision in t_0 is the path dependency in our study. Due to methodological reasons of a cross-sectional study we could not observe a real subsequent decision. The participants rather based their answers on a hypothetical new decision. Hence, we observed the intended risk preference.

If the expected targets from the past decision are not or only partially met, the result of the decision is not compatible with the expectations of the decision maker. As mentioned in section 2, this results in cognitive dissonance. Conversely, if the targets exceed expectations, the decision maker does not feel cognitive dissonance (Festinger 1957). This leads to the following hypothesis:

> *H1a: The degree of target achievement of a decision at the time t_{-1} is negatively related to the decision maker's perception of cognitive dissonance at time t_0.*

The cognitive dissonance is a construct derived from psychological research. Literature in this field has argued that individuals are more or less prone to cognitive effects depending on their level of experience. Overconfidence, as an example of one of the most robust cognitive biases, can be lowered by experience (McKenzie, Liersch and Yaniv 2008). To control our study for this relationship, we defined a moderator variable called experience. We assume that the level of ITO relevant experience lowers the cognitive dissonance resulting from bad target achievement. The following hypothesis can be derived:

> *H1b: ITO relevant experience lowers the causality postulated in hypothesis H1a.*

Based on the PT and the corresponding reference point dependency derived in section 2, decision makers display risk affinity after experiencing an objective loss. In our study, this is the case if the targets from a past decision at time t_{-1} could not have been sufficiently met. Conversely, decision makers act risk averse after an objective gain, which is the case when the targets have been exceeded (Arkes and Blumer 1985, Kahneman and Tversky 1979). These assumptions lead to the following hypothesis:

> *H2: The degree of target achievement of a decision at the time t-1 is negatively related to the decision maker's intended risk preference at time t0.*

As mentioned in section 2, a decision maker tries to resolve the experienced cognitive dissonance. In our study, we offered the participants a possibility to enhance their target achievement and therefore resolve the cognitive dissonance by making a fictional risky decision in t_0. Hence, cognitive dissonance is a mediator in our model between the degree of target achievement at the time t_{-1} and the risk preference in a subsequent decision at the time t_0 (Arkes and Blumer 1985, Festinger 1957, Kahneman and Tversky 1979). Thus, we posit the following hypothesis:

> *H3: The cognitive dissonance and the intended risk preference at the time t0 are positively related.*

The last hypothesis postulated for our research model is based on the fact that decision makers in organizations are human beings whose behavior is influenced by personality traits. An important personality trait is personal willingness to assume risk. Literature in this field has shown that personal willingness to assume risk also influences the risk preference in organizational decision situations (March and Shapira 1987). Hence, we formulate the following hypothesis:

> *H4: The personal willingness to assume risk is positively related to the intended risk preference in ITO decisions.*

4 METHODOLOGY

4.1 Respondents and Descriptive Analysis

A field survey tested the hypotheses. To gain content validity of the constructs in our survey, we used well-established items from prior ITO research. However, most of the prior studies that focus on decision making and risk preferences are based on experiments. Because these constructs are crucial for our research questions, we had to adapt them to make them usable in a survey approach. To guarantee content validity for these constructs, we conducted a three-step pre-test. First, we asked 15 IT researchers to check the items and constructs concerning methodological correctness, scale development and the definition of our dependent variables. Second, we discussed the adapted questionnaire with two IT decision makers. During a guided interview, we conducted the whole questionnaire together and made notes on the comprehensibility and the internal logic of the questions. Third, the final version of the questionnaire was tested with a small sub-sample of eight IT decision makers to measure the average time of completion and to identify possible points of abortion.

