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THE EFFECT OF FORMAL AND INFORMAL INTRA-ORGANIZATIONAL STRUCTURES ON THE PERCEIVED STRATEGIC IT-BUSINESS ALIGNMENT

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Abstract

Shared understanding is not only a prerequisite for the strategic alignment between IT and business but also one dimension of it. A community can shape its actors' opinions or perceptions, and hence, a shared understanding is composed as a result of interactions within a community. This case study aims at identifying the intra-organizational communities, which have an effect on the perceived strategic IT-business alignment. The case organization operates in energy industry and has a stable, function-based organization. We studied the effect of a membership in an organizational department, geographical proximity, actual interactions, and friendship on the perceived strategic alignment by using the methods of social network analysis. We found out that in addition to friendship ties, a membership in an organizational department had more effect on the individuals' perceptions than their actual interactions, which crossed the departmental borders.

Keywords: IT-Business Alignment, Social Network Analysis, Case Study, Shared Understanding

1 INTRODUCTION AND MOTIVATION

For several years, alignment between IT and business has been one of the key issues for IT executives. Even though there has been a lot of research on both the antecedents (e.g. Brown and Magill 1994; Sabherwal and Chan 2001; Chan et al. 2006) and the outcomes of the alignment (e.g. Sabherwal and Chan 2001; Kearns and Lederer 2003; Byrd et al. 2006; Kearns and Sabherwal 2006), it keeps on staying among the top concerns. IT executives are still searching for the effective ways of linking IT and the business.

Recently, the Society for Information Management (SIM 2008) released the results from its annual survey targeted to CIOs and other IT executives. Again, the top concern was alignment between IT and business. According to Luftman and Kempaiah (2008), one reason for alignment being as a persistent issue is that still too many organizations are just aligning IT with business but not seeing it as a two-way street. IT should be regarded as a partner for business, not as a subordinate. As a second reason, Luftman and Kempaiah bring up that setting up new technology is not enough but organizations must address other issues too, such as processes, human resources, metrics, and governance. Thirdly, the technology and related terminology are developing rapidly. Luftman and Kempaiah state that this could also explain the difficulties in alignment: business leaders are not able to follow the constantly changing language, and therefore, they are uncertain on how to achieve the alignment. All three reasons above concern shared understanding between IT and business (Ray et al. 2007). By shared understanding, we refer to the degree to which the different parties in an organization have a shared understanding of the present and future role of IT in the organization (Preston and Karahanna 2004).

However, shared understanding is not only a prerequisite for the alignment but also one dimension of it (Reich and Benbasat 1996). If the views on the alignment differ a lot, there is a chance that IT representatives have misinterpreted the business needs or business executives cannot exploit the opportunities that IT provides for them. Instead of examining alignment from a few representatives' point of view, we want to measure the alignment by collecting a wide set of perceptions and comparing if they differ from each other or not. In this way, we can capture if there is a consensus over the IT-business alignment or not.

Business and IT executives are actors in a network of organizational relationships. They are connected to each other with formal or informal, direct or indirect ties. These ties enable the interactions, with which actors have an effect on each other. The community or network can shape the actors' opinions or perceptions, and a shared understanding is composed as a result of interactions within the network (Salancik and Pfeffer 1978; Kogut and Zander 1992).

People are attached to several networks in an organization. We are interested in finding out which networks shape the views on IT-related matters in an organization. Therefore, we conducted a case study where individuals' perceptions on the alignment between business and IT were analyzed against the network structures and organizational relationships. Methods of social network analysis were used for the analysis purposes.

The paper is organized as follows. First, we define and discuss strategic alignment between IT and business, and we create a theoretical basis for our research. In the next section, we introduce our research approach, constructs, and hypotheses. Then, the data analysis and research findings follow. Finally, we close this paper with discussion and conclusions.

2 ALIGNMENT BETWEEN IT AND BUSINESS

2.1 How to Measure the Strategic Alignment between IT and Business

The strategic alignment between IT and business can be defined as a fit between IT and business strategy (Palmer and Markus 2000; Chan et al. 2006; Tallon 2007). However, the concept of alignment has not been simple or unambiguous in the IS research. In the literature, one can find such terms as integration (Henderson and Venkatraman 1993), harmony (Weill and Ross 2004), linkage (Luftman and Brier 1999), assimilation (Armstrong and Sambamurthy 1999), and bridge (Peppard 2001) – just to mention a few of them. Yet, all these terms refer to the same idea: integrating the strategies relating to the business and IT (Chan 2002; Avison et al. 2004).

