

Interorganizational Collaboration in Supply Chain Management: What Drives Firms to Share Information with Their Trading Partners?

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Abstract

With growing use of interorganizational systems the scope of interfirm collaboration has increased considerably, particularly in the supply chain context. An important prerequisite of interfirm collaboration is information sharing. Extant research suggests clear advantages of information sharing. The research presented in this paper addresses antecedents of interorganizational information sharing. Based on findings from interorganizational systems adoption and interfirm collaboration research, a structural model is developed and validated by a quantitative survey among Austrian retailers and manufacturers in the fast moving consumer goods sector. The proposed model explains the effect of internal factors (commitment, information policy, and readiness), inter-organizational factors (relationship, trust, power, and trading partners' readiness), and economic factors (perceived benefits and costs) on information sharing behavior. The results show the relevance of internal factors and perceived benefits. The study reveals particularities of information sharing behavior and can help practitioners to understand what motivates their trading partners to share information.

1. Introduction

In the last years the intensity of efforts for an intensified collaboration between firms in a supply chain has increased. Interorganizational systems (IOS), i.e. electronic linkages between trading partners that can eliminate manual information transfer, have largely contributed to this paradigm shift as they proved to be technological enablers for closer relationships and tighter coordination between trading partners. Collaboration techniques such as vendor-managed inventory, rely on regular sharing of information between the engaged firms [1]. As [20], [21], and [40] argue interorganizational information sharing can considerably contribute to a reduction of the bullwhip

effect, a distortion in the supply chain that increases with growing distance from the final consumer. In doing so, IOS have contributed to changes in business processes across organizations.

Despite the large variety of collaboration models and benefits that can be obtained by information sharing, it is not evident that IOS are actually used for information sharing. In practice, firms are still reluctant to participate in a regular exchange of business data. One potential reason is a lack of the necessary IOS. But factors other than the availability of IOS may also be relevant. Generally speaking, we can identify a gap between purported benefits and actual information sharing participation in practice.

The benefits of information sharing that have been identified in literature suggest that firms should at least consider it. As information sharing is a cross-organizational activity, firms need to understand why and under which circumstances their trading partners are willing to share information. To give practically relevant recommendations about the appropriate degree of information sharing and about trading partners which are reasonable to share information with, we need a better understanding about motivations and drivers of information sharing. If firms realize why their trading partners show a particular information sharing behavior, it is easier for them to pursue an appropriate information sharing policy. Also expectations of trading partners can better be understood. The research questions of this study are the following:

To what extent do internal antecedents impact a firm's participation in information sharing?

To what extent do interorganizational antecedents impact a firm's participation in information sharing?

To what extent do perceived benefits and costs impact a firm's participation in information sharing?

These research questions are attempted to be answered by an empirical study in the Austrian fast moving consumer goods (FMCG) sector. The paper is organized as follows: In the next section, a literature

review on characteristics and benefits of information sharing is provided. Then the research model and the hypotheses are developed. In the subsequent sections the research methodology and the study results are presented before the findings are discussed in detail. Finally, a contribution statement and implications for research and practice are developed.

2. Interorganizational Information Sharing

Information sharing is referred to as the regular exchange of data that goes beyond the transmittal of data necessary in any cross-organizational trading. Although it need not necessarily be conducted electronically, information sharing will hardly be economically justifiable if it does not involve IOS.

There are three system models for information sharing [22]. (1) In the information transfer model a firm transmits information directly to a trading partner that maintains the database for decision making. (2) In the third party model, an intermediary collects the information, supports the transactions, and maintains the database. (3) The information hub model has the same structure as the third party model except that the third party is replaced by a system.

Seidmann and Sundararajan [39] distinguish four levels of information sharing: (1) The order information exchange is the simplest form as it only covers electronic transfer of information that is contained by orders. Strictly speaking, this level is not considered information sharing. (2) Operational information sharing includes the transmittal of information on an operative level exceeding order information, such as inventory levels. (3) Sharing of strategic information requires long-term contractual agreements. (4) Strategic and competition information sharing involves competing firms, e.g. by sharing market information.

