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THE IMPACT OF DECISION MAKING PROCESS MATURITY ON DECISION MAKING EFFICIENCY

DOCTORAL THESIS

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SUBFIELD: BUSINESS MANAGEMENT

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ANNOTATION

Purpose: Decision making can be considered as a core part of management science and management practice. However, there still is a lack of understanding as to which major success factors in the decision making process will ultimately lead to better decision making outcomes. In this context, the thesis investigates the impact of the major success factors in the decision making process, defined as the **decision making process maturity**, on the decision making outcomes, defined as the **decision making efficiency**, by focusing on the strategic supplier selection process in manufacturing enterprises as an exemplary task of decision making in business management. Moreover, this research analyses the moderating effects of **company-internal determinants** in the strategic supplier selection process.

Research Design/Approach: The thesis is grounded in the notion of "critical rationalism" which implies that the stepwise deduced theoretical framework has to be tested in an empirical environment. The empirical evidence is gained through a laboratory experiment and through a field study with manufacturing enterprises. Furthermore, the author has executed a variety of statistical procedures by using state of the art software technology (e.g., structural equation modelling).

Findings: The main findings of this research support the basic hypothesis that there is a significant impact of **the decision making process maturity** on the **decision making efficiency** in the strategic supplier selection process. The applied statistical procedures provide significant evidence in support of this claim: The laboratory experiment shows a significant impact of the **decision making process maturity** on the ***decision making economic efficiency*** and a highly significant impact on the ***decision making socio-psychological efficiency.*** Likewise, the field study indicates a highly significant impact of the **decision making process maturity** on the ***decision making economic efficiency*** and a highly significant impact on the ***decision making socio-psychological efficiency***. Surprisingly, the tested **company-internal determinants** such as the ***manager´s experience***, ***manager´s education***, and ***company´s reward initiatives*** did not significantly affect the strategic supplier selection process.

Originality/Value: The author creates a new construct of the **decision making process maturity**, which goes beyond actual state of the art concepts, and introduces a holistic approach to measure the **decision making efficiency** as well. Furthermore, the thesis contributes to the research on descriptive decision making theory by focusing on the strategic supplier selection process in manufacturing enterprises, where empirical research is particularly scarce.

Keywords: decision making, decision making process maturity, decision making efficiency, strategic supplier selection process.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of variance
AVE	Average variance extracted
CBA	Cronbach´s alpha
CR	Composite reliability
DMDET	Company-internal determinants of the decision making process
DMDETCRI	Company-internal determinant company´s reward initiatives
DMDETMED	Company-internal determinant manager´s education
DMDETMEX	Company-internal determinant manager´s experience
DME	Decision making efficiency (dependent variable/latent endogenous variable)
DMEE	Decision making economic efficiency (dependent variable/latent endogenous variable)
DMEE_x	Decision making economic efficiency (indicator)
DMPM	Decision making process maturity (independent variable/latent exogenous variable)
DMPMHEUR_x	Decision making process maturity heuristics application (indicator)
DMPMINF_x	Decision making process maturity information orientation (indicator)
DMPMORG_x	Decision making process maturity organisation (indicator)
DMPMTO_x	Decision making process maturity target orientation (indicator)
DMSPE	Decision making socio-psychological efficiency (dependent variable/latent endogenous variable)
DMSPE_x	Decision making socio-psychological efficiency (indicator)
f^2	Effect size
HTMT	Heterotrait-Monotrait Ratio
OT	Organisational theory
PLS(-SEM)	Partial least squares(-structural equation modelling)
Q^2	Predictive relevance
R^2	Coefficient of determination
SEM	Structural equation modelling
VIF	Collinearity statistics
γ_x	Path coefficient between the exogenous and the endogenous variable
δ_x	Residual (value) related to an indicator of an independent variable
ε_x	Residual related to an indicator of a dependent variable
ζ_x	Residual related to an endogenous variable
λ_x	(Factor) loadings

INTRODUCTION

Topic Relevance

Decision making can be considered as a core part of management science and management practice. Thereby, the investigation of decision making in business management has been an active area of research in recent decades resulting in a multitude of valuable findings by focusing on decision making heuristics, decision making biases, human characteristics in the decision making process, individual/collective decision making approaches, etc. However, there still is a lack of understanding as to which major success factors in the decision making process will ultimately lead to better decision making outcomes.

