A Conceptual Reference Framework for Data-driven Supply Chain Collaboration

Anna-Maria Nitsche[1,2][a], Christian-Andreas Schumann[2] and Bogdan Franczyk[1,3][b]

[1]*Faculty of Economics and Management Science, University of Leipzig, Leipzig, Germany*

[2]*Faculty of Business and Economics, University of Applied Sciences Zwickau, Zwickau, Germany*

[3]*Department of Information Systems, Wrocław University of Economics, Wrocław, Poland*

Keywords: Empirically Grounded Reference Modelling, Supply Chain Collaboration, Digitalisation, Collaborative Enterprise Architecture.

Abstract: This paper presents the preliminary results of the systematic empirically based development of a conceptual reference framework for data-driven supply chain collaboration based on the process model for empirically grounded reference modelling by Ahlemann and Gastl. The wider application of collaborative supply chain management is a requirement of increasingly competitive and global supply networks. Thus, the different aspects of supply chain collaboration, such as inter-organisational exchange of data and knowledge as well as sharing are considered to be essential factors for organisational growth. The paper attempts to fill the gap of a missing overview of this field by providing the initial results of the development of a comprehensive framework of data-driven supply chain collaboration. It contributes to the academic debate on collaborative enterprise architecture within collaborative supply chain management by providing a conceptualisation and categorisation of supply chain collaboration. Furthermore, this paper presents a valuable contribution to supply chain processes in organisations of all sectors by both providing a macro level perspective on the topic of collaborative supply chain management and by delivering a practical contribution in the form of an adaptable reference framework for application in the information technology sector.

1 INTRODUCTION

The global integration of supply chains, continuous population growth and urbanisation put city ecosystems and logistics networks under increasing pressure (Hölderich et al., 2020; Schönberg, Wunder, & Huster, 2018; Witten & Schmidt, 2019) while other mega trends such as the digitalisation and automation of business processes also drive comprehensive changes in the logistics sector, where approximately half of the companies consider themselves to be trendsetters or innovators (Kohl & Pfretzschner, 2018). Thus, cross-industry logistics cooperation for digitalisation (Kohl & Pfretzschner, 2018) and supply chain transparency (Kersten, Seiter, von See, Hackius, & Maurer, 2017; Kersten, von See, S, & Grotemeier, 2020; Zanker, 2018) drive the need for stronger interconnection of and cooperation between companies. Tremendous changes and potential paradigm shifts are expected within the logistics and supply chain sector over the next decade, for instance concerning the influence of technology on physical and information or data flows, new models of cooperation in connected value networks, and autonomous decision-making (Backhaus et al., 2020; Junge, Verhoeven, Reipert, & Mansfeld, 2019). The wider application of collaborative supply chain management (SCM) is driven by multiple factors (Cao, Vonderembse, Zhang, & Ragu-Nathan, 2010) and a high heterogeneity of systems and processes (Glöckner, 2019). Inter-organisational exchange of data and knowledge and sharing are well-known problems and considered to be crucial competitive factors (Backhaus et al., 2020; Gesing, 2017; Junge et al., 2019).

While the relevance of supply chain collaboration (SCC) within logistics and SCM is frequently highlighted in the literature (Cao & Zhang, 2013;

[a] https://orcid.org/0000-0003-3164-5066
[b] https://orcid.org/0000-0002-5740-2946

Nitsche, A., Schumann, C. and Franczyk, B.
A Conceptual Reference Framework for Data-driven Supply Chain Collaboration.
DOI: 10.5220/0010474107510758
In *Proceedings of the 23rd International Conference on Enterprise Information Systems (ICEIS 2021) - Volume 2*, pages 751-758
ISBN: 978-989-758-509-8

Glöckner, 2019; Schönberg et al., 2018; Soosay & Hyland, 2015), a uniform orientation framework for SCC is not available. This position paper thus aims to provide a comprehensive overview of data-driven SCC to facilitate the implementation of inter-organisational data and knowledge exchange. It contributes to the academic debate on collaborative enterprise architecture (EA) within collaborative SCM by providing a conceptualisation and categorisation of data-driven SCC. Furthermore, this paper presents a valuable contribution to supply chain processes in organisations of all sectors by providing a macro level perspective on the topic of collaborative SCM, and by delivering an adaptable reference framework for application in the information technology (IT) sector. The remainder of the position paper presents the research approach and methods, the intended reference modelling approach, and preliminary results.