Due to its definition, the alignment is often operationalized as the similarities between business and IT strategies or as common elements or concepts in them. This, however, requires an explicit definition for a strategy, too. Venkatraman and Camillus (1984) have explored the concept of fit in strategic management and recognized different schools of thought for defining a strategy. We follow the scheme that e.g. Henderson and Venkatraman (1993) have pursued. In this scheme, strategy involves both formulation and implementation. Therefore, we must not attach only in the contents of strategic plans but also examine how the strategy is realized in practice. Both perspectives need to be covered.

The strategy of a firm can be pointed out in value disciplines (Porter 1985). We follow the approach of Tallon (2007) and use the value disciplines typology devised by Treacy and Wiersema (1995) — a typology that parallels the one of Porter's. We will look at how well the current IT solutions support the value disciplines that a firm has selected. If succeeding in supporting the value disciplines, IT contributes in realizing the strategy in practice.

As we chose to follow the scheme that includes also the formulation of the strategy, we will study how well business plans match with IT plans, and vice versa. Taking business directions, strategies, and goals into account in IT plans indicates a fit between business plans and IT plans (Kearns and Lederer 2000). On the other hand, when the business plan refers to specific IT solutions or technologies, firms are more likely to recognize IT-enabled opportunities and to regard information as a strategic resource (Kearns and Lederer 2000). Moreover, if IT is supposed to use in an innovative way for strategic purposes, then an active dialogue between business and IT executives is required (Campbell et al. 2005; Huang and Hu 2007). The results of this dialogue are recorded both in business plans and in IT plans.

Finally, shared understanding can be considered one dimension of the IT-business alignment (Reich and Benbasat 1996). The strategic alignment between IT and business can be considered successful if both business and IT representatives have a high regard for it. If there is a clear disagreement between their views, an organization has not fully succeeded in the alignment between business and IT.

In this study, we aim to capture a wide view on the perceived alignment in an organization. We will study the enterprise-level strategic alignment between business and IT by examining the set of perceptions on both realized and planned alignment in an organization. With realized alignment, we refer to the degree of how well the current IT solutions support the value disciplines that an organization prefers (Tallon 2007). Planned alignment refers to the degree of how well business plans are taken into account in IT plans and whether IT and its opportunities have had an impact on business plans (Kearns and Lederer 2000).

2.2 Factors Influencing the Perceptions on the Strategic Alignment

Ever since the strategic alignment model (Henderson and Venkatraman 1993) was introduced, there has been research on the outcomes and consequences of alignment. The organizations, which manage to align business and IT, are able to use IT for competitive advantage or perform better in general

(Sabherwal and Chan 2001; Kearns and Lederer 2003; Byrd et al. 2006; Kearns and Sabherwal 2006). Even if the outcomes of alignment can be considered attractive, the strategic alignment model as such, however, does not give us any advice on how the fit can be achieved in practice. This has resulted in the research on the antecedents for the alignment. Among these antecedents are social factors, such as business competence of IT executives (Bassellier and Benbasat 2004), IT competence of business executives (Bassellier et al. 2001), the relationship between CIO and the top management team (Armstrong and Sambamurthy 1999), and shared domain knowledge (Reich and Benbasat 2000; Kearns and Lederer 2003; Chan et al. 2006; Preston and Karahanna 2009).

However, shared understanding is not only a prerequisite for the alignment but also one dimension of it (Reich and Benbasat 1996). If we accept this suggestion, we should also study what factors contribute to a shared understanding on the alignment between IT and business. The theory on organizational knowledge creation brings insight to building a shared understanding. Its basic assumption is that individuals hold the knowledge (Kogut and Zander 1992; Nonaka 1994; Grant 1996). However, the knowledge is socially constructed within the community where an individual belongs (Kogut and Zander 1992). Thus, the communities or networks have an impact on individuals' knowledge. When individuals meet and exchange knowledge, they simultaneously create new knowledge or reconfigure their previous knowledge. In an organizational context, a firm is an entity where individuals create, exchange and apply knowledge through social ties and structures of a firm (Grant 1996). These human interactions can be represented as a network of ties and nodes. The network structure and the properties of the relationships can give us valuable insight to how the perceptions are shaped.

