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Integration of stakeholders in the innovation process of transportation networks

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Purpose: Transportation networks play an important role in providing reliable and resilient transport solution for their customers. To stay competitive, members of freight forwarding networks use their joint knowledge to innovate. This paper provides information about the influence of commitment on the success factor of integration of stakeholders.

Methodology: To evaluate the influence an online survey was conducted with participants of several transportation networks. The findings of the quantitative study were analysed with the help of the partial least square (PLS) approach.

Findings: The study demonstrates that the attitude-oriented commitment has a positive effect on the integration of stakeholders. Hence the proposed hypothesis of a positive effect was confirmed.

Originality: The presented study provides a guideline for members of transportation networks to precisely ensure that the success factor integration of stakeholders is considered in the innovations process. Furthermore with regard to the success factor the influence of attitude-oriented commitment needs to be involved to enhance the output within the inovation process.

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1 Introduction

Faced with dynamic markets, medium-sized freight forwarders are challenged to create innovative products and processes that will ensure the company's continued survival in a globally operating customer supply chain. At the same time, it is becoming increasingly apparent that freight forwarders are attempting to join together in company networks in order to meet these requirements. This can be attributed to the fact that, given the many influencing factors, this form of cooperation is regarded as the superior organisational structure for overcoming the various challenges presented. (Möller, 2006)

One of the features considered to be a significant advantage for participating haulage companies is that they are given a platform in the network that enables a targeted exchange of knowledge in innovation projects between the stakeholders. It is worth emphasising that it is essential to take the integration of stakeholders into account as a success factor in order to take full advantage of the network and to incorporate all the expertise of the participants.

For a freight forwarding network to achieve this goal, it is crucial that the stakeholders are committed to working together in the business network. Research into success factors considers commitment to be an important factor for targeted success, and the question of what influence commitment has on the integration of stakeholders during the innovation process needs to be investigated.

2 Theoretical background

This chapter provides the necessary theoretical background. As well as a brief description of freight forwarding networks and innovation processes, the factors of stakeholder integration and commitment are presented, followed by the research method and the results.

2.1 Transportation networks

When examining freight forwarding networks, it should first be noted that, according to Sorat's definition, freight forwarders are defined as agents that possess logistics expertise. Transport services, which are responsible for transporting goods from one destination to another, represent one area of logistics expertise. (Sorat, 2005) As such, they hold an important position within the value chain. Figure 1 below illustrates the respective interface to the transport service based on the value creation process of a supply chain. The transport services are depicted by a graphic notation and further emphasise their importance within a globally operating value chain.

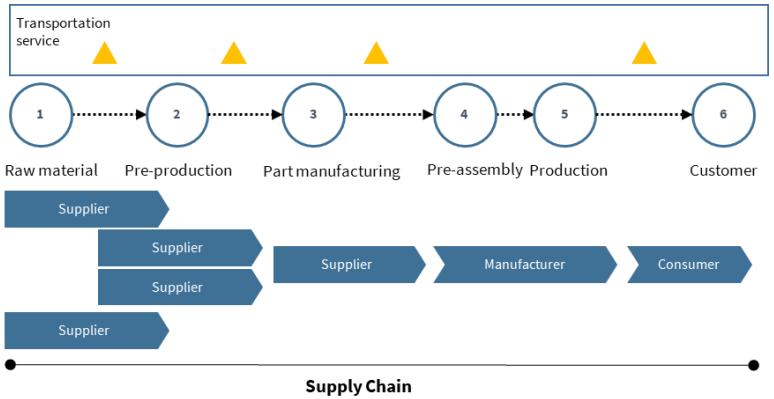

Figure 1: Transport services within the supply chain

With consideration given to the supply chain described above, a wide variety of network structures and process flows are possible. Freight forwarding networks are unique in that they are a cooperation of horizontally oriented companies. These networks are based on the premise of providing logistical services. This situation is explored and illustrated in Figure 2.