2 KEY CONCEPTS

SCC is a broad term and can be characterised "as seven interweaving components of information sharing, goal congruence, decision synchronization, incentive alignment, resources sharing, collaborative communication, and joint knowledge creation" (Cao & Zhang, 2013, p.55). Richey, Adams, and Dalela (2012, p.35) define collaboration as "a mutually shared process where two or more firms display mutual understanding and a shared vision, and the firms in question voluntarily agree to integrate human, financial, or technical resources with the aim of achieving collective goals". Barratt (2004) similarly states that a collaborative culture is based on trust, mutuality, information exchange, openness, and communication. Data-driven collaboration means that the collaborative process is prescribed by relevant data structures (D. Müller, Reichert, & Herbst, 2007). In other words, it is determined by, or dependent on, the collection or analysis of data as it is "happening or done according to information that has been collected" (CUP, 2021).

EA is defined as "the organizing logic for business process and IT capabilities reflecting the integration and standardization requirements of the firm's operating model" (CISR, 2016). It supports the complexity management of organisations through the structured description of organisations and their relationships and through communication facilitation for business and IT alignment (Niemi & Pekkola, 2017; Simon, Fischbach, & Schoder, 2014). Collaborative EA attempts to fill the gap caused by the existing lack of collaboration in EA development (Banaeianjahromi & Smolander, 2017).

3 RESEARCH APPROACH & METHODS

Design science research (DSR) has been part of information systems (IS) research under varying terms for at least 30 years (Peffers, Tuunanen, & Niehaves, 2018). Its construction-oriented and problem-solving approach aims at the creation and evaluation of useful IT solutions for organisational problems (Gregor & Hevner, 2013; Hevner, March, Park, & Ram, 2004) and is thus suitable to depict collaborative SCM. This paper intends to contribute a DSR artefact in the form of a model. Based on the typology of reference models (vom Brocke, 2003), the characteristics of the Conceptual Reference Framework for Data-Driven Supply Chain Collaboration are illustrated in Table 1. Reference modelling serves multiple purposes, thus addressing all levels and business fields of enterprises, for example strategic and organisational aspects, the

Table 1: Typology of reference models based on vom Brocke (2003, p.98) with the appropriate categories underlined.

<table>
<tr><th colspan="2">Characteristic</th><th colspan="6">Description</th></tr>
<tr><td rowspan="6">**Model-related**</td><td>Aspect</td><td colspan="3">Aspect-specific</td><td colspan="3">Multi-aspect</td></tr>
<tr><td>Formality</td><td colspan="2">Not formal</td><td colspan="2">Semi-formal</td><td colspan="2">Formal</td></tr>
<tr><td>Subject</td><td colspan="2">Technical concept</td><td colspan="2">Data processing concept</td><td colspan="2">Implementation</td></tr>
<tr><td>Objective</td><td colspan="3">Organisational system model</td><td colspan="3">Application System Model</td></tr>
<tr><td>Sector</td><td>Industry</td><td colspan="2">Trade</td><td colspan="2">SCM</td><td>Other sectors</td></tr>
<tr><td>Task</td><td colspan="2">Support</td><td colspan="2">Purpose</td><td colspan="2">Steering</td></tr>
<tr><td>**Method-related**</td><td>Fulfilment of requirements</td><td colspan="3">Reference model-unspecific</td><td colspan="3">Reference model-specific</td></tr>
<tr><td>**Technology-related**</td><td>Representation</td><td colspan="3">Print</td><td colspan="3">Computer-aided</td></tr>
<tr><td>**Organisation-related**</td><td>Availability</td><td colspan="3">Unpublished</td><td colspan="3">Published</td></tr>
</table>

design of IS, the description of organisations, business process (re-)engineering and knowledge management, and is therefore suitable for this research project (Becker & Delfmann, 2013; Fettke, Loos, & Zwicker, 2007).

The construction of the Conceptual Reference Framework for Data-Driven Supply Chain Collaboration is developed based on the process model for empirically grounded reference modelling suggested by Ahlemann and Gastl (2007) as a deductive approach (Rehse, Fettke, & Loos, 2015), which consists of planning, model construction, validation, practical testing, and documentation (see Figure 1) and has been applied in various contexts (e.g. de Kinderen & Kaczmarek-Hess, 2019). This procedure is chosen to bridge the gap between theoretical and empirical construction methods, as a prevalence of analytical and theoretical concepts over empirically developed reference models is acknowledged (Fettke & Loos, 2004). As phrased by Fettke and Loos (2004, p.338), the "wide gap between theoretical and empirical research in a real science is worrying". Moreover, the process model matches well if the DSR paradigm due to the similarity of the phases and the underlying research principles.