3 FORMAL AND INFORMAL STRUCTURES

Within an organization, an individual is attached to several groups or clusters. Some of them are more formal and explicitly defined (e.g. organizational units, departments, committees, clubs, etc.) whereas others are informal and their existence emerges from more latent and obscure factors (e.g. a friendship network, or a group of people connected to each other because of their daily interactions).

Rank (2008) defines the formal structure of an organization as a network comprising all the various cooperative ties between organizational positions that have been intentionally created to safeguard economic processes. In identifying the formal structure, assignments, tasks, and responsibilities are in the key role. In this study, we focus on the department structure, which is defined by the top management. We also regard the geographic structure as an intentionally created structure, and therefore, we consider it formal. On the other hand, informal ties are defined as voluntary cooperative relationships between organizational actors (Rank 2008). In this study, we examine the friendship network as an informal structure. The daily interactions can reflect either formal or informal structures.

4 OPERATIONALIZATION OF VARIABLES AND HYPOTHESES

Our dependent variable is *the perceived strategic alignment between business and IT*. The concept of strategic IT-business alignment refers to realized and planned alignment between business and IT at an enterprise level.

Our independent variables are dyadic variables with which we examine a tie between a pair of actors. The first one, i.e. *department membership*, refers to whether a pair of actors belongs to the same department. This was measured by allowing a respondent choose a right alternative from the organizational chart encoded into the questionnaire. If a pair of actors are members in the same unit, this variable receives one as a value. For this study, we created a matrix to depict the shared membership of all the pairs (i, j) in our data. For instance, Ibarra and Andrews (1993) found departmental affiliation to have significant effects on the job-related perceptions, and therefore, our first hypothesis is the following:

H1: Actors i and j will be more likely to have similar perceptions on the strategic alignment between business and IT if they are in the same department.

The case organization was geographically dispersed. The head office located in the metropolitan region but there were offices also in other cities in Finland. We created a matrix of **geographical proximity**, where cell ij equaled one if i and j both worked in the same office. Because the physical proximity enables face-to-face communication, which has been considered as the most effective communication channel (Daft et al. 1987), we suggest the following:

H2: Actors i and j will be more likely to have similar perceptions on the strategic alignment between business and IT if they are geographically proximate.

We captured **actual interactions** with the sociometric questions in the questionnaire. The respondents were asked to name the people in their company with whom they discuss what is going on in the company, whom they approach if they have a work-related problem, and who would turn to them when having a work-related problem. Answers to these questions were used to define the network on actual interactions. The interaction was coded as one, if either both or one of them reported a tie. Direct ties link the actors together and create a social context, where actors are more likely to develop similar views (Salancik and Pfeffer 1978; Ibarra and Andrews 1993). Therefore, our third hypothesis is the following:

H3: Actors i and j will be more likely to have similar perceptions on the strategic alignment between business and IT if they are interacting with each other.

Friendship is an informal tie between two actors, which we measured with the sociometric question in the questionnaire. The respondents were asked to nominate those with whom they consider being friends. The interaction was coded as one, if either both or one of them reported a tie. According to the friendship literature, people are more likely to identify psychologically with friends, not only because friendship shows similarities in attitudes but also because friends are normatively expected to identify with each other (McDonald and Westphal 2003). Hence, we created our fourth hypothesis on the friendship's effect on the perceptions on IT-business alignment:

H4: Actors i and j will be more likely to have similar perceptions on the strategic alignment between business and IT if they are friends.

All our hypotheses suggest that the ties between a pair of actors influence positively on the similarity of their perceptions on the strategic alignment between business and IT.

5 RESEARCH APPROACH

This research utilizes a social network analysis, which is the most applicable to be approached as a case study. The case study approach is justified mainly for two reasons. First, we need to collect data from all network members (Ibarra 1993). This excludes the use of surveys. Secondly, we need a thorough understanding on the context of the network. This makes the phenomenon far too complex to be approached with other research strategies, i.e. for example a pure survey or an experiment. The boundaries of the network must be defined in advance even if we do not know the names of the respondents, yet (Wasserman and Faust 1994; Scott 2000).