Information sharing can also be categorized according to the type of information shared [22]. Information sharing on the inventory level can contribute to a decrease of necessary safety stock levels and is the basis of many collaboration models. Transmittal of sales data is related to consumer behavior and can help avoiding the bullwhip effect. Order status information supports tracking and tracing. Sales forecast data sharing improves inventory management by exploiting the market expertise of downstream trading partners. Sharing of production and delivery schedules can optimize production planning along the entire supply chain. Any information shared can further be characterized according to the quality, i.e., up-to-dateness, accuracy, and completeness [1].

Literature has thoroughly examined the benefits associated with information sharing. Simulations have quantified the extent of benefits for individual players in a supply chain. Information sharing can yield considerable benefits for firms, particularly by reducing costs, improving service levels, and reducing lead times and stockouts [1]. Particularly the positive impact of information sharing on the elimination of the bullwhip effect could be demonstrated [20], [21], [40], [8]. Also empirical research reports the positive impact of an intensive relationship including information sharing on a firm's performance [31].

Information sharing is relying on the existence of IOS as they are a technical prerequisite and provide the economic justification of information sharing-based collaboration. Furthermore, the use of IOS can be regarded as a basis of interfirm collaboration (see [18] for a review). The use of IOS, collaboration, and the participation in information sharing have many characteristics in common. Like information sharing, IOS-based collaboration turned out to be a source of various kinds of benefits to firms [4], [6], [24], [38]. As [30] have shown, IOS-based collaboration can provide both operational benefits, i.e. the reduction of paperwork and strategic benefits by launching interfirm collaboration. Thus, information sharing is a key to obtaining particularly strategic benefits out of the use of IOS. Like IOS application, also information sharing involves the cooperation and commitment of all participating firms [32]. [35] analyzed the impact of IT integration capabilities on firm performance, mediated by supply chain process integration. Their study revealed that all these relationships are significant. [45] stressed the benefits obtained by electronic data interchange (EDI) integration with enterprise application integration (EAI). Similarly, also partnership attributes show a positive impact on IOS implementation success, which itself positively influences IOS performance [19].

The motivation to use IOS has been subject to many studies in IS research. Frequently EDI as a widespread IOS technology was addressed. Empirical studies revealed diverse drivers that impact the use of IOS in practice. In an early study, [13] identified competitive need, proactive technological orientation, internal push, market assessment, impediments, and industry adoption as antecedents of IOS use. [34] and [17] pointed at relative advantage, costs, and technical compatibility as drivers of IOS use.

Later, organizational and power-related issues were addressed. [32] and [33] successfully investigated the role of competitive pressure, exercised power, internal need, top management support, customer support, and firm size. [15] took a more detailed look at the different facets of power and demonstrated the

impact of the trading partners' dependence, persuasive and coercive power, trust, and continuity as antecedents of IOS use. [36] distinguished between internal antecedents (internal support, IOS benefit potential, IOS compatibility, and resource intensity) and interorganizational factors (customer support and competitive pressure). The role of expected benefits was first considered by [9].

Similarly, researchers also investigated drivers and benefits of interfirm collaboration (e.g. [16], see [12] for a comprehensive literature review). [23] developed a framework based on wide-spread theories to explain conceptually why firms can obtain benefits from collaboration.

Due to these various analogies between IOS use, interfirm collaboration, and information sharing, we apply dominant theoretical approaches that were used for research in IOS adoption to investigate drivers of information sharing. Areas of research which provide the necessary theoretical foundation for the research model and the selection of the variables are TCE [46], RBV [3], and the theory of embeddedness [43], which are included in the framework by [23]. In addition, power theory [15] is considered.