4 THE CONCEPTUAL REFERENCE MODEL

4.1 Phase I: Planning

Phase I of the reference modelling approach based on Ahlemann and Gastl (2007), as illustrated in Figure 1, covers model-related planning, including the problem identification and definition as well as method-related, organisational, technological and project planning. The steps within this phase are based on the four design areas for reference modelling identified by vom Brocke and Fettke (2019): organisation (i.e. the analysis of the organisational environment), model (i.e. the variability of requirements), method (i.e. the selection of the design approach) and technology (i.e. the selection of a technical platform on which model creation, storage, exchange and discourse can be realised).

The model-related planning is concerned with the definition of the reference model domain, which is referred to as the problem definition by Schütte (1998). This step can be done in collaboration with domain experts or potential model users, such as supply chain managers (Ahlemann & Gastl, 2007). Inter-model relationships in the form of compliance with relevant standards and norms such as the SCOR model should also be identified (Ahlemann & Gastl, 2007). Method-related planning is the second component of phase I and is tasked with the selection of appropriate problem-solving and model representation techniques. Representation techniques can be chosen from a large variety of modelling languages and concepts such formal, semi-formal, natural, and graphical languages. As stated above, the modelling approach for the artefact is based on the process model for empirically grounded reference modelling suggested by Ahlemann and Gastl (2007) while natural language is chosen as the representation technique. Organisational planning covers the definition and documentation of a research design, the identification of the experts to be involved in the modelling process as well as the coordination of these activities. Technological planning is concerned with the selection of appropriate technologies to support the modelling process, including the model

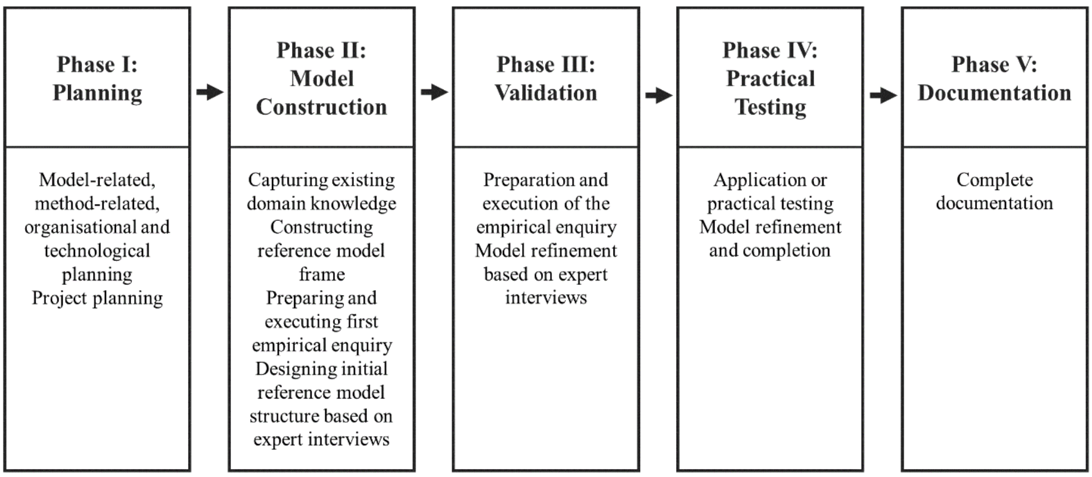

Figure 1: Reference modelling approach based on Ahlemann and Gastl (2007).

construction (i.e. modelling tools or computer-aided software engineering tools), the documentation of the reference model (i.e. text processing systems) and the recording and analysis of the expert interviews (i.e. audio systems) (Ahlemann & Gastl, 2007). The last step of phase I is project planning. A top-down approach for complex tasks has long time been established as suitable to achieve different levels of abstraction (Schütte, 1998). The project planning should include a time and work schedule, a resource plan, and a risk analysis.

4.2 Phase II: Model Construction

The second phase is the model construction phase which comprises capturing existing domain knowledge, constructing the reference model frame, preparing, and executing the first empirical enquiry, and designing the initial reference model structure.