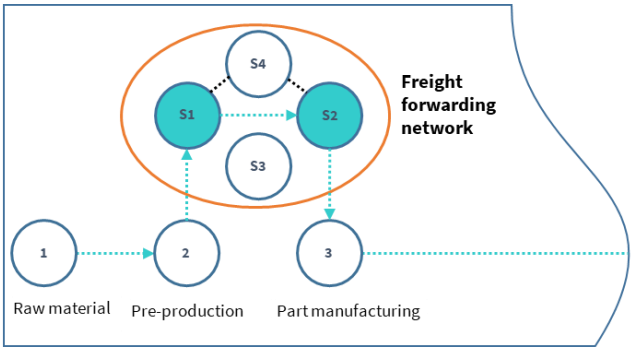

Figure 2: Use of freight forwarding company networks within the value chain

The figure 2 also illustrates that freight forwarding networks systematise the use of resources for the handling of the transport services and that not all network partners necessarily have to be involved in the creation of the service.

2.2 Innovation process

The literature presents a variety of phase models for the innovation process which are characterised by different stages and break down the process of innovation. (Verworn/Herstatt, 2000; Cooper/Kleinschmidt, 1990; Wagner/Busse, 2008, Thom, 1992; Herstatt, 1999) Here it can be inferred that the level of abstraction of the respective phase model is regulated by the number of process steps.

Table 1 illustrates the range of different phase models within innovation process research and clarifies the different approaches.

For this research, the Wagner/Busse innovation process model was used because it relates to logistics innovations. (Wagner/Busse, 2008) The innovation development phase has also been chosen as the frame of reference in order to narrow down the topic.

Table 1: Innovation processes from the literature

Authors	Process steps					
Cooper/ Kleinschmidt (1990), S. 46	Idea	Preliminary Assessment	Definition	Development	Validation	Commercialization
Thom (1992), S. 9	Ideengenerierung			Ideenakzeptierung		Ideenrealisierung
Cooper (2008), S. 215	Discovery	Scoping	Build Business Case	Development	Testing and Validation	Launch
Herstatt (1999), S. 73	Ideengenerierung und Bewertung	Konzepterarbeitung Produktplanung		Entwicklung	Prototypenbau Testing	Produktion Markteinführung
Wagener/ Busse (2008), S. 115	Ideengenerierung und Selektion	Innovationsentwicklung			Realisation	Innovationsprozessentwicklung

2.3 Influence of commitment on the integration of stakeholders

The commitment of the stakeholders to the respective activity is a central aspect of cooperation in business networks. (Morgan/Hunt, 1994) What is crucial in this context is the commitment during the innovation development process.

The term commitment is nevertheless discussed in many different ways and is distinguished in a one-dimensional concept between behaviour-oriented and attitude-oriented approaches. The attitude-oriented commitment approach primarily focuses on the inner attitude of the stakeholders. This approach therefore lends greater weight to the congruence of values and goals of the partners and places the purely economic-rational aspects downstream. (Wallenburg, 2004)

Alongside the importance of commitment, it is necessary to define the integration of stakeholders in order to subsequently determine, on the basis of a hypothesis, what influence each factor has.

Stakeholder integration is primarily concerned with the participation of all relevant stakeholders in the innovation development phase with the aim of creating a harmonious and cooperative attitude among the stakeholders. As a result, communication between partners and the use of resources are crucial for intensifying integration.

From this, the following hypothesis can be assumed regarding the influence of attitude-oriented commitment on the integration of stakeholders.

The greater the attitude-oriented commitment of the stakeholders in freight forwarding company networks, the more comprehensive the integration of stakeholders in a freight forwarding company network will be in the innovation development phase. (Leven, 2022)

Figure 3: The effect of the attitude-oriented commitment on the integration of the stakeholders

3 Methodology and sample description

In order to investigate the impact of commitment on stakeholder integration, an online survey was conducted with the help of a quantitative study over a one-month period, which was sent to various members of freight forwarding networks. The software LimeSurvey was employed as a supporting tool for conducting the online survey.