In order to assure the rigor research methodology, we will follow the case study guidelines (Yin 2003; Gibbert et al. 2008). Among these guidelines is the use multiple sources of evidence, the following of a case study protocol, and the use of theories as a driver.

5.1 Research Site

This case organization was selected by the pre-defined selection criteria. The first one was that the organization must not be too large or multifaceted. We believe that the phenomenon can be examined

in a smaller scale. The complexity would have reduced the manageability of the study. The second criterion was that IT should be in a focal role in business processes. Thirdly, the organization should have either a centralized or federal (hybrid) IT function, when the need for collaboration is greater than in fully decentralized organizations. The organization chosen for the research site met all these requirements.

The case organization, Zeta (a pseudonym) is a Finnish company, which operates in the energy industry. Zeta's head office is located at the metropolitan region, and the majority of its personnel work there. However, Zeta has offices in other Finnish cities as well. If measured by number of employees, Zeta with 200 employees can be classified as a medium-sized organization, and therefore, it provides a manageable environment for mapping a network structure.

Zeta has nine functional departments of which three represent administrative functions, such as finance, human relations, and business planning. The IT is organized as a centralized function, which is a part of the business planning function. The CIO is not a member of the top management team. Neither does he report to the CEO. However, to facilitate the communication between business executives and IT function, Zeta has established an IT steering committee to which the CIO represents the IT initiatives. The IT steering committee consists of the members of the top management team but excluding the CEO.

The field study started with the discussions with one of the Vice Presidents and the CIO, who gave an overview on business and helped to specify the research plan. The research proposal was presented to the top management team members who all agreed to participate personally.

5.2 Data Collection

The primary source of data for capturing the respondents' perceptions was a web-based questionnaire, which was targeted to all the network members. The items related to the strategic alignment are shown in the Appendix 1. The questionnaire included both open and structured questions. A part of the structured questions were *sociometric questions*, which are very appropriate for network studies and help to figure out informal network structures in quite an efficient way (Zwijze-Koning and de Jong 2005). As an option, we also offered an opportunity to participate in an interview instead of filling in a questionnaire. However, everyone selected a questionnaire over the interview.

For a network analysis, one needs to determine the boundaries of the network. Without appropriate pre-set boundaries, the network structure may be distorted. We defined our data collection to cover the intra-organizational connections of the top management team members and of those who the top management team identified as a discussion partner in organizational matters, a trusted partner to whom they turn in a need for advice, or a friend. The strategic alignment between IT and business can be regarded as the responsibility of the top management (Ross and Weill 2002; ITGI 2005), and hence, we wanted to explore their perceptions on the alignment. All the actors that the top management team nominated with these criteria were included in the network, and therefore, they were contacted. In this way, we can check if the connection was a reciprocal.

Because we did not know the exact number of the network members or their names in the beginning of the study, we used the snowball technique to track the network (Wasserman and Faust 1994; Scott 2000). The first one contacted was the CIO of Zeta. The next data collection phase consisted of the people, who the CIO named in his response. Among these names were all the top management team members. In this second phase, some new names came up. Therefore, the new ones were contacted in the third round. However, everyone who was considered as an external from Zeta's perspective was excluded. All the top management team members were interviewed in the second round. That is why the data collection finished after the third round.

Using the snowball technique expands the network until the predefined boundaries are met. One of the disadvantages of this method is that it excludes the isolates. All the actors are connected to each other

either directly or indirectly. However, this was not an issue in our study since we managed to reach all the top management team members with this technique.

The participation in this study was voluntary, but we received a high number of responses. Everyone in the top management team responded and 22 of 29 people that the top management team nominated replied as well. The total number of responses was 37 out of 44, which results in the respond rate of 84%.

In general, using multiple sources of evidence will increase the construct validity of this study. Therefore, interviews with the key informants and certain organizational documents, i.e. annual reports, organization descriptions, organization charts, and written reports, served as the secondary data source.

6 DATA ANALYSIS AND THE RESEARCH FINDINGS

In Table 1, we present the descriptive statistics on the perceptions on strategic alignment in Zeta. The scale for the variable was from one to five. Thus, the perceptions varied very much in Zeta. This gives us a reason to study further, how these perceptions are created. In this study, we focus on the effect of the communities and networks where the individuals are attached to. We examine the influence of the organizational departments, physical locations, interaction networks, and friendship networks.