The first step is the analysis of relevant current domain knowledge to ensure the model uniqueness and to incorporate previous research. To capture existing domain knowledge, appropriate sources such as scientific publications or practice reports need to be identified, catalogued, and prioritised (Ahlemann & Gastl, 2007). The modelling approach for the reference framework is based on thorough reviews of the literature.

The subsequent construction of the reference model frame is useful for structuring the expert interviews and for constructing and documenting the reference model. First, general domain knowledge of logistics process and collaboration modelling is used. Apart from the distinction of different levels of focus, E. Müller and Ackermann (2010) propose the modelling of logistics structures using 3-level models and structure types such as production and distribution system, transport system and infrastructure system. Levels of focus are usually the macro level, i.e. the external relations of the network, the meso level, i.e. inter-organisational level, and the micro level, i.e. intra-logistics. Villarreal, Salomone, and Chiotti (2007) suggest that Business to Business (B2B) collaboration necessitates integration at both a business and a technological level. Thus, collaborative business processes need to be specified and modelled for decision-making, setting strategic goals, coordinating actions, and exchanging information. Furthermore, the requirements of inter-organisational collaborations need to be incorporated. These include a global view of the collaboration, enterprise autonomy, the decentralised management of collaborative processes through peer-to-peer interactions and the use of suitable abstractions to model complex communicative actions and negotiations (Villarreal et al., 2007). This also highlights the importance of data-driven collaborative processes. While the model is intended to also include business to customer (B2C) relations, the focus is on business-level interactions.

The reference model frame is depicted in Figure 2 and consists of the agents of a basic 1-tier supply chain: supplier, manufacturer, and customer. Within the individual agents four layers of structure types can be distinguished in the model frame. These are business collaboration system, production and distribution system, transport system, and infrastructure system. Here, infrastructure system

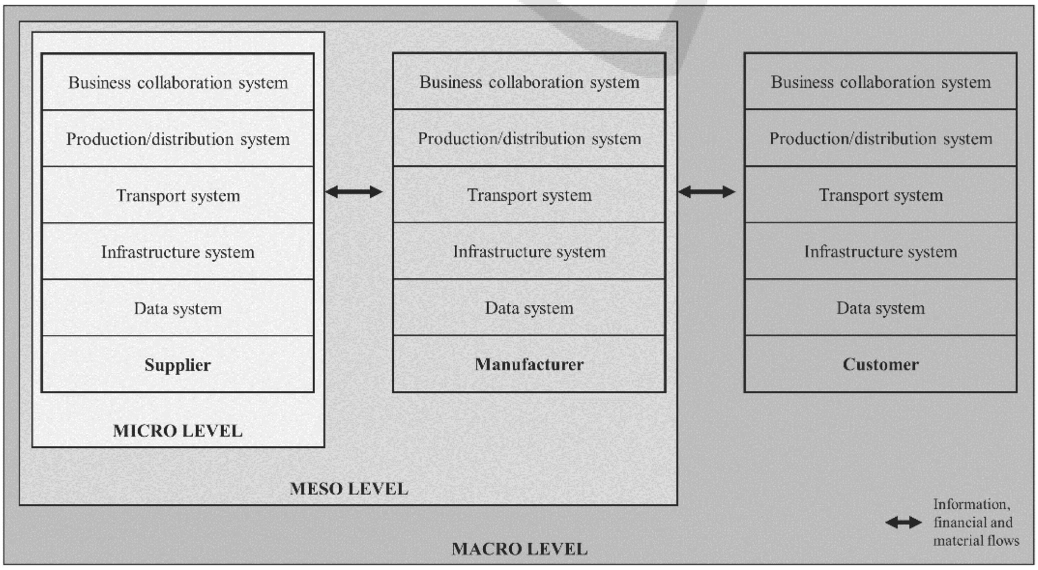

Figure 2: Reference model frame.

also comprises handling and storage processes. The main flows within supply networks are shown as summarised arrows between the individual agents, they comprise information, financial and material flows. The supply chain agents are communicating and collaborating on different levels. A 3-level structure, which is prevalent in logistics and SCM models, is used to illustrate the different levels of collaboration. The micro level is restricted to one agent, in this example the supplier, and thus covers intra-logistical collaborative aspects such as cross-department coordination. The meso level on the other hand describes the relations on an inter-organisational level within the supply chain. For instance, the supplier and manufacturer collaborate on topics such as production planning harmonisation. The third level is concerned with the external relations of the network and takes on a macro perspective regarding collaboration. This could include strategic network decisions such as coopetition or sharing of infrastructure.