The sample consists predominantly of medium-sized logistics service providers and the response rate as well as the group of participants illustrate the significance of the topic.

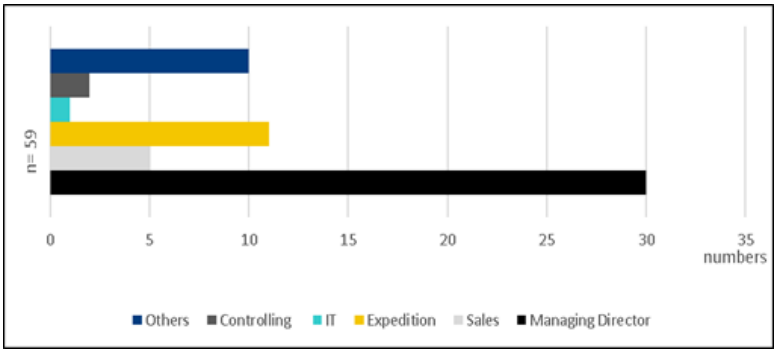

Figure 4: Sample of the survey I

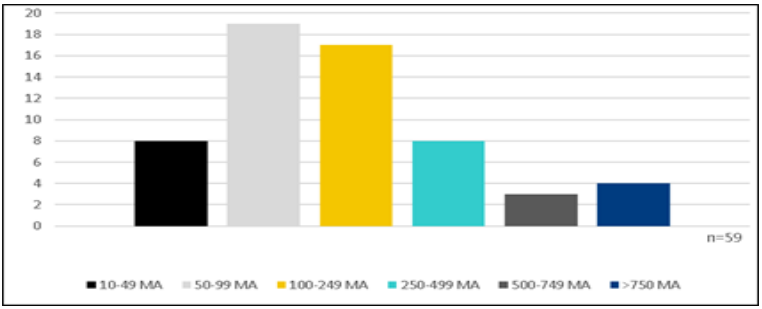

Figure 5: Sample of the survey II

The group of participants is composed of representatives from the various corporate divisions, whereby the importance of the topic is underlined by the number of participating managing directors.

The questions in the questionnaire were coded with a seven-point Likert scale. The scale ranges from Not at all applicable (level 1) to Fully applicable (level 7). This type of coding was subsequently converted into a statistical analysis form. 59 fully assessable questionnaires were evaluated as a result.

A variety of multivariate analysis methods may be used to analyse cause-effect relationships. (Fischer, 2006; Ohlwein, 1999; Rink, 2008; Wallenburg, 2004) Structural equation modelling offers a suitable method for this, as the aim of the procedure is to analyse cause-effect relationships between latent and manifest variables. The number of questionnaires that can be analysed makes the partial least square (PLS) approach particularly suitable as an evaluation method, as it allows for an analysis to be carried out even with a small sample size. Furthermore, this approach can be evaluated with the user-friendly software smartPLS 3 and a model assessment can be performed.

The aim of this research is to make non-measurable variables measurable in order to be able to assess the factors. In order to do this, it is first necessary to operationalise the constructs. In this process, it is possible to develop an adequate measurement model by drawing on already proven measurement models. (Bagozzi, 1992; Weiber/Mühlhaus, 2014; Backhaus/Weiber, 2007) The operationalisation of Siguaw, et al. is used for the

attitude-oriented commitment. (Siguaw, et al., 1998) Nevertheless, attention is paid to the specifics of the application environment and adaptation of the wording is considered.