	Mean	Stdev	Min	Max	N
Perceived Strategic Alignment	3,03	0,60	1,78	4,22	37
How well the current IT solutions support the value disciplines that an organization prefers	2,95	0,69	1,67	4,50	35
How well business plans are taken into account in IT plans	3,29	0,81	1,67	5,00	34
How well IT and its opportunities are taken into account in business plans	3,00	0,70	1,67	4,50	34

Table 1. Descriptive statistics for the perceived level of strategic alignment

First, we analyzed the structures of the networks under discussion. The friendship network in Zeta was quite a sparse. The density of it was only 0.0601 with 80 ties, whereas the density of the network on actual interactions was 0.2080 with 277 ties. The density of department membership was 0.0976 with 130 ties but the density of network depicting the geographical proximity was as high as 0.4278 with 570 ties due to the fact that the majority (62%) worked in the head office.

Our hypotheses are based on a mix of dyadic and monadic units of analysis. Dyadic units refer to ties between a pair of actors, whereas monadic units stand for actors, who represent the nodes in a network. In mixed dyadic-monadic hypotheses, we are suggesting that network structure (i.e. ties) influences the opinions or perceptions of the actors. This phenomenon is known as autocorrelation. In testing hypotheses on the network structures, one has take into account that samples are non-random but observations depend on each others. The most used statistical tests are not applicable but one can use permutation tests instead. Geary's C is used to measure the autocorrelation:

$$C = (n-1) \frac{\sum_i \sum_j w_{ij} (x_i - x_j)^2}{2 \sum_{i,j} w_{ij} \sum_i (x_i - \bar{x})^2}$$

W_{ij} indicates the adjacency of nodes i and j , and X_i indicates the score of node i on attribute X (i.e. in this study, a perception on the alignment between business and IT). The value of C can vary from 0 to 2. If $C = 1$, there is no dependence between the network structure and attribute values, while $C > 1$ indicates negative autocorrelation and $C < 1$ indicates positive autocorrelation.

In Table 2, we present the autocorrelations for the perceived strategic alignment and different network proximities. We used UCINET 6 (Borgatti et al. 2002) for our analysis. Autocorrelation is based on our observations. In the Geary's C autocorrelation test, permutation trials are used to create a sampling distribution. We used 1000 trials in our test. In these random trials, the average observed Geary's C was 1.006 when the network structure referred to the department membership. Respectively, it was 1.004 for geographical proximity, 0.993 for actual interactions, and 1.016 for friendship. The difference of our result from the average of 1000 random trials is statistically significant when we examine the network structure of department membership, actual interactions, and friendship.

Autocorrelation values are less than one, which indicates a positive association between the three network structures and the perceived strategic alignment. Although the values for autocorrelation are not particularly high, they still indicate positive correlation and the results are statistical significant. However, the Geary measure of correlation for geographical proximity is approximately 1, which means that geographical proximity does not correlate with the perceived strategic alignment.

	Proximities			
	Department Membership	Geographical Proximity	Actual Interactions	Friendship
Autocorrelation	0.655	0.997	0.718	0.544
Significance	0.020*	0.478	0.003*	0.008*
Permutation average	1.006	1.004	0.993	1.016
Standard error	0.161	0.124	0.108	0.215
Proportion as large	0.980	0.522	0.997	0.992
Proportion as small	0.020	0.478	0.003	0.008

Table 2. *Autocorrelations between the perceived strategic alignment and network proximities*

7 DISCUSSION AND CONCLUSIONS

The results of this study provide some support for three of the four study hypotheses. The hypothesis H2, which suggested that geographical proximity influenced the perceived strategic alignment, was not supported. However, there are several studies that have found the physical proximity as an important factor in forming groups and networks, which in turn, impact on the opinions, attitudes, and perceptions. Our results are similar to the findings of Preston and Karahanna (2004), who did not receive support for the idea that physical systems promote the shared understanding. Even though studied a lot, the significance of the location deserves more research, because the number of geographically dispersed firms keeps on increasing. However, in our study the geographical proximity referred to the location of the office. Maybe, the proximity should be examined at a floor-level, i.e. people who work at the same floor are closely connected to each others.