In this context, this thesis is primarily focusing on the strategic supplier selection process in manufacturing enterprises as an exemplary task of decision making in business management. The literature review has revealed that both, theoretical conceptions[1] and empirical studies[2] describe the strategic supplier selection process as one of the main possibilities for manufacturing enterprises to gain sustainable competitive advantage.

However, the literature review also shows that the theoretical foundation of the major success factors in the decision making process, respectively the major success factors in the strategic supplier selection process, can be perceived as very limited and incomplete. In addition, only very few empirical studies exist. So far, mainly due to the variety of potential success factors, most of the identified research studies tend to focus only on one specific success factor in the strategic supplier selection process e.g., the use of appropriate selection criteria,[3] which of course limits the applicability of the established research results. Others recommend the use of mathematical models[4] in order to increase the decision making outcomes which often cannot resist practical tests due to their various model-based restrictions. Nevertheless, the described shortcomings of the unidimensional and/or mainly normative-based state of the art concepts must be regarded as an additional research gap.

[1] Porter (1980), pp. 3–29, Prahalad & Hamel (2006), p. 275, Pütz (2005), p. 6.

[2] Rink & Wagner (2007b), p. 39. Aguezzoul & Ladet (2007), p. 157, Glock (2010), p. 95.

[3] Sen et al. (2008), pp. 1825–1845, Sarode et al. (2010), pp. 20–27.

[4] E.g. Aguezzoul & Ladet (2007), pp. 157–158, Janker (2008), Irlinger (2012), pp. 135–137.

Moreover, there is a tremendous need for developing a more application-oriented theory of decision making in business management which can only be achieved by focusing on the decision making process, on the (specific) application, and on the decision making outcomes.[5]

Summarised, there is a clear need to conduct more holistic and therefore systematically-deduced, empirically-based research in this area. Therefore, this thesis will investigate the impact of the major success factors in the decision making process, defined as the **decision making process maturity**, on the decision making outcomes, defined as the **decision making efficiency**, by focusing on the strategic supplier selection process in manufacturing enterprises.

In addition, the author will analyse the impact of situational influencing factors on the proposed relationship between the **decision making process maturity** and the **decision making efficiency** which will be described by the moderating effects of the **company-internal determinants**.

In sum, this innovative approach will contribute to the further development of decision making theory and provide tremendous potential for the future improvement of the strategic supplier selection process in manufacturing enterprises to ensure sustainable growth and long-term competitive advantage.

Purpose

The main purpose of this thesis is to substantiate the relationship between the **decision making process maturity** and the **decision making efficiency**. The theoretical construct and the empirical results are supposed to contribute to the further development of decision making theory and decision making practice as well.

Objective

This thesis investigates the impact of the major success factors in the decision making process, defined as the **decision making process maturity**, on the decision making outcomes, defined as the **decision making efficiency,** exemplified by the strategic supplier selection process in manufacturing enterprises. Furthermore, this thesis analyses the moderating effects of the **company-internal determinants**, in particular the ***manager´s experience***, the ***manager´s education***, and the ***company´s reward initiatives***, on the proposed relationship between the **decision making process maturity** and the **decision making efficiency.**

[5] Wild (1982), pp. 28–31.