A representative, random sample, based on firm size and industry membership was drawn from the Hoppenstedt firm database which is the most reliable databases about German companies containing data of 300,000 firms, covering over 85% of the German economic potential. Because there were no indications in the literature that our research questions did not suit a specific group of companies, we did not delimit our sample ex ante. Because our study focuses on strategic decision tasks of ITO decisions, it was of vital importance for the results to have participants from the top or, at least, middle management of a company. Based on the email addresses of the Hoppenstedt sample, we invited 33,818 IT decision makers matching our requirements to an online survey in April 2010. After four weeks we sent a reminder email to those who have not answered yet. The participants in our study were selected as key informants of the company. The key informant methodology enables researchers to use estimations and evaluations of experienced and knowledgeable personnel as indications of the behavior of a company (Segars and Grover 1998). A total of 1,225 usable responses were received, resulting in a response rate of 4.5%. Only 230 of the respondents had outsourced one or more IT activities, such as system design, system operation, end user support, and application development and maintenance in the past and were willing to base their responses on one of those past decisions. Thirty-two surveys were excluded due to incomplete data, resulting in 198 used responses. The potential for non-response bias was explored based on the work of Armstrong and Overton (1977), who argued that the characteristics of late respondents are similar to those of non-respondents. The responses were divided into two groups representing those received before and after the reminder email. No structural differences between early and late respondents were detected (Armstrong and Overton 1977). Table 1 shows that manufacturing firms are the most common practitioners of ITO. The rest of the branches have approximately the same sizes in our sample.

Items asked	**Responses (in %)**											
Age (in years)	18-24:	**.5**	25-39:	**19.7**	40-54:	**67.7**	55-69:	**12.1**	>70:	**.0**		
Gender (m/f)	M:	**94.4**	F:	**5.6**								
Total Revenue (in m. €)	<6:	**10.1**	6-10:	**12.6**	11-50:	**29.3**	51-100:	**17.7**	>100:	**30.3**		
Firm Size (total head count)	<100:	**31.3**	100-499:	**34.8**	500-999:	**11.1**	> 999:	**22.7**				
Lifecycle Stage of Outsourced Function (Development[1], Operations[2], Maintenance[3], Others[4])	[1]	**24.4**	[2]	**31.6**	[3]	**43.1**	[4]	**.9**				
Type of Outsourcing (Onshore[1], Nearshore[2], Farshore[3])	[1]	**81.2**	[2]	**13.8**	[3]	**5.0**						
Industry Membership (Manufacturing[1], Trade[2], Building [3], Service[4], Information&Communication[5], Others[6])	[1]	**26.3**	[2]	**6.6**	[3]	**6.1**	[4]	**12.6**	[5]	**8.6**	[6]	**39.8**

Table 1. Descriptive Statistics on the Survey Respondents and Firms

The distribution of total firm size in our sample was interesting. Almost half of the firms have total revenue of more than 50 million Euro per anno, whereas only 10% have total revenues less than five million Euro. This is counterintuitive to the demographics of German firms, which mainly consist of small and medium sized companies. This bias can be explained by the fact that only the questionnaires of respondents that actively outsource IT functions were used. Because larger firms benefit more from

ITO than smaller ones, they also build the majority in our sample. From a life cycle point of view on the outsourced functions, it becomes obvious that maintenance is most commonly outsourced. Application and system development is usually kept in-house. Nonetheless, all phases are represented in our sample. We restricted the generalization of our results only with respect to the outsourcing type. 95% of the respondents reported that their outsourcing deals are within Europe (onshore or nearshore). Only 10 of the projects were operated farshore. Hence, we can generalize our results to onshore and nearshore outsourcing decisions but not to farshore outsourcing.

4.2 Measures

All constructs, references and items are depicted in Table 2. Because most past studies measuring comparable items were conducted qualitatively or in experiments, some constructs had to be adapted as a conglomerate of several studies. Nevertheless, the constructs are valid and reliable as an upcoming quality test of the outer model proves.