During phase II, the first empirical enquiry is prepared and executed to enable the first construction cycle of the reference model based on the experts' domain knowledge. The preparation comprises the identification, examination and selection of interview partners, and the creation of an interview guide.

To acquire experts for the interviews, different sampling techniques are available (Saunders, Lewis, & Thronhill, 2016). Due to the need for the involvement of expert domain knowledge, Ahlemann and Gastl (2007) propose two non-probability techniques, namely chain sampling and anonymous sampling using (mass) media. The approach for this artefact uses homogenous purposeful sampling as described by Saunders et al. (2016), which is similar to chain sampling. To include different perspectives and to achieve a meaningful model, it is recommended to involve several experts (Saunders et al., 2016; Schütte, 1998). While it is generally advised to continue qualitative data collection until data saturation is reached, Saunders et al. (2016) propose minimum sample size relative to the nature of the study. For the construction of the Conceptual Reference Framework for Data-Driven Supply Chain Collaboration, which uses semi-structured in-depth interviews, Saunders et al. (2016) advice the involvement a minimum of a total 10 interviewees (i.e. 5 interviews per cycle). To incorporate both academic and practice-oriented viewpoints and experiences, the intended qualitative sample comprises four scholarly experts and three experts with a practical SCC background from different industries in Germany and the UK. Thus, the empirical inquiry is based on a total of 14 in-depth interviews.

An interview guide can be used to structure the interview. Ahlemann and Gastl (2007) recommend dividing the interview guide into separate sections which cover the model context, the interviewees domain knowledge and specific experience regarding the model as well as the problem domain and the design of the reference model, and the interviewee's person. Here, elements of EA are incorporated into the research project and the interview guide for the first empirical inquiry is structured according to the ARIS concept (Scheer, 1997, 2013) and the St. Gallen approach to business engineering (Österle, 1995; Österle & Blessing, 2005; Österle & Senger, 2011; Winter, 2010). The ARIS concept is a process-oriented framework concept for modelling and implementing reference models that focuses on the following views of a business process: functional, organisational, data and control view. The views' relationships are specified in the control segment. The St. Gallen approach to business engineering was developed in the early 1990s at the Institute for Information Systems at the University of St. Gallen (Österle, 1995) and has been continuously developed (e.g. Österle & Blessing, 2005). It includes principles and methods for the transformation of organisations in the information era and distinguishes between three design levels, namely strategy, organisation, and information system.

Currently, the status of the research project is a finalised preparation of the first empirical enquiry, including the acquisition of experts. All subsequent steps are intended for the months before and directly following the conference as the interviews are scheduled for February/March (first empirical enquiry) and May/June (second empirical enquiry).

Following the first empirical enquiry, the initial reference model structure is designed. Here, established problem solution and representation techniques can be used. The model construction is generally based on five sources of data, namely the interview results, relevant standards and norms, existing research results identified through a literature review, own domain knowledge and other appropriate data sources. As the interview guide is based on EA concepts, the construction of the initial reference model structure is similarly based on these elements. The Conceptual Reference Framework for Data-Driven Supply Chain Collaboration factors in both natural and artificial intelligence as it is intended to incorporate an artificial intelligence toolbox based on findings of literature reviews. This enables supply chain managers and other stakeholders to choose and compare the available artificial intelligence and machine learning tools regarding their specific use context.

4.3 Phase III: Validation

Phase III is the validation phase which consists of the preparation and execution of the second empirical enquiry and the model refinement. In contrast to phases I and II, which are concerned with the model construction, phase III and onwards have the purpose of stabilisation, discussion, and refinement through empirical research (Ahlemann & Gastl, 2007). The lists of correction proposals gathered during each expert interview form the basis for the further model refinement. The integration of conflicting suggestions is a critical aspect of this step and all decisions made in relation to this need to be documented in sufficient detail (Ahlemann & Gastl, 2007).

This research project intends to apply a formative-summative design-evaluate-construct-evaluate pattern based on Sonnenberg and vom Brocke (2012) containing elements of both ex-ante and ex-post evaluation. The evaluation of the model is based on the principles of proper reference modelling, the recommendations for DSR evaluation (Peffers, Rothenberger, Tuunanen, & Vaezi, 2012) and the framework for evaluation in design sciences (Venable, Pries-Heje, & Baskerville, 2016) and uses expert evaluation (Peffers et al., 2012) to judge accuracy, completeness, consistency, generality, level of detail, reliability/robustness, usability/ease of use and effectiveness. For instance, usefulness may be assessed based on the scale of Davis (Prat, Comyn-Wattiau, & Akoka, 2015).