3. Research Model and Hypotheses Development

The dependent variable in the research model is information sharing behavior. It investigates to what extent a firm shares information with its most important trading partners. The model refers to information sharing on the second and third level of [39]'s information sharing intensity classification and distinguishes between operational and strategic information sharing. Operational information is characterized as being short-term, quantitative information about daily logistics and sales activities or status information on orders and inventory levels. Its main purpose is reducing order cycle times and inventory levels and improving customer service. Strategic information is related to long-term issues in marketing, logistics, and other business strategies. It is necessary for carrying out interfirm collaboration and other strategic logistics decisions [14]; [26].

Strategic information sharing behavior is measured by the frequency of sharing the following types of information: market research data, new target markets, new product introduction, forecasting data, promotion plans, and distribution, promotion, and pricing strategies. Operational information sharing summarizes dispatch advice, delivery status information, production batches, best before data, and

quality assurance data. Figure 1 (on the next page) shows the research model graphically.

Antecedents of information sharing are separated into internal, interorganizational, and economic factors. The separation between internal and interorganizational factors has been made frequently in IS research on IOS adoption (e.g. [32], [36]). To account for the strong impact of the economic perspective that has been identified in IOS adoption research [34], [17], [9], [29], we apply perceived benefits and costs as additional antecedents of information sharing. Although [17] attribute benefits to the organizational level, they consider it distinct from organizational readiness. In our study the economic factors are separated from the internal factors as they are related to the firms' perceptions of information sharing behavior's result. In other words, the estimation of perceived benefits and costs requires considering its expected consequences given information sharing is already practiced. In contrast, the internal variables do not require to think of an outcome of information sharing and are therefore considered conceptually different from the economic factors.

Like the application of IOS, information sharing can strongly affect the entire firm. Hence it is likely that internal factors influence this decision. Due to the linkages between IOS use and information sharing, we posit that there are technical and organizational factors that form an internal predisposition to information sharing [36].

An important internal factor identified in prior research is top management commitment. Due to necessary investments and changes within the firm, information sharing is expected to encounter much resistance if it is not supported by top management [26]. Only top management can send the right signals to the affected parts of the organization. Top management support is also necessary for convincing trading partners to participate in information sharing [36]. Therefore we hypothesize that

H_{1a}: Top management commitment will positively impact strategic information sharing behavior.

H_{1b}: Top management commitment will positively impact operational information sharing behavior.

An organizational factor that is considered relevant for information sharing participation in particular is a firm's general information policy. A firm's general willingness to disseminate information outside its boundaries to different stakeholders is considered to ease or hinder information sharing. Previous research stressed the relevance of external communication for the success of partnerships [27], [28]. In analogy to commitment we posit that an active

information policy positively impacts information sharing behavior.

H_{2a}: An active information policy will positively impact strategic information sharing behavior.

H_{2b}: An active information policy will positively impact operational information sharing behavior.

information. Embeddedness theory suggests that partners can and will share more sensitive information if they are in an embedded relationship.

According to the theory of embeddedness, trust is one of the main characteristics of an embedded relationship [43] and supposed to be even more