Table 2: Indication of the construct “attitude-oriented commitment”

Indicator number	Indicator (complete formulation)	Source
C01	We defend the supplier when outsiders criticize the company.	Siguaw et al. (1998)
C02	We are patient with this supplier when they make mistakes which cause us trouble.	
C03	If another supplier offered us better coverage, we would most certainly take them on, even if it meant dropping this supplier.	
C04	We are continually on the lookout for another supplier to replace or add to our current supplier. (R)	
C05	We are willing to dedicate whatever people and resources it takes to grow sales for this supplier.	

The construct of stakeholder integration is also operationalised and made accessible through five indicators. As with the construct of attitude-oriented commitment, various aspects are examined in order to gain a comprehensive picture. These are based on the already proven operationalisation method according to Neubauer. (Neubauer, 2008)

Table 3: Indicators of the construct “Integration of stakeholders”

Indicator number	Indicator (complete formulation)	Source
IN01	The stakeholders of the freight forwarding company network communicated *formally* with each other very frequently during the development phase (i.e. scheduled meetings, regular exchange of forms or reports, existence of written documented rules, etc.).	
IN02	The stakeholders of the freight forwarding company network communicated *informally* with each other very frequently during the development phase (i.e. irregular/unscheduled conversations, etc.).	
IN03	The stakeholders of the freight forwarding company network exchanged information with each other to a large extent during the development phase (e.g. market analyses, technical support).	Neubauer (2008)
IN04	The stakeholders of the freight forwarding company network exchanged resources with each other very often during the development phase (e.g. Financial resources, staff and/or physical work output).	
IN05	During the development phase, the stakeholders of the freight forwarding company network had a high degree of agreement on their goals.	

4 Results

The results of the research are presented below. This is followed by an examination of the measurement models and subsequently an assessment based on the structural equation model. It is important to distinguish between reflective and formative measurement models. This is especially important when considering the different quality criteria that are used for the assessment.

The assessment of content validity is based on the comprehensive literature research and the use of proven operationalisation.

The relevant criteria for assessing the quality of reflective models are also presented. The criteria for the assessments are the Average Variance Extracted (AVE) value and the Composite Reliability (CR) value. Values above 0.5 for the AVE and above 0.7 for the CR value are considered relevant. These have been achieved and can be seen in the table below.

Table 4: Assessment result of the measurement model

Construct	Item	Loading	AVE	CR
Attitude-oriented commitment	C01	0.879	0.625	0.832
	C02	0.767		
	C03	0.713		

The following tables illustrate the different quality criteria for assessing formative measurement models.

Table 5: Assessment result of the measurement model

Construct	Item	VIF value
Integration of stakeholders	IN01	1.362
	IN02	1.038
	IN03	1.578
	IN04	1.570
	IN05	1.417

The Variance Inflation Factor (VIF) is used to test the multicollinearity of formative measurement models. Scores below five are conducive to this, as it must otherwise be assumed that there is a high degree of multicollinearity. (Hair, et al., 2011; Hair, et al., 2014) All indicators fulfil these requirements.

The significance of the individual indicators is examined below. A bootstrapping procedure is carried out to obtain the t-values of the outer weight. Values greater than 1.96 are necessary in order to assume significance. (Hair, et al., 2014) Indicator IN05 meets this criteria. The outer loadings are then also subjected to a bootstrapping procedure for the purpose of inferring the remaining t-values. This reveals that, in addition to IN05, the values IN01 and IN03 also produce the required values.

Table 6: Assement result of the outer weight and loading

Construct	Item	Loading	t-values	Loading	t-values
		Outer Weight		Outer Loading	
Integration of stakeholders	IN01	0.253	0.578	0.565	1.664
	IN02	-0.138	0.405	-0.057	0.153
	IN03	0.216	0.532	0.516	2.084
	IN04	-0.268	0.719	0.354	1.363
	IN05	0.896	2.260	0.930	2.980

In summary, after assessing the quality, it can be assumed that the measurement model is valid and reliable.

Following the presentation of the measurement models, it is useful to assess the structural model. The coefficient of determination R^2 is used to assess the construct. The results show that the Integration of Stakeholders success factor accounts for over 22% of the variance in the construct.