Construct	Items asked (Label)	Categories	Reference
Target achievement of the past ITO decision (*formative*)	*How important were the following targets within the ITO decision? How would you rate the current degree of target achievement?* Cost reduction (TA01), transformation of fixed to variable costs (TA02), head count reduction (TA03), improvement of the quality of service (TA04), risk reduction (TA05), increase in efficiency (TA06), increase in flexibility (TA07), standardization of IT (TA08), access to know how and innovative technologies (TA09), concentration on core competencies (TA10)	5-point Likert scale: 1 (very unimportant) to 5 (very important) 5-point Likert scale: 1 (far below expectations) to 5 (far above expectations)	Adapted from: (Cullen, Seddon and Willcocks 2008, Dahlberg and Nyrhinen 2006, Schniederjans and Cao 2006)
	How good will the project stay within budget?* (TA11)	5-point Likert scale: 1 (far below expectations) to 5 (far above expectations)	Adapted from: (Schniederjans and Cao 2006)
ITO Experience (*formative*)	How high is your influence in ITO decisions? (E01)	5-point Likert scale: 1 (very low) to 5 (very high)	Adapted from: (Roodhooft and Warlop 1999)
	How old are you? (E02)	5 categories	Adapted from: (Dibbern 2004)
	How many years of ITO experience do you have? (E03)	Years	
Intended risk preference (*reflective*)	*The following improvement of your current target achievement is predicted. Which risks were you poised to take in a new decision on the same IT functions, to achieve the predicted improvement?* Very small improvement.** (RP01), small improvement.** (RP02), high improvement (RP03), very high improvement (RP04)	7-point Likert scale: 1 (very low) to 7 (very high)	Own operationalization based on: (Kahneman and Tversky 1979, McNamara and Bromiley 1997, Simon, Houghton and Aquino 1999)
	From a personal point of view it is arguable to take a risk if an improvement in the degree of target achievement is predicted. (RP05) From a corporate point of view it is arguable to take a risk if an improvement in the degree of target achievement is predicted. (RP06)	5-point Likert scale: 1 (totally disagree) to 5 (totally agree)	Adapted from: (Kasi 2007)
Personal willingness to assume risk	How would you rate our willingness to assume risk in comparison to peers?(AR)	5-point Likert scale: 1 (much lower) to 5 (much higher)	Adapted from: (Keil, Mann and Rai 2000)
Cognitive dissonance	I perceive a malaise due to the current degree of target achievement. (CD)	5-point Likert scale: 1 (totally disagree) to 5 (totally agree)	Adapted from: (Kasi 2007)

*: Inverted afterwards; **: Deleted from construct due to low factor loadings

Table 2. Operationalization of the Constructs

The central dependent variable of our study is the risk preference of a decision maker on a subsequent ITO decision at time t_0. This variable could not have been directly measured because the intention was to take a risk on a hypothetical decision rather than the risk preference in a real subsequent decision, we had to build a reflective construct based on several references (Kahneman and Tversky 1979, Kasi 2007, McNamara and Bromiley 1997, Simon, Houghton and Aquino 1999). As depicted in our research model in Figure 1, the risk preference is explained by the direct and indirect path dependencies to a past decision and by the personal willingness to assume risk. Based on similar studies by Keil (2000) and Ardehali et al. (2005), we operationalized the personal willingness to assume risk in one item. On the one side, the path dependency is based on the assessment of the degree of target achievement of a decision at time t_{-1}. We measured the ten targets most often mentioned in the body of knowledge of ITO decisions. First, we asked how important the target was in the past decision and then we asked how well the target has been achieved. Together with the budget adherence of the past decision, these ten weighted target achievements build the formative construct (Cullen, Seddon and Willcocks 2008, Dahlberg and Nyrhinen 2006, Schniederjans and Cao 2006).

The second way, the path dependency is expressed is via a mediator variable (cognitive dissonance) as described in section 3. Cognitive dissonance was operationalized in dependence on Kasi (2007).

As especially in quantitative mono method research common method variance (CMV) is a possible hazard, we tried to overcome that by following suggestions of Podsakoff und Organ (1986). We conducted a Harman's One-Factor Test. All measured indicators were analyzed using an explorative factor analysis. If the study was affected by CMV there would be only one factor or one factor would explain most of the variance (Podsakoff and Organ 1986). The results of our analysis show that there are five factors and the biggest co-variance explained by one factor is 17.5%. Hence, we conclude that a CMV that influences the results can be precluded.

4.3 Data Analysis

The research model was tested using partial least squares (PLS), a modeling technique well-suited to assessing complex predictive models. PLS concurrently tested the psychometric properties of the scales used to measure the variables and analyzed the strength and direction of the relationships among the variables. The PLS method was suitable for our study because two of the variable constructs were latent variables with measurement items that predicted or caused the variables (formative), whereas one of the variables was a latent variable with measurement items that were caused or predicted by the variable (reflective). Furthermore, analysis conducted with SPSS revealed that the residue of the sample is not normally distributed, which forbid the use of a covariance-based method (Chin 1998). SmartPLS (Version 2.0.M3) was used for the path analysis and also as a bootstrap re-sampling tool to determine the significance of the paths within the model.