Tasks to achieve the research objective

To achieve the previously defined objectives of this thesis, the author will have to conduct the following tasks:

1. The author will analyse theoretical concepts and fundamental organisational theories of decision making in business management with a particular focus on the strategic supplier selection process in manufacturing enterprises. The author will perform three structured content analyses by focusing on research-subject-related studies from 1972 to 2016 in order to create the conceptual framework in which this research is grounded. These analyses will be divided into the literature review on concepts and measures of the **decision making process maturity**, the **decision making efficiency**, and the **company-internal determinants**.
2. The findings from the theoretical analyses and the results from the conceptual framework will be used to formulate the basic hypothesis, to develop the model framework, and to define the sub-hypotheses of the research model. For testing the hypothetical cause-effect relationships, the author will select and develop an appropriate research methodology and research design.
3. In the first empirical study, the author will conduct a laboratory experiment in order to investigate the cause-effect relations in the strategic supplier selection process within a controllable environment. The developed questionnaire and the preliminary results of the laboratory experiment will be analysed, evaluated, pre-tested, and developed further by specialists working in the field of strategic supplier selection processes, in order to ensure their applicability in the following field study. In the second empirical study, the author will conduct a field study by directly contacting supply managers in manufacturing enterprises.
4. The collected data will be analysed by executing a variety of statistical procedures (e.g., normal distribution tests, confidence intervals, correlation analyses, regression analyses, non-parametric group comparison tests, and structural equation modelling) by using state of the art software technology.
5. Finally, the author will derive implications the optimisation of decision making in business management, exemplified by the strategic supplier selection process in manufacturing enterprises. Moreover, the author will work out recommendations for future fields of decision making research and highlight possible directions that can be of relevance to practitioners, universities, and governmental institutions.

Research object

Manufacturing enterprises

Research subject

The decision making process exemplified by the strategic supplier selection process

Hypotheses and research questions

From the analyses in the topic relevance section, the following research questions arise:

1. What are the major success factors of decision making in business management, exemplified by the strategic supplier selection process, in order to develop a latent construct of the **decision making process maturity**?
2. Which holistic measurement concept can be used to evaluate the decision making outcomes, defined as the **decision making efficiency**, exemplified by the strategic supplier selection process?
3. Can **company-internal determinants** influence the decision making process exemplified by the strategic supplier selection process?

Based on these three research questions, the basic hypothesis is proposed as follows:

> **H_B:** There is a significant relationship between the **decision making process maturity** and the **decision making efficiency** in the strategic supplier selection process.

Consequently, more detailed sub-hypotheses will have to be formulated in course of this investigation.

Methodology

For the purpose of ensuring the research novelty and importance, as well as in an attempt to reduce the previously-identified research gap the author has conducted an in-depth literature analyses on the state of the art in research-subject-related literature and completed this bulk of research studies with additional explorative semi-structured interviews.

Moreover, the author used meta-search-queries to identify research-relevant studies in scientific databases for the structured content analyses. The author focused on decision making behaviour-oriented studies in the timeframe from 1972 to 2016 in order to create the conceptual framework of this research. Thereby, the structured content analyses included research-subject-related studies from various related research areas (e.g., strategic management, logistics, supply chain management, and production management).

The first empirical evaluation of this thesis is based on the findings from a laboratory experiment with 117 participants. The questionnaire developed and the preliminary results of the laboratory experiment were analysed, evaluated, and pre-tested by 23 specialists working in the field of strategic supplier selection processes.

In the second empirical study, the author used three membership directories to contact 3,949 supply managers from European manufacturing enterprises, resulting in 139 valid responses.

The data collected was analysed by applying a variety of statistical procedures (e.g., normal distribution tests, confidence intervals, correlation analyses, regression analyses, group comparison tests, and structural equation modelling) by using state of the art software technology (IBM® SPSS® Statistics v.24 and SmartPLS® v.3.2.3).

Scientific novelty of the research

The scientific novelty of research is accomplished by concerning the following elements:

1. Development and detailed structuring of a comprehensive cause-effect model of **decision making process maturity** and **decision making efficiency**, exemplified by the strategic supplier selection process in manufacturing enterprises. The developed theoretical cause-effect model goes beyond actual state of the art concepts by identifying various measureable elements of the **decision making process maturity** and of the **decision making efficiency** as well.
2. Empirical substantiation of the impact of varying degrees of **decision making process maturity** on varying **decision making efficiency** variables, thus confirming the theoretical cause-effect model outline. The empirical findings were corroborated by a triangulated combination of empirical research designs. This research combines empirical evidence from a laboratory experiment, evaluations by specialists working in the field of strategic supplier selection processes, and a field study, thereby incorporating findings from a variety of industrial branches in Europe where empirical research is particularly scarce.
3. Provision of a new combination of theoretical constructs and empirical substantiation of the design of successful composition, temporal, personal, and content-related organisation of efficiency-oriented decision making processes exemplified by the strategic supplier selection process in manufacturing enterprises, also in a practical focused intention.
4. Provision of an empirically-confirmed framework for training initiatives (i.e. for supply managers in manufacturing enterprises) based on the investigated and corroborated

major success factors in the strategic supplier selection process, identified as the constitutional elements of the **decision making process maturity**.

Research limitations

This thesis mainly focuses on the impact of the **decision making process maturity** on the **decision making efficiency** exemplified by the strategic supplier selection process in manufacturing enterprises. The **decision making efficiency** consists of the ***decision making economic efficiency***, operationalised as the supplier performance by using cost-, time- and quality-based measures, and the ***decision making socio-psychological efficiency***, operationalised as the decision maker´s satisfaction concerning both the decision making process as well as the final decision itself. However, this research does not address the overall impact of **decision making process maturity** on the companies´ performance.

Moreover, this research centres on the individually performed strategic supplier selection process, and therefore group processes are not considered. Furthermore, this thesis is limited to the industrial sector of manufacturing enterprises. As such, it primarily focuses on European companies and mainly includes relevant insights from research studies conducted in the timeframe 1972-2016.

Approbation of research results

a) Conferences

The author has presented the findings of this thesis to the scientific community in the following national and international conferences, doctoral colloquia, and research workshops:

1. Woschank, M.: **Supply Chain Performance and Knowledge Management: A Theoretical Framework to Increase the Supply Chain Performance in Multiple Supply Chains**, Global Business Management Research Conference "Recent Developments in Business Management Research", 02.-04.12.2011, Fulda (Germany)
2. Woschank, M.: **A Critical Reflection of Professional Internships and Trainee Programs: SCM and Inventory Management Optimization**, 1st International University-Industry Partnership Conference, 02.-05.02.2012, Pompano Beach (U.S.A)
3. Woschank, M.: **The Impact of Increased Effectiveness in Logistics Planning Operations on Logistics Performance**, New Challenges of Economic and Business Development - 2012, 10.-12.05.2012, Riga (Latvia)
4. Woschank, M.: **Logistics Efficiency: A Planning Based Approach to Logistics Excellence**, International Business & Economics Conference “Innovative Approaches

of Management Research for Regional and Global Business Development", 03.-05.08.2012, Kufstein (Austria)

5. Woschank, M.: **Logistics Planning – Theoretical Investigation, Model Development**, Research Design, LU 71th Conference, 30.01.2013, Riga (Latvia)
6. Woschank, M.: **Logistics Planning: An Organizational Theory Based Approach to Logistics Excellence**, 15th Facility & Real Estate Management Congress "Ph.D. Thesis Session", 06.-08.02.2013, Kufstein (Austria)
7. Woschank, M.: **Logistics Management in a Hyper-Dynamic Environment**, New Challenges of Economic and Business Development - 2013, 09.-11.05.2013, Riga (Latvia)
8. Neuert, J.; Hoeckel, C.; Woschank, M.: **Measuring Rational Behaviour and Efficiency in Management Decision Making Processes – Theoretical Framework, Model Development and Preliminary Experimental Foundations - Part 1**, Academy of Business Administration "2013 International Conference", 14.-17.03.2013, Lisbon (Portugal)
9. Woschank, M.: **A Comprehensive Review on Theoretical Approaches in Logistics and Supply Chain Management**, International Business & Economics Conference Scientific Days FH Kufstein Tirol "Current Approaches of Modern Management and Strategy Research", 29.-30.11.2013, Kufstein (Austria)
10. Woschank, M.: **A Theoretical Investigation on the Critical Success Factors (CSF) in Supply Chain Management Decision Making**, LU 72th Conference, 05.02.2014, Riga (Latvia)
11. Woschank, M.: **A Theoretical Investigation on the Optimization of Cooperative Networks: Using Laboratory Experiments in Supply Chain Management Research**, Strategic Interdisciplinary Research Agenda Workshop "Tackling Logistics Challenges of Tomorrow", 18.03.2014, Brussels (Belgium)
12. Neuert, J.; Hoeckel, C.; Woschank, M.: **Measuring Rational Behaviour And Efficiency in Management Decision Making Processes – Theoretical Framework, Model Development and Preliminary Experimental Foundations - Part 2**, 14th Annual Hawaii International Conference on Business, 22.-25.05.2014, Hawaii (U.S.A.)
13. Woschank, M. & Zsifkovits, H.: **Der Einsatz von Prognosemethoden in der Logistik: Eine Metaanalyse von theoretischen Konzepten und empirischen Befunden**, 2. Wissenschaftlicher Industrielogistik-Dialog „2nd Scientific Industrial Logistics Conference", 25.-26.09.2014, Leoben (Austria)