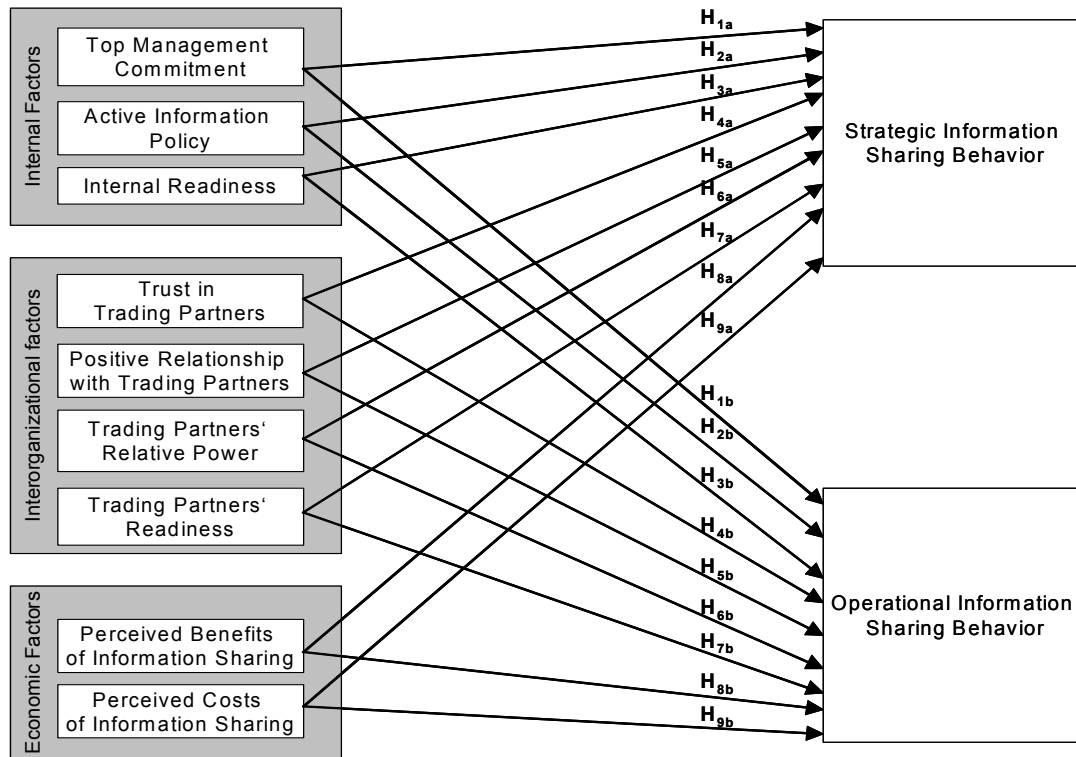


Figure 1. Research Model

From a technological point of view, information sharing requires the availability of appropriate IOS. Internal readiness denotes the existence of appropriate electronic links to trading partners [5]. Technical readiness has been identified by various studies as an antecedent of IOS application (e.g. [11], [41], [17]).

H_{3a}: Internal readiness will positively impact strategic information sharing behavior.

H_{3b}: Internal readiness will positively impact operational information sharing behavior.

On the interorganizational level, findings from TCE, RBV, power, and embeddedness theory can be applied. Research based on power and embeddedness theory demonstrated the crucial role of trust, relationship, and power for the adoption of IOS. TCE can explain the value of information sharing across organizations to reduce transaction costs by increasing efficiencies. RBV stresses the potential for creating unique capabilities which is also possible by joining resources from two or more partners through sharing of

important than contractual agreements. [43] reports that trust reinforces the exchange of sensitive information and joint problem-solving. Trust consists of items concerning a firm's perception that the trading partner provides correct information and does not abuse the relationship [26]. Therefore we consider the following relationships between trust and information sharing:

H_{4a}: Trust in the trading partners will positively impact strategic information sharing behavior.

H_{4b}: Trust in the trading partners will positively impact operational information sharing behavior.

The relationship between firms has been investigated in several contexts to explain IOS adoption intention or benefits obtained by IOS use. Like IOS application, information sharing is highly dependent on interfirm agreements and a joint commitment. These factors provide the necessary conditions for information sharing and related IT investments. This assumption is also derived from the

theory of embeddedness [43]. A positive relationship with trading partners is characterized by its focus on long-term relationships, its intensity and average time horizon [26] but also on the role of contractual obligations. A positive relationship is closely related to a positive transaction climate.

H_{5a}: A positive relationship with trading partners will positively impact strategic information sharing behavior.

H_{5b}: A positive relationship with trading partners will positively impact operational information sharing behavior.