Content validity was established through the adoption of constructs used in former studies and through our three pre-test stages. Because there is no global quality criterion for a PLS model, the inner and outer models had to be validated separately. If the single results are above the thresholds established in the literature, the structural equation model (SEM) is valid. Based on the system of Chin (1998), the reflective and formative constructs have to be assessed first.

The reflective measurement models were validated using the standard procedures of the current literature (Chin 1998). Factor loadings have to be above .70. The case for the indicators RP1 and RP2 did not reach that threshold, so they were abandoned for further analysis. A new calculation of the model showed significant factor loadings above the threshold. Discriminant validity was assessed by analyzing the average variance extracted (AVE) and the inter-construct correlations (Cronbach's Alpha). Both values exceeded the thresholds of .50 for AVE and .60 for Cronbach's Alpha (Anderson and Gerbing 1988). As Table 3 indicates, the composite reliability was also above the threshold of .70.

Reflective construct	# Indicators	Factor loadings*	Composite reliability	Cronbach's Alpha	AVE
Intended risk preference	4	.735-.785	.850	.767	.587

* All factors were significant at the level of p<.005

Table 3. Assessment of the Reflective Construct

In contrast to reflective models, formative constructs reverse the direction of causality because the indicators form or cause the latent variable. Thus, the latent variable is a summative index of the items. This reversal of causality requires a significant difference in the interpretation of the model. Thus, for formative indicators, one examines item weights, interpreted as a beta coefficient in a standard regression, expressing the strength with which each indicator forms a given construct. Because the formative measurement model is based on the principle of multiple regressions, the weights provide information about the predictive power of each indicator in relation to the dependent variable associated with the construct. The factor loadings were calculated using the bootstrapping algorithm of SmartPLS. Beside the indicators TA2, TA6 and TA9, all factors were significant. Furthermore, the variance inflation factor (VIF) can be calculated trough linear regressions in SPSS. A VIF-value below 10 (Chin 1998) would indicate multi-collinearity, which can cause serious interpretation problems because of instable regression coefficients and difficulty in ascribing explained variance to a

single item. Because all computed VIF values were far below 10, no multi-collinearity could be observed. Table 4 depicts all values of the calculations.

Construct	Label	External Factor Loadings	VIF	Label	External Factor Loadings	VIF
Target achievement of the past ITO decision	TA01	.255****	1.32	TA07	.197****	1.57
	TA02	.034ns	1.32	TA08	.153***	1.24
	TA03	-.415****	1.15	TA09	.021ns	1.42
	TA04	.183****	1.49	TA10	.261****	1.49
	TA05	.374****	1.22	TA11	.383****	1.19
	TA06	-.024ns	2.06			
ITO Experience	E1	.896****	1.07	E3	.178*	1.06
	E2	.456****	1.01			

* p<.1; ** p<.05; *** p<.01; **** p<.005; ns = not significant

Table 4. Assessment of the Formative Constructs

The structural model was also tested with the bootstrapping algorithm of SmartPLS. We used n=1,000 as subsamples for the calculation and m=198 as cases equal to our sample size. As Figure 2 shows, all hypotheses in our model were accepted on a significance level of at least p<.005. The degree of target achievement from a decision at time t_{-1} has a negative influence on the cognitive dissonance that a decision maker perceives while evaluating the past decision (β_{1a}=-.347, p<.005, f^2.25). Hence, the worse the degree of target achievement, the higher is the perceived cognitive dissonance. Furthermore, several tests showed that cognitive dissonance is a partial mediator due to the fact that all path coefficients in the model are significantly different from zero as well as the direct effect between target achievement and intended risk preference (β_2=-.116, p<.005, f^2=.03). Otherwise cognitive dissonance would fully mediate the relationship. Moreover, the direct path between target achievement and intended risk preference is significantly higher in a computation without the mediating construct (β_2^1=-.281, p<.005). The calculation of the VAF-value (Vinzi et al. 2010) proves that more than 88% of the causality between target achievement and intended risk preference is mediated by cognitive dissonance. Therefore, cognitive dissonance positively affects the intended risk preference in t_0 (β_3=.189, p<.005, f^2=.08). Further, the ITO experience of the decision maker drastically lowers the causality between target achievement and cognitive dissonance (β_{1b}=.387, p<.005). Hence, the more ITO experience a decision maker has, the lower is the influence of bad results on his perceived cognitive dissonance. As the β-coefficient is significantly different from zero, ITO experience is a moderating effect in our model with a middle effect size (f^2=.19). Beside the significance of a path, the effect size (f^2) describes the influence of a predictor variable on the dependent variable (Chin 1998). Also the personal willingness to assume risk is a strong influence on the intended risk preference at the time t_0 (β_4=.357, p<.005, f^2=.15). Overall, the explained variance (R^2) for the intended risk preference at t_0 is 21.6%, whereas for cognitive dissonance it is 35%.