4.4 Phase IV: Practical Testing

Phase IV is tasked with the application or practical testing and the subsequent model refinement and completion. The reference model should ideally be used in an information or organisational system project to increase its acceptance, to further refine and improve the model and to confirm its applicability and practical benefits. The results from the practical application can be used to improve and complete the conceptual model. This phase is intended to apply the Conceptual Reference Framework for Data-Driven Supply Chain Collaboration to a last mile supply chain and logistics network context.

4.5 Phase V: Documentation

A complete documentation is carried out in the fifth and last phase to ensure increased comprehension and validity. Ahlemann and Gastl (2007) recommend a documentation structure comprising a description of the construction process, annotations of model elements, the documentation of empirical elements and a table of model elements. Further publications are planned to realise this phase.

5 CONCLUSIONS

Despite the comprehensive perspective on the research problem provided by the design-oriented approach of this paper, the limitations that relate to the related choices need to be acknowledged. Although the DSR approach contains several useful suggestions, it suffers from significant weaknesses (Zelewski, 2007). While the adopted DSR guidelines necessitate rigorous testing and validation, they themselves do not necessarily meet these requirements. Furthermore, the process model for empirically grounded reference modelling (Ahlemann & Gastl, 2007) is limited regarding its focus on qualitative methods for data generation.

The paper presents the preliminary results of the systematic empirically based development of a Conceptual Reference Framework for Data-Driven Supply Chain Collaboration. The authors intend to complete and evaluate the reference framework following the data collection (phase II). The wider application of collaborative SCM is a requirement of increasingly competitive and global supply networks. Thus, the different aspects of SCC, such as inter-organisational exchange of data and knowledge and sharing can be considered as essential factors for organisational growth. This paper and further development of the research project attempt to fill the gap of a missing overview of this field by providing a comprehensive framework of data-driven SCC. It contributes to the academic debate on collaborative EA within collaborative SCM by providing a conceptualisation and categorisation of SCC. Furthermore, this paper presents a valuable contribution to supply chain processes in organisations of all sectors by both providing a macro level perspective on the topic of collaborative SCM and by delivering a practical contribution in the form of an adaptable reference framework for application in the IT sector.

Future research avenues include the completion, evaluation, and application of the Conceptual

Reference Framework for Data-Driven Supply Chain Collaboration. In addition, quantitative approaches as well as case studies can be used to further develop and refine the framework. Potentially, it could be adapted to other areas where data-driven collaboration could have a positive impact.

ACKNOWLEDGEMENTS

This work was supported by the tax revenues on the basis of the budget adopted by the Saxon State Parliament under Grant SAB/100379142.

REFERENCES

Ahlemann, F., & Gastl, H. (2007). Process Model for an Empirically Grounded Reference Model Construction. In P. Fettke & P. Loos (Eds.), *Reference Modeling for Business Systems Analysis* (pp. 77-97). London: Idea Group Publishing.

Backhaus, A., Grotemeier, C., Jacobi, C., Kille, C., Lehmacher, W., Meißner, M., Stiehm, S. (2020). Logistik 2020: *Struktur- und Wertewandel als Herausforderung*.

Banaeianjahromi, N., & Smolander, K. (2017). Lack of Communication and Collaboration in Enterprise Architecture Development. *Information Systems Frontiers*, 21(4), 877-908. doi:10.1007/s10796-017-9779-6.

Barratt, M. (2004). Understanding the meaning of collaboration in the supply chain. *Supply Chain Management: An International Journal*, 9(1), 30-42. doi:10.1108/13598540410517566.

Becker, J., & Delfmann, P. (2013). *Referenzmodellierung: Grundlagen, Techniken und domänenbezogene Anwendung*: Springer-Verlag.

Cao, M., Vonderembse, M. A., Zhang, Q., & Ragu-Nathan, T. S. (2010). Supply chain collaboration: conceptualisation and instrument development. *International Journal of Production Research*, 48(22), 6613-6635. doi:10.1080/00207540903349039.

Cao, M., & Zhang, Q. (2013). *Supply Chain Collaboration: Roles of Interorganizational Systems, Trust, and Collaborative Culture*. London: Springer-Verlag London.

CISR. (2016). *Enterprise architecture*. Retrieved from https://cisr.mit.edu/content/classic-topics-enterprise-architecture.