Extant literature reveals the high importance of relative power between trading partners. The concept of power was put forward by [15] and [2]. Research on EDI adoption demonstrated that competitive pressure [33] and exercised power [15] are key drivers for EDI adoption. In the present study the trading partners' relative power is of interest. It is measured by a firm's perception that it depends on the trading partners and that they can influence their internal IT decisions. Derived from research on IOS adoption, we posit that information sharing will be fostered by powerful firms that can influence other firms' information sharing decisions. Powerful players are often early adopters of IS innovations and tend to impose them on trading partners (e.g. as Wal-Mart did after it had implemented RFID [7]). Therefore we conclude:

H_{6a}: Trading partners' relative power will positively impact strategic information sharing behavior.

H_{6b}: Trading partners' relative power will positively impact operational information sharing behavior.

From a technological point of view, a firm that is willing to share information might be hindered from it due to a lack of its trading partners' technological capabilities. Therefore, we regard the trading partners' technical readiness as a further antecedent of information sharing behavior. This construct is described in an analogous way as the internal technical readiness and reflects the existing technical infrastructure as an enabler of information sharing.

H_{7a}: Trading partners' readiness will positively impact strategic information sharing behavior.

H_{7b}: Trading partners' readiness will positively impact operational information sharing behavior.

Finally, the relationship between perceived benefits and costs of information sharing and information sharing behavior is analyzed. Although information sharing relies on already existing IOS, it is likely that further improvements and adaptations to its IOS are necessary. Also special considerations on security or agreements concerning data formats, transmittal intervals, data granularity or other issues

will have to be determined. Drawing again an analogy with IOS adoption [34], [17], [9], [29], we assume that perceived benefits positively and perceived costs negatively impact information sharing. Perceived benefits cover improvements in the logistics process (e.g. lower inventory levels, higher delivery accuracy) and monetary measures such as sales increase or cost reductions. Perceived costs include necessary financial investments, technical security issues, and an additional workload to the firm.

H_{8a}: Perceived benefits of information sharing will positively impact its strategic participation.

H_{8b}: Perceived benefits of information sharing will positively impact its operational participation.

H_{9a}: Perceived costs of information sharing will negatively impact its strategic participation.

H_{9b}: Perceived costs of information sharing will negatively impact its operational participation.

4. Research Methodology

To test the research model and its hypotheses, a quantitative survey among firms in the Austrian FMCG industry has been conducted. This sector was chosen because it shows a high delivery and order frequency, thus reaching a critical mass for IOS use and collaboration. As many goods are perishable, logistics processes are complex. These attributes make the FMCG sector appropriate for this study.

The Austrian FMCG market shows some particularities that are typical for a small country (8 million inhabitants) and thus evoke differences to large markets such as the U.S.. During the last years, a strong tendency towards consolidation among retailers could be observed, which contributed to an increased power of retailers over suppliers. Furthermore, the industry experienced a sharp increase of discounters, particularly in the groceries industry. While there are few strong and many small retailers in the market, the supplier side is more homogenous. Dominant players are international brand manufacturers which are competing with mid-size local manufacturers. Most large retailers as well as numerous large and medium-sized manufacturers are expanding to the Eastern European countries, hence many firms are export-oriented. Due to the small size of the market, there is little anonymity between firms. Managers on both sides know each other very well and therefore personal contacts play a major role in the Austrian market.

The research sample contained both manufacturers and retailers. The questionnaire was developed based on a thorough literature research and validations by experts in academia and practice. All items were developed in English and translated into German by a

German native speaker. To avoid a language bias, the items were back-translated by an English native speaker. The comparison with the original items resulted in minor corrections of the wording. Before the survey period started, the questionnaire was pre-tested with five practitioners from the FMCG sector, which led to small adjustments and the elimination of one question outside the research model.

The written questionnaire was sent via a mailing to approximately 2,000 firms in June 2006. The addresses were obtained from the leading Austrian yellow pages provider, Herold Business Data. In October 2006, a follow-up mailing took place and the questionnaire was advertised in the Austrian GS1 quarterly newsletter in December 2006. A total of 223 firms responded to the questionnaire, out of which 62 were incomplete and thus eliminated from further analysis. Therefore a sample of 161 questionnaires was used for model testing, which results in a rather low response rate of 8.1%, a problem that is occurring frequently in surveys among organizations [37]. The target persons were the general managers and CEOs who were addressed personally. In the cover letter, managers were requested to forward the questionnaire to competent employees, if necessary. The sample description is shown in Table 1.