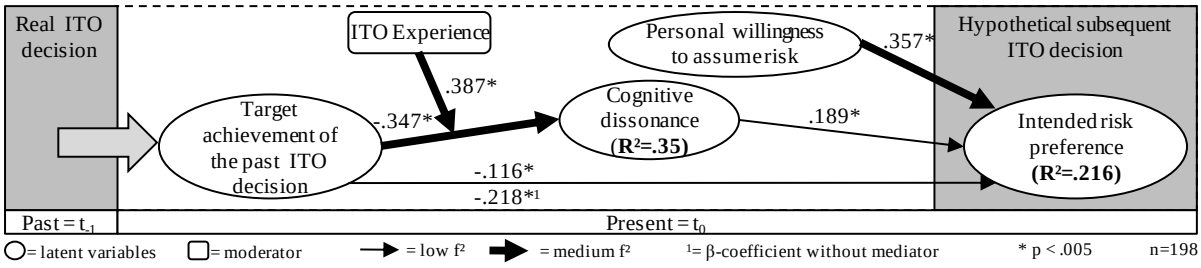

Figure 2. Test of the SEM: Standardized Path Coefficients, Explained Variance (R^2) and Effect Size (f^2)

5 IMPLICATIONS, CONCLUSION AND LIMITATIONS

Based on the research questions in section 1, we now present the main results of our study: *We showed that IT decision makers use the target achievement of past ITO decisions as a reference point. Furthermore, the target achievement affects the intended risk preference of decision makers in a*

subsequent ITO decision. This causality can be shown directly and indirectly over the perceived cognitive dissonance. The latter effect is even stronger than the first.

From a theoretical point of view, this study is interesting because it is a first step in a new direction of ITO research. After more than 20 years of ITO research on a macro-level, where the organization was the focus of the research, we now focus on the decision maker. Furthermore, we leave the strong assumption of rationality behind and take theories from psychology and sociology to better explain the behavior of ITO decision makers. Hence, we bring the research down to a micro-level, where non-rational effects play a major role in decision making. This study is only a first brick in the wall, but we showed that target achievement affects the intended risk preference in ITO decisions. Practical implications can also be drawn from this study. We evinced that targets and objectives influence the performance of an ITO project because the risk preference of a responsible decision maker is also affected. Literature shows that the risk preference of a decision maker is one of the determinants that define the performance of a project (Lumpkin and Dess 1996). To use this connection for our research model, a more detailed interpretation of the results is needed. Therefore, we use a fictive case with two very simplified scenarios (see Table 5 (left)).

A firm decides to outsource their data center. The main target is to reduce operation costs. After half of the contract time, the analysts estimate the forecasted cost reductions. A subsequent decision has to be made:

	SCENARIO 1	**SCENARIO 2**
Initial target:	60% cost reduction	20 % cost reduction
New estimate:	40% cost reduction	
New option:	Shift the data center to a low-wage county	
Chance:	Further cost reduction by 20%	
Risk:	20% additional costs due to system failure (p_{risk}=.8)	20% additional costs due to system failure (p_{risk}=.2)