14. Neuert, J. & Woschank, M.: **The Logic of Planning and Decision Making Behaviour in Business Management - Scientific, Praxeological, and Pedagogical Implications from an Experimental Investigation into Decision Making Rationality and Decision Making Efficiency**, Western Decision Sciences Institute "44th Annual Meeting", 31.03.-03.04.2015, Hawaii (U.S.A.)
15. Woschank, M. & Neuert, J.: **Decision making process maturity and Decision Making Efficiency in Strategic Supplier Selection Decisions – Theoretical Framework and Empirical Evidence (LabEx)**, Applied Business and Entrepreneurship Association "12th Annual Meeting", 16.-21.11.2015, Hawaii (U.S.A.)
16. Neuert, J. & Woschank, M.: **Business Simulations as Instruments for Business Management Education and Research: Conceptual, Methodical and Didactical Implications**, Academy of Business Administration "2015 International Conference", 03.-07.08.2016, Prague (Czech Republic)
17. Neuert, J.; Neuert, A.; Woschank, M.: **Ex-Post Rationalisation in Business Decision Making: Objective Performance and Subjective Satisfaction**, The Western Decision Science Institute "WDSI 2017 Annual Meeting", 04.-08.04.2017, Vancouver (Canada)
18. Neuert, J.; Neuert, A.; Woschank, M.: **Socio-economic Analyses of the "Co-Integrative Mediation" – Model in Conflict Management Processes: Findings from a Laboratory-based Experimental Evaluation Study**, The Western Decision Science Institute "WDSI 2017 Annual Meeting", 04.-08.04.2017, Vancouver (Canada)
19. Neuert, J.; Zsifkovits, H.; Woschank, M.: **Decision Making Behaviour and Decision Making Efficiency – Theoretical Framework, Model Development, and Preliminary Empirical Evidence from a Laboratory Experiment**, Jahrestagung der GfeW 2017, 18.-20.09.2018, Kassel (Germany)
20. Neuert, J.; Neuert, A.; Woschank, M.: **Decision Making Behaviour as an Interplay of Value-Orientation and Economic Reasoning**, The Western Decision Science Institute "WDSI 2018 Annual Meeting in Kauai", 03.-06.04.2018, Kauai (U.S.A.)
21. Neuert, J.; Neuert, A.; Woschank, M.: **Epistemological and Methodological Considerations of Socio-economic Decision Making Research - Some Conjectures and Refutations -**, The Western Decision Science Institute "WDSI 2018 Annual Meeting in Kauai", 03.-06.04.2018, Kauai (U.S.A.)

b) Publications

In addition to the conferences listed above, the author has published the following papers and chapters in peer-reviewed and ranked journals and edited volumes:

1. Woschank, M.: **The Impact of Increased Effectiveness in Logistics Planning Operations on Logistics Performance**, Conference Proceedings: New Challenges of Economic and Business Development - 2012, 2012, pp. 782-800, Riga (Latvia)
2. Woschank, M.; Magnet, C.; Hunschofsky, H.: **Verbesserung der Unternehmensplanung durch makroökonomische Analysen – Ansatz zur Erhöhung der Planungsqualität durch die Einbeziehung von gesamtwirtschaftlichen Indikatoren**, WINGbusiness „Journal of Engineering Economics“, 2012, 45 (3/12), pp. 6-9, Graz (Austria)
3. Hunschofsky, H.; Magnet, M.; Woschank, M.: **Besser geplant – Ein Ansatz zur Erhöhung der Planungsqualität und Rentabilität ist die Einbindung von gesamtwirtschaftlichen und branchenspezifischen Indikatoren**, Mayr, O. & Staberhofer, F. (eds.): Fast Forward - Die Wirtschaft von morgen, 2013, pp. 50-55, Hohenems et al. (Austria)
4. Woschank, M. & Zsifkovits, H.: **Der Einsatz von Prognosemethoden in der Logistik: Eine Metaanalyse von theoretischen Konzepten und empirischen Befunden**, Zsifkovits, H. & Altendorfer-Kaiser, S. (eds.): Logistische Modellierung - 2. Wissenschaftlicher Industrielogistik-Dialog in Leoben (WiLD II), 2014, pp. 123-133, Mering et al. (Germany)
5. Neuert, J. & Woschank, M.: **The Logic of Planning and Decision Making Behaviour in Business Management: Scientific, Praxeological, and Pedagogical Implications from an Experimental Investigation into Decision Making Rationality and Decision Making Efficiency,** Contemporary Approaches of International Business Management, Economics and Social Research, 2014, 1, pp. 39-55, Berlin (Germany)
6. Woschank, M.: **The Importance of Knowledge Management in Logistics Processes: Theoretical Framework and Preliminary Model Development**, Contemporary Approaches of International Business Management, Economics and Social Research, 2014, 1, pp. 154-159, Berlin (Germany)

7. Neuert, J.; Hoeckel, C.; Woschank, M.: **Measuring Rational Behaviour and Efficiency in Management Decision Making Processes: Theoretical Framework, Model Development and Preliminary Experimental Foundations**, British Journal of Economics, Management & Trade, 2015, 5 (3), pp. 299-318, London et al. (United Kingdom)
8. Neuert, J. & Woschank, M.: **Ex-Post Rationalisation in Business Decision Making: Objective Performance and Subjective Satisfaction**, Journal of Organizational Psychology, 2017, 17 (4), pp. 102-111, Seattle et al. (U.S.A)
9. Neuert, J. & Woschank, M.: **Socio-economic Analyses of the "Co-Integrative Mediation" – Model in Conflict Management Processes: Findings from a Laboratory-based Experimental Evaluation Study**, Journal of Organizational Psychology, 2017, 17 (5), pp. 139-146, Seattle et al. (U.S.A)
10. Woschank, M.: **Mehrdimensionale Optimierung von Logistikprozessen: Steigerung der Informationsqualität und weitere Ansätze zur Erhöhung der Prozesseffizienz**, Montanuniversität Leoben – WerWasWo Forschung @ MUL, 2017, p. 240, Leoben (Austria)
11. Scharrer, B.; Neuert, J.; Woschank, M.: **Gender Differences and the Influence of a Code of Conduct on Individual Ethical Decision Making at Work: A Comparison of German/Austrian and Chinese Employees**, Journal of Organizational Psychology, 2018, 18 (2), pp. 1-11, Seattle et al. (U.S.A)
12. Scharrer, B.; Neuert, J.; Woschank, M.: **Impact of Ethnicity on an Employee`s Readiness to Comply with a Code of Conduct: Differences between German/Austrian and Chinese Employees**, Journal of Applied Business and Economics, 2018, 20 (3), pp. 1-10, Seattle et al. (U.S.A)

Content and structure of the thesis

The introduction addresses the relevance of the research, the research gap, the problem statement, and the overall purpose and structure of this thesis.