Table 1. Sample Description

Annual sales		Employees	
Less than 10 mio EUR	41.6%	Less than 50	55.3%
10-50 mio EUR	30.4%	50-250	26.7%
50-100 mio EUR	9.9%	250-500	3.7%
100-500 mio EUR	10.6%	500-1,000	4.3%
500-1,000 mio EUR	2.5%	More than 1,000	8.1%
More than 1,000 mio EUR	2.5%		
Geographic area		Stage at supply chain	
Austria only	47.2%	Manufacturer	42.4%
Mainly Austria	38.5%	Retailer	36.6%
Mainly outside of Austria	11.2%	Distributor	16.8%
Industry		Position of respondent	
Groceries	65.8%	CEO/owner	57.8%
Drug	11.2%	Sales manager	13.7%
Others	19.9%	Others	28.5%

Research variables were measured by multi-item scales which were applied by previous research or developed by the authors. All items applied a seven-point Likert scale ranging from 1 (= totally agree) to 7 (= totally disagree). The 7-point Likert scale was chosen because this is a common approach in empirical IS research. For all questions concerning interorganizational variables (i.e. trust, power, relationship, and trading partners' readiness as well as for information sharing behavior) the respondents were requested to consider their five most important trading partners. In Table 2, the used multi-item measurement scales are presented together with their sources. Also

the reliabilities (Cronbach's Alpha) are shown in the table. The values are all above the recommended level of .7.

Table 2. Measurement Scales

Variable	Description	No. of items	Source of items	Cronbach's Alpha
SISB	Strategic information sharing behavior	5	[44], [26]	.938
OISB	Operational information sharing behavior	8	[44], [26]	.841
COMM	Top management commitment	9	[32]	.934
INFPOL	Active information policy	3	New	.805
INTRDY	Internal readiness	6	[36]	.941
TRUST	Trust in trading partners	5	[10]	.907
RELAT	Positive relationship with trading partners	5	[32], [47]	.904
POWER	Trading partners' relative power	5	[13], [15]	.802
TPRDY	Trading partners' readiness	5	[36]	.912
ISBNFT	Benefit of information sharing	9	[17]	.930
ISCOST	Costs of information sharing	7	[17]	.883

5. Study Results

In this section the results of model testing are presented. The model was tested by means of a Partial Least Squares (PLS) analysis. This method was preferred to structural equation modeling (SEM) for several reasons. First, SEM requires the manifest variables to be multivariate normal distributed. The Kolmogorov-Smirnoff test revealed that this assumption failed. The sample size is rather small, which is another argument for PLS analysis. Third, as [42] suggest, PLS is considered more appropriate for research models that are in an early stage of development and therefore have not yet been tested extensively. The analysis was carried out by the open source software SmartPLS provided by the University of Hamburg. To calculate the significance of the path coefficients, a bootstrapping procedure was carried out that yielded T values [35]. Path coefficients with T values higher than 1.65 are significant at a 5% level. Table 3 shows the results of the PLS analysis.