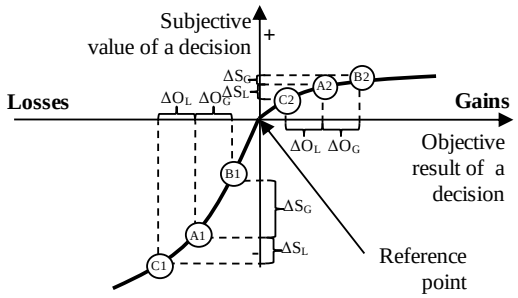

Table 5. Case and Scenario Descriptions (left); Utility Function of the PT (right)

Scenario 1: The targets in the scenario are quite high and cannot be reached within the project. Hence, based on our results, the decision maker perceives strong cognitive dissonance and is on the left side of the reference point in terms of PT (see Table 5 (right), A1). In the upcoming decision, the possible further cost reduction of 20% to point B1 causes a higher change in the subjective value than the possible additional costs of 20% to point C1 ($\Delta S_G > \Delta S_L$). Even though the objective change in value is equal ($\Delta O_G = \Delta O_L$). Hence, the assumed higher risk preference of the decision maker may cause the decision maker to accept the very risky offer (p_{risk}=.8).

Scenario 2: The targets in the scenario are quite low and can be easily reached within the project. The decision maker feels no cognitive dissonance and is on the right side of the reference point (see Table 5 (right), A2) because the target achievement exceeds expectations. In the upcoming decision, the possible further additional costs of 20% to point C2 cause a higher change in the subjective value than the possible further cost reduction by 20% to point B2 ($\Delta S_G < \Delta S_L$). Even though the objective change in value is equal ($\Delta O_G = \Delta O_L$). Hence, the assumed low risk preference of the decision maker may cause the decision maker to avoid the offer even though the risk is comparably low to the offered chance (p_{risk}=.2).

Those two scenarios show what can happen when targets are set too optimistically or too pessimistically. If the targets are set too high like in scenario 1, the decision maker tends to take non-rational risks to finally achieve the targets. Thus, projects may get into trouble and performance may decrease even though a lower target achievement would have been also a success. Conversely, decision makers that reach certain targets too fast, like in scenario 2, may also avoid risks that are relatively low in comparison to the chance. This also lowers the possible total performance. Combined with our observation that this causality is moderated by ITO experience and influenced by the personal willingness to assume risk, we conclude the following practical implication for ITO management: *To optimize the ITO project performance, targets should be set high for experienced and/or risk averse*

decision makers, whereas targets should be set low for inexperienced and/or risk affine decision makers.

Our study depicts that non-rational effects can have a significant influence on the risk preference of ITO decision makers. Nevertheless, the study is also subject to some limitations. First, the research model shows only medium explanatory power, which is due to the time constraints connected to survey studies relying on top-level decision makers. We were not able to ask more than the presented items. Risk preference is a very complex construct, especially in an organizational context. Beside the exogenous variables we have measured, it is influenced by many more factors like hierarchical dependencies or firm policies on risk taking. Due to the mentioned constraints these factors could not have been exhaustively measured which results in a medium R^2. However, the explanatory power is sufficient for our interpretations. The second limitation is the cross-sectional design itself, which is limited to a single time point. It was therefore not possible to observe the past (t_{-1}) and the current decision (t_0). Hence, we had to ask for the intention to take a risk in the new decision. Although this approach is sometimes criticized, it is a common procedure in cross-sectional research. Since we also meet the conditions mentioned by Ajzen (1991), necessary to use the 'intention to' construct, we do not rate it as a major problem (Ajzen 1991). The study does, however, generate significant results that also have valid practical implications. Nevertheless, follow up research should be conducted in an longitudinal way to better address this problem. Furthermore, a longitudinal study would better fit the essence of Path Dependency Theory which is based on a process model rather than on a variance model as it is used in this study. Third, in terms of generality, we have a lot of large companies in our sample and only a few middle- to medium-sized companies. That does not comply with the real distribution of German companies. One explanation for this bias is given in section 4.1. Altogether, the results of the study are promising. The new research approach on ITO decision making should be further developed to better explain the influences of ITO decisions. Some of our other, still unpublished studies already try to identify further non-rational biases like overconfidence or sunk cost, which both seem to have huge impact on the quality of ITO decisions.

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