In the first chapter of this thesis, the author develops the theoretical foundation and analyses fundamental organisational theories of decision making in business management exemplified by the strategic supplier selection process in manufacturing enterprises. The key terminology used throughout is defined and the theoretical framework is deduced by using descriptive decision making theory.

In the second chapter, the author creates the conceptual framework of this thesis by conducting three structured content analyses. For this purpose, research relevant literature on the **decision making process maturity**, the **decision making efficiency**, and on **company-internal determinants** was carried out.

In third chapter of the thesis, the author develops the research model, including a basic hypothesis and the underlying sub-hypotheses and introduces the research methodology and research design for the two empirical studies. Furthermore, the author systematically analyses the findings as derived from the two empirical studies by evaluating the descriptive results, the model assessment, the structural analyses, and finally by testing the proposed hypotheses. Moreover, this chapter comparatively evaluates the findings from the two empirical studies and concludes with the main implications and limitations of this thesis.

The last section of this thesis contains the conclusions and recommendations for practitioners, academics, and governmental institutions based on the hypotheses, the research questions, the propositions, and the overall objectives of this research.

1. THEORETICAL ANALYSES OF DECISION MAKING IN BUSINESS MANAGEMENT EXEMPLIFIED BY THE STRATEGIC SUPPLIER SELECTION PROCESS IN MANUFACTURING ENTERPRISES

In the first chapter, the author develops the theoretical foundation for this thesis. Therefore, the author outlines the basic theory and terminology of decision making in business management with a specific focus on the strategic supplier selection process in manufacturing enterprises. The second part of this chapter focuses on the development of the theoretical framework based on the evaluation of research-subject-related organisational theories due to their applicability to the field research. Finally, this chapter tackles the application the descriptive theory of decision making and further aspects of the concept of the situational theories, in order to create a substantial theoretical foundation of this thesis. In the end, the theoretical analyses of this thesis form the basis for the investigation of the major success factors in the decision making process, defined as the **decision making process maturity**, the evaluation of decision making outcomes, defined as the **decision making efficiency**, and the situational influencing factors, defined as **company-internal determinants**.

1.1. THEORY AND TERMINOLOGY OF DECISION MAKING WITH A SPECIFIC FOCUS ON THE STRATEGIC SUPPLIER SELECTION PROCESS

In general, decision making can be regarded as a core-element of management theory and management practice. Moreover, decision making can be defined as the target-oriented and information-processing-based selection of a preferred solution among a set of more or less equal alternatives.[6] Thereby, the most important characteristics of decision making in business management can be summarised as follows:[7]

- It can be seen as a process that lasts over a certain period of time rather than as an intermittent choice,
- it requires the existence of (two or more) alternatives,
- it ends with the final decision by selecting the preferred solution,
- it is based on an action which is oriented towards a certain target or target-system,
- it is connected to a specific purpose respectively it is used in order to solve a specific problem-situation in the (near or far) future, and

[6] Pfohl (1977), pp. 17–19.

[7] Gzuk (1975), pp. 17–18.

- it is primarily based on human-interaction and requires a certain degree of self-involvement, respectively a certain degree of dependency from decision making outcomes.

In order to achieve a more precise understanding of decision making in business management it is necessary to apply a process-oriented approach. In this context, literature has developed a myriad of generic decision making models which basically can be categorised to three-stage, four-stage, five-stage, and six-stage models.[8] For example, generic decision making models for were developed by Wild, Adam, Laux, Pfohl, and Grüning.[9] Thereby, it should be remarked that based on the empirical investigations of Witte et al., the individual phases of the decision making process will be processed multiple times, nonlinear, and more or less intensively in the course of the decision making procedures.[10] However, in the course of this thesis, the author will refer to the "Brim-Glass-Lavin-Goodman stage process of the decision making". This generic decision making process model was frequently used in empirical investigations and consists of the following six steps:[11]

1. The identification of the problem,
2. the attainment of necessary information,
3. the production of possible solutions,
4. the evaluation of possible solutions,
5. the selection of a strategy for performance, and
6. the final decision (i.e. the actual performance of an action or actions).