Table 3. PLS Analysis Results

Hypothesis	Path coefficient	T value	Hypothesis decision
H _{1a} : COMM -> SISB	.268	2.555	supported
H _{1b} : COMM -> OISB	.098	.825	rejected
H _{2a} : INFPOL -> SISB	.265	2.246	supported
H _{2b} : INFPOL -> OISB	.237	2.140	supported
H _{3a} : INTRDY -> SISB	.054	.427	rejected
H _{3b} : INTRDY -> OISB	.257	1.905	supported
H _{4a} : TRUST -> SISB	-.066	.620	rejected
H _{4b} : TRUST -> OISB	.107	1.060	rejected
H _{5a} : RELAT -> SISB	.056	.435	rejected
H _{5b} : RELAT -> OISB	-.047	.408	rejected
H _{6a} : POWER -> SISB	.077	.586	rejected
H _{6b} : POWER -> OISB	.079	.693	rejected
H _{7a} : TPRDY -> SISB	-.013	.109	rejected
H _{7b} : TPRDY -> OISB	-.053	.483	rejected
H _{8a} : ISBNFT -> SISB	.211	1.795	supported
H _{8b} : ISBNFT -> OISB	.203	1.650	supported
H _{9a} : ISCOST -> SISB	.025	.242	rejected
H _{9b} : ISCOST -> OISB	-.024	.230	rejected

6. Discussion

The PLS analysis shows that several internal variables as well as the perceived benefit of information sharing show a significant impact on information sharing behavior. H_{1a} and H_{1b} postulated that top management commitment would impact strategic and operational information sharing. H_{1a} yielded a significant path coefficient of .268, which is the highest path coefficient in the model. Hence the impact of top management commitment on strategic information sharing could be confirmed. This result is consistent with prior findings on the role of commitment for the adoption of IOS. In contrast, the impact of commitment on operational information sharing (H_{1b}) is not supported by data. A possible explanation of this result could be related to organizational structures. As the decision to practice operational information sharing is likely to be made by department managers rather than general managers, the commitment of the senior management level might play a minor role in this respect.

Hypotheses H_{2a} and H_{2b} assumed a significant impact of information policy on strategic and operational information sharing. Both hypotheses could be confirmed. H_{2a} shows a path coefficient of .265, H_{2b} a path coefficient of .237. Therefore the newly introduced variables show a significant positive impact on information sharing behavior. This result implies for practice that firms seem to have a general attitude toward the dissemination of information in several dimensions. If a firm's information policy is known, this might help to predict its willingness to share information in the context of the supply chain.

The next two hypotheses H_{3a} and H_{3b} predicted a significant impact of internal technical readiness on information sharing behavior. While this relationship is supported by data in the context of operational information sharing (H_{3b}), there is no significant impact on strategic information sharing (H_{3a}). The path coefficient of H_{3b} is .257. The results allow the conclusion that a high technical readiness may be a prerequisite for operational information sharing, while it is not for strategic information sharing. This difference could lie in the different nature of strategic and operational data. While operational data is usually highly standardized and formatted, strategic data (e.g. plans or marketing strategies) are frequently less structured which reduces the dependence on appropriate IOS.

The next eight hypotheses are related to interorganizational variables. As the results in Table 3 show, none of the hypothesized impacts is significant. H_{4a} and H_{4b} investigated the influence of trust on information sharing behavior. Although there is a stronger impact of trust on operational information sharing, there is no significant indication that this relationship exists in practice. Similarly, no impact of relationship on information sharing behavior (H_{5a} and H_{5b}) could be observed. As a consequence, the considerations based on TCE, the RBV, and theory of embeddedness are different from the findings from the survey. H_{6a} and H_{6b} stated that there would be a positive impact of trading partners' power on information sharing behavior. Also this relationship could not be supported, thus the findings from power theory cannot be transferred to the information sharing context. Finally, H_{7a} and H_{7b} are also rejected. There is no impact of trading partners' readiness on a firm's information sharing behavior.

Although previous studies on IOS adoption were conducted with similar methods and variables [9], [32], [33], [34], [36], this result is different from these findings. There may be several reasons for that. First, information sharing is obviously conceptually different from IOS adoption. Second, this result may be due to particular market conditions in Austria. As the market is small, trust, relationship, and power may generally play a different role than in the U.S., where most of the previous studies have been carried out. Furthermore, also cultural issues may be relevant. Third, the time elapsed between the referenced IOS adoption studies and this study could provide an explanation for these differences.