An interesting observation is that a department membership produced a stronger autocorrelation than proximity in the actual interactions. In Zeta, department structure has been rather stable and it is organized by different organizational functions. Therefore, the role of IT can differ depending on the department. Even though the respondents were asked to evaluate the strategic alignment in their organization in general, it is possible that their own experiences from the functions and processes they are personally involved influence their views. Recently, Zeta has looked for more process-oriented operations but the organization structure has remained function-based.

Friendship generated the strongest autocorrelation, which was expected. However, the friendships were scarce in Zeta. Either they are uncommon in Zeta, or the respondents did not report them. The majority of Zeta's employees were Finnish. Finnish culture promotes the task-orientation instead of building personal relationships (e.g. Metcalf et al. 2007). Therefore, it is possible that friendships do not flourish in Zeta.

Our main finding was the significance of the departmental division on the perceptions on IT-business alignment. If the management wants to change the perceptions on IT-business alignment, it has to pay attention to such structures and mechanisms that could break the effect of the departmental silo thinking. Zeta had implemented a cross-departmental IT steering committee but it did not beat the effect of the departmental division. A broader variety of horizontal mechanisms is needed (Brown 1999).

7.1 Limitations

However, there are some issues and limitations in this study to be considered. One issue is the validity of the constructs. The interpretation of the concepts may not be the same for all. To avoid the validity issues, we used the established instrument. The items were well-known both for the perceived strategic alignment (Kearns and Lederer 2000; Kearns and Sabherwal 2006; Tallon 2007) and for capturing the communication, advice, and friendship networks (Ibarra and Andrews 1993; Borgatti and Cross 2003). We also pre-tested the questionnaire with both academics and practitioners. Minor modifications were made based on the pre-test.

Another issue relates to the data collection in terms of the reliability. In sociometric studies, the respondents may be tempted to answer according to the prevailing organizational norms, which might not necessarily match with the reality. They might be reluctant to reveal any facts that they may consider sensitive. To prevent this scenario, we have to build confidence by applicable non-disclosure agreements, which protect single respondents but still allow us to report our findings to academy. The confidentiality of the responses was emphasized. In addition, the questions were formulated in a neutral manner and tested beforehand.

7.2 Contributions

We are confident that this study will contribute to both practitioners and academy. Practitioners will better understand the effect of organizational structures on the perceived strategic alignment. As the influence of the functional division was significant, organizations should continue to seek for the lateral mechanisms to break the impact of the silos.

Academy will benefit on the expanding the concept of the strategic IT-business alignment to include the dimension of consensus. Adding this dimension to the concept of IT-business alignment can direct the research to new fields. Instead of focusing on the intellectual dimension of the alignment, the focus can be on the social dimension (Reich and Benbasat 1996). Academy could search answers for the questions such as: Which intra-organizational structures shape the perceptions most? Are there any inter-organizational structures that have an influence on the perceptions? Future research should address on through which mechanisms the perceptions on the alignment evolve in companies. A longitudinal study on evolution of the perceptions in the context of structural changes in a company could be beneficial for both academy and practitioners.

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Appendix 1

CONSTRUCT-RELATED QUESTIONNAIRE ITEMS

<i>Construct</i>	<i>Questionnaire Items</i>	<i>Source</i>
Perceived strategic alignment between business and IT		
How well the current IT solutions support the value disciplines that an organization prefers	To what extent are operational excellence, customer intimacy, and product/service innovations emphasized in the strategy of your company? ¹ To what extent do your current IT solutions help in achieving the objectives in operational excellence, in customer intimacy, and in product/service innovations? ¹	Tallon (2007);
How well business plans are taken into account in IT plans	Our IT plans reflect the business plans. ² Our IT goals reflect the business goals. ² Our IT plans support the business strategies. ²	Kearns & Lederer (2000); Kearns & Sabherwal (2006)
How well IT and its opportunities are taken into account in business plans	Our business plan contains the IT plan or it refers to the IT plans. ² Our business plan refers to specific information technologies and/or IT applications. ² Our business plan utilizes the strategic capability of our IT. ²	Kearns & Lederer (2000); Kearns & Sabherwal (2006)

¹ 5-point scale ranging from "Not at all (1)" to "To very great extent (5)"

² 5-point scale ranging from "Totally disagree (1)" to "Totally agree (5)"