CUP. (Ed.) (2021) *Cambridge Dictionary Online*. Cambridge University Press.

de Kinderen, S., & Kaczmarek-Hess, M. (2019). *Multi-level Modeling as a Language Architecture for Reference Models: On the Example of the Smart Grid Domain*. Paper presented at the 2019 IEEE 21st Conference on Business Informatics (CBI).

Fettke, P., & Loos, P. (2004). Referenzmodellierungsforschung. *Wirtschaftsinformatik*, 46(5), 331-340.

Fettke, P., Loos, P., & Zwicker, J. (2007). Using UML for Reference Modeling. In P. Rittgen (Ed.), *Enterprise Modeling and Computing with UML* (pp. 171-202). Hershey, PA: IGI Global.

Gesing, B. (2017). *Sharing Economy Logistics: Rethinking logistics with access over ownership*.

Glöckner, M. (2019). *Foundational Research Artifacts of Cloud Logistics: Development of Selected Artifacts for Virtualizing, Categorizing and Encapsulating Resources and Services of Logistics within Reusable Modules*. Leipzig: Wirtschaftswissenschaftlichen Fakultät der Universität Leipzig.

Gregor, S., & Hevner, A. R. (2013). Positioning And Presenting Design Science Research For Maximum Impact. *MIS Quarterly*, 37(2), 337-355.

Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design Science In Information Systems Research. *MIS Quarterly*, 28(1), 75-105.

Hölderich, P., Weiß, M., Wolff, P., Flammann, M., Micciche, G., Rüdiger, D., & Jarmer, J.-P. (2020). *City-Logistik neu gedacht - Impulse für das Stuttgarter Rosensteinviertel*.

Junge, A. L., Verhoeven, P., Reipert, J., & Mansfeld, M. (2019). *Pathway Of Digital Transformation In Logistics: Best Practice Concepts and Future Developments* (F. Straube Ed. Vol. Special Edition 8). Berlin: Universitätsverlag TU Berlin.

Kersten, W., Seiter, M., von See, B., Hackius, N., & Maurer, T. (2017). *Trends and Strategies in Logistics and Supply Chain Management – Digital Transformation Opportunities*.

Kersten, W., von See, B., S, L., & Grotemeier, C. (2020). *Trends und Strategien in Logistik und Supply Chain Management – Entwicklungen und Perspektiveneiner nachhaltigen und digitalen Transformation*. Retrieved from BVL digital.

Kohl, A.-K., & Pfretzschner, F. (2018). *Logistikmonitor 2018: Der Wirtschaftszweig in Zahlen*.

Müller, D., Reichert, M., & Herbst, J. (2007). *Data-driven modeling and coordination of large process structures*. Paper presented at the OTM Confederated International Conferences" On the Move to Meaningful Internet Systems".

Müller, E., & Ackermann, J. (2010). Modellierung von Logistikstrukturen mittels 3-Ebenen-Modell und Strukturtypen. In W. Delfmann & T. Wimmer (Eds.), *Strukturwandel in der Logistik: Wissenschaft und Praxis im Dialog* (Vol. 5, pp. 274-285). Hamburg: DVV Media Group.

Niemi, E., & Pekkola, S. (2017). Using enterprise architecture artefacts in an organisation. *Enterprise information systems*, 11(3), 313-338.

Österle, H. (1995). *Business Engineering: Prozess-und Systementwicklung* (2nd ed.). Berlin: Springer.

Österle, H., & Blessing, D. (2005). Ansätze des Business Engineering. *HMD*, 42(241), 7-17.

Österle, H., & Senger, E. (2011). Prozessgestaltung und IT: Von der Unternehmens-zur Konsumentensicht. *Controlling & Management*, 55(2), 80-88.

Peffers, K., Rothenberger, M., Tuunanen, T., & Vaezi, R. (2012). *Design Science Research Evaluation*. Paper presented at the International Conference on Design Science Research in Information Systems (DESRIST), Las Vegas, US.

Peffers, K., Tuunanen, T., & Niehaves, B. (2018). Design science research genres: introduction to the special issue on exemplars and criteria for applicable design science research. *European Journal of Information Systems*, 27(2), 129-139.

Prat, N., Comyn-Wattiau, I., & Akoka, J. (2015). A Taxonomy of Evaluation Methods for Information Systems Artifacts. *Journal of Management Information Systems*, 32(3), 229-267. doi:10.1080/07421222.2015.1099390.