Table 7: Assessment of R^2

Construct	R^2
Integration of stakeholders	0.226

The hypothesis is then tested. The table below summarises the various results. The path co-efficiency and the significance level are indicated. Furthermore, the t-value illustrates the level of significance that can be assumed. (Backhaus, et al., 2011) The effect size f^2 is also shown. The value indicates a moderate effect size. (Chin, 1998) Finally, the notation is used to depict the confirmation of the hypothesis graphically.

Table 8: Path coefficients and significance level of the relationship

Effect relationship of the hypotheses	Path co-efficients	t-value	Significance	f^2	Hypo-thesis result
Attitude-oriented commitment -> Integration of stakeholders	0.465	2.557	<0.05	0.243	✓

5 Discussion

The positive effect of attitude-oriented commitment on the integration of stakeholders can be fundamentally confirmed.

The participants of the study indicate that they display loyalty towards the stakeholders. (C01) At the same time, this does not support the assumption that stakeholders will withdraw their commitment and go elsewhere if a better offer is made. Rather, it was found that the stakeholders would defend members in the face of external criticism and thus contribute to strengthening the cohesion of the network. This behavior can also be seen when stakeholders make mistakes, which suggests that there is a strong bond in this context. (C02)

The provision of resources is also essential for a high level of commitment and the resulting greater integration of stakeholders. It is clear that the stakeholders are using this resource to promote joint growth. (C05)

In addition, it could be confirmed that the integration of stakeholders is strengthened by scheduled meetings and the exchange of targeted information. (IN01) It should also be noted that exchanging information ensures that all stakeholders have the same level of knowledge and thus contributes to progress within the development phase of the innovation process. (IN03) The exchange also ensures that the stakeholders have a high degree of agreement on their goals. (IN05)

This above mentioned factors provide valuable insights on the behavior of the participants from freight forwarding networks during the innovation process. Additionally it demonstrates the linkage as well as the willingness to succeed within an innovations process. Taking into consideration that potential competitors contribute their expertise into the innovation project it demonstrates the potential of the success factor.

6 Limitations and Outlook

The survey is subjected with some limitations with respect to the several connecting factor. Further the sample of the study is concentrated to freight forwarding networks in the area of Germany. Furthermore, the survey was mainly conducted by small and medium-sized enterprises which represent a limitation for the study. Additionally, the participants represent an industry group with a focus onforwarding companies.

These limitation represent the need to conduct further research on quantitative and qualitative level. For instance, further research may also include success factors besides the integration of stakeholders, while transferring the research into another stage of the innovation process. Furthermore the limitation of the sample provides the opportunity to expand the size of the sample as well as the geographic location of the freight forwarding networks. Additionally, future research work should also consider involvement of further operations.

7 Conclusion

The aim of this study was to show the impact of attitude-oriented commitment on the integration of stakeholders. The focus was on the freight forwarding network environment and the development phase of the innovation process.

To do this, theoretical foundations were first developed. This involved taking a closer look at innovation processes and freight forwarding networks. In connection with the innovation process, various flow processes were outlined that divide the innovation process into different stages. A number of different perspectives on freight forwarding networks were presented to illustrate their role within the supply chain.

The influence of commitment on the integration of stakeholders was also theorised, resulting in the development of a hypothesis.

In order to move towards the goal of concretely demonstrating its influence, a structural equation model was created for the hypothesis. A quantitative study was used to interview various stakeholders in freight forwarding networks. The results of the study were then analysed using the smartPLS3 software. The findings of the research confirm the hypothesis that attitude-oriented commitment has a positive effect on the integration of stakeholders. The results were verified by the relevant quality criteria and the efficiency of the individual indicators of the measurement models could be shown. This yields a range of recommendations for action, which are presented in the discussion chapter and reveal, among other things, added value for practical application.

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