Concerning the economic perception of information sharing, the hypothesized impact of benefit on strategic information sharing behavior could be supported. H_{8a} which assumed a positive impact of perceived benefits on information sharing was

supported due to a significant path coefficient of .211. Similarly, operational information sharing is influenced by perceived benefit with a path coefficient of .203. Like related findings on the use of IOS, these hypotheses also confirm the relevance of perceived benefits for a certain organizational behavior. The negative impact of perceived costs on information sharing behavior (H_{9a} and H_{9b}) could however not be supported. There is no indication that perceived costs would hinder firms from information sharing.

7. Contribution and Implications

The presented empirical study has revealed that key drivers of information sharing are internal factors and perceived benefits. However none of the interorganizational variables could be confirmed as antecedents of information sharing. Therefore we can conclude that a firm's decision to share information is largely dominated by internal considerations. As information sharing is an interorganizational process, however, this result has important implications for its interorganizational prerequisites.

First, information sharing seems to be a voluntary activity and largely independent from external and technical conditions. If a firm wishes to share information with others, it has to be aware that its trading partners will only agree if they are internally predestinated for it and if they sure to benefit from it. This implies that a firm may put much effort on convincing its trading partners to share information. Trust, a good relationship or even coercive power do no guarantee that a firm can initiate information sharing with others. There are conceptual differences between IOS use, collaboration, and information sharing. While IOS use and collaboration are decisions that cannot be revised easily, information sharing can be started and terminated at any time with less necessary adjustments.

Second, drivers of strategic and operational information sharing are different. Top management commitment only impacts strategic information sharing. Thus if a firm wants to share operational information, it must convince department managers first. On the other hand, appropriate IOS are only perceived as a prerequisite for operational information sharing. For strategic information sharing firms might assume that they need less sophisticated IOS.

Finally, the impact of perceived benefits is confirmed again in this study. Firms are ready to share information if they are sure that they will benefit from this decision. This finding provides a positive indication for potential future information sharing activities. If the benefits of information sharing, as

shown by numerous mathematical simulations, can be clearly communicated to practice and if first-movers can demonstrate the benefits of their information sharing activities, other firms will be likely to start information sharing. Initiatives such as national and international efficient consumer response movements may serve as catalysts for information sharing.

The study at hand provides several contributions to literature. First, it is one of the first empirical investigations on this subject. Although previous research has addressed this field [26], there have been few empirical findings on the particular issue of information sharing. Therefore, this study provides first insights into a topic of considerable theoretical relevance.

Second, the critical role of internal factors as an antecedent of information sharing could be confirmed. In particular, information policy, which has not yet been investigated as an antecedent of information sharing has successfully been introduced to the research model. As information policy has not been measured so far, we could also provide a first measurement scale for this construct. The relevance of information policy for information sharing behavior leads to the conclusion that this theoretical direction should be further investigated.

The irrelevance of interorganizational factors for information sharing behavior shows that the analogies between findings on IOS adoption and IOS-based collaboration activities are less important than assumed. This result clearly indicates that IOS adoption, collaboration, and information sharing are conceptually different. This insight implies that much more research is necessary to understand further drivers of information sharing, particularly in the context of interorganizational variables.

Therefore we can identify several implications for future research. As the research model has been tested in a small market in a particular industry, it should be validated in further settings, i.e. other countries, other industries, and other stages within the supply chain. Certainly the rather small sample size is a limitation, thus following research activities should target larger sample sizes. A larger sample size would also allow analyzing whether there are different impact factors between firms that apply IOS and those that do not by splitting the sample into sub-groups. The model itself requires revision concerning potential control variables, such as firm size, stage at the supply chain or role of respondent. Also potential mediating or moderating factors should be considered in the analysis of antecedents of information sharing. For example it is worth considering that perceived benefits mediate the impact of top management commitment on information sharing. The model could also be extended to

continuous versus ad-hoc information sharing that is particularly relevant for strategic information sharing. Finally, international and global issues of information sharing should be considered as they will gain importance with increasing internationalization [25].

8. References

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