Rehse, J.-R., Fettke, P., & Loos, P. (2015). A graph-theoretic method for the inductive development of reference process models. *Software & Systems Modeling*, 16(3), 833-873. doi:10.1007/s10270-015-0490-0.

Richey, R. G., Adams, F. G., & Dalela, V. (2012). Technology and flexibility: enablers of collaboration and time - based logistics quality. *Journal of Business Logistics*, 33(1), 34-49.

Saunders, M., Lewis, P., & Thronhill, A. (2016). *Research methods for business students* (7th ed.). Harlow, UK: Pearson Education Ltd.

Scheer, A.-W. (1997). ARIS - House of Business Engineering: Konzept zur Beschreibung und Ausführung von Referenzmodellen. In J. Becker, M. Rosemann, & R. Schütte (Eds.), *Entwicklungsstand und Entwicklungsperspektiven der Referenzmodellierung* (pp. 3–15). Münster: Institut für Wirtschaftsinformatik, Westfälische Wilhelms-Universität.

Scheer, A.-W. (2013). *Wirtschaftsinformatik: Referenzmodelle für industrielle Geschäftsprozesse* (5th ed.). Berlin: Springer.

Schönberg, T., Wunder, T., & Huster, S. W. (2018). *Urban logistics 2030 in Germany: Stronger together: Keep the Wild West scenario at bay with cooperation*.

Schütte, R. (1998). *Grundsätze ordnungsmäßiger Referenzmodellierung: Konstruktion konfigurations- und anpassungsorientierter Modelle* (Vol. 233). Wiesbaden: Springer-Verlag.

Simon, D., Fischbach, K., & Schoder, D. (2014). Enterprise architecture management and its role in corporate strategic management. *Information Systems and e-Business Management*, 12(1), 5-42. doi:10.1007/s10257-013-0213-4.

Sonnenberg, C., & vom Brocke, J. (2012). *Evaluations in the Science of the Artificial – Reconsidering the Build-Evaluate Pattern in Design Science Research*. Paper presented at the International Conference on Design Science Research in Information Systems (DESRIST), Las Vegas, US.

Soosay, C. A., & Hyland, P. (2015). A decade of supply chain collaboration and directions for future research. *Supply Chain Management: An International Journal*, 20(6), 613-630. doi:10.1108/scm-06-2015-0217.

Venable, J., Pries-Heje, J., & Baskerville, R. (2016). FEDS: a Framework for Evaluation in Design Science Research. *European Journal of Information Systems*, 25(1), 77-89. doi:10.1057/ejis.2014.36.

Villarreal, P. D., Salomone, E., & Chiotti, O. (2007). Modeling and Specification of Collaborative Business Processes. In P. Rittgen (Ed.), *Enterprise Modeling and Computing with UML* (pp. 13-44). Hershey, PA: IGI Global.

vom Brocke, J. (2003). *Referenzmodellierung: Gestaltung und Verteilung von Konstruktionsprozessen*. Berlin: Logos Verlag Berlin.

vom Brocke, J., & Fettke, P. (2019). *Referenzmodellierung*. Retrieved from https://enzyklopaedie-der-wirtschaftsinformatik.de/wi-enzyklopaedie/lexikon/daten-wissen/Informationsmanagement/referenzmodellierung/index.html?searchterm=referenzmodell.

Winter, R. (2010). *Business engineering navigator: Gestaltung und Analyse von Geschäftslösungen" Business-to-IT"*: Springer-Verlag.

Witten, P., & Schmidt, C. (2019). Globale Trends und die Konsequenzen für die Logistik der letzten Meile. In M. Schröder & K. Wegner (Eds.), *Logistik im Wandel der Zeit – Von der Produktionssteuerung zu vernetzten Supply Chains* (pp. 303-319). Wiesbaden: Springer Gabler.

Zanker, C. (2018). *Branchenanalyse Logistik: Der Logistiksektor zwischen Globalisierung, Industrie 4.0 und Online-Handel*.

Zelewski, S. (2007). Kann Wissenschaftstheorie behilflich für die Publikationspraxis sein? Eine kritische Auseinandersetzung mit den "Guidelines" von Hevner et al. In F. Lehner & S. Zelewski (Eds.), *Wissenschaftstheoretische Fundierung und wissenschaftliche Orientierung der Wirtschaftsinformatik* (pp. 71-120). Berlin: GITO mbH Verlag.