This thesis focuses on the strategic supplier selection process as a specific type of decision making in business management. Therefore, the author will briefly outline the theory and terminology of the strategic supplier selection process in manufacturing enterprises.

The strategic supplier selection process can be seen as one of the most important functions of supply management in manufacturing enterprises.[12] The supplier selection process aims to guarantee a reliable and cost-efficient supply of the enterprise with the required materials and

[8] E.g. Pfohl (1977), pp. 24–26, Witte (1988a), p. 203.

[9] Wild (1982), pp. 148–152, Adam (1996), pp. 31–35, Laux (2007), pp. 8–12, Pfohl (1977), pp. 24–26, Grünig & Kühn (2013), pp. 29–36.

[10] Witte (1988a), pp. 202–226. For further investigations see Wossidlo (1975).

[11] Witte (1988a), pp. 203.

[12] The importance of the strategic supplier selection process as a specific form of a decision making process was identified by an in-depth literature analyses and by additional explorative semi-structured interviews. See appendix 2 for the list of explorative semi-structured interviews.

services for the production processes.[13] Thereby, the target system of the strategic supplier selection process can be divided into cost targets, quality targets, time targets,[14] and additional targets.[15] Furthermore, the strategic supplier selection process is able to influence the profit of the company, and therefore they can be seen as one of the major opportunities to gain sustainable competitive advantage. For example, Arnolds et al. state that if a manufacturing enterprise wants to achieve an effect similar to a 4% reduction of the supplier´s material prices, the company will have to increase its sales by 33%.[16] Moreover, the strategic supplier selection process is the starting point of long-time supplier relationships because the selected suppliers contribute to various abilities of the enterprise which aim to provide continuous quality, increase the performance, elevate the flexibility, and strengthen the delivery capacity.[17]

Again, the author will use the previously outlined process-oriented view to describe the strategic supplier selection process. Similarly to the previously described generic decision making process models, recent literature also offers many specific process models for the strategic supplier selection process.[18] However, the strategic supplier selection process can be aggregated to the following steps: The supplier pre-selection (supplier identification and the limitation of possible suppliers trough pre-selection criteria), the supplier analysis (detailed analyses of the pre-selected suppliers based on additional information), the supplier assessment (detailed evaluation-based on pre-defined criteria), and the final supplier selection decision.

In detail, the primary goal in the stage of the supplier pre-selection process is to find suppliers who will meet the pre-selection criteria of the manufacturing enterprises. These criteria are deduced from the requirements and standards of the requested products and/or service and the inter-related processes.[19] In this first step, detailed market analyses should lead to a pool of potential suppliers.[20]

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[13] Irlinger (2012), p. 12, Kummer et al. (2009), p. 93, Arnolds et al. (2013), pp. 2–3.

[14] Cousins et al. (2002), pp. 62–67, Arnolds et al. (2013), pp. 6–11.

[15] Additional targets can be summarised as common welfare targets (e.g., social, ecologic, and environmental targets) and autonomic targets (e.g., reducing the dependence on a single source of supply). Schulte (2009), pp. 269–270

[16] Arnolds et al. (2013), pp. 13–14. See Wildemann (2002), p. 2 for similar results.

[17] Schuh et al. (2014), pp. 183–185, Hofbauer & Mashhour (2009), pp. 21–22, Brenner & Wenger (2007), pp. 42–43, Harrison & van Hoek (2008), pp. 265–269.

[18] E.g. Janker (2008), pp. 32–34, Cousins et al. (2002), pp. 60–61, Schuh et al. (2014), pp. 189–192, Hofbauer & Mashhour (2009), pp. 35–39.

[19] Cousins et al. (2002), pp. 60–61.

[20] Hofbauer & Mashhour (2009), pp. 35–36.

This pool, which is often described as supplier database,[21] is consequently updated and used for further analyses, which will be conducted on the basis of more detailed supplier information. This preparatory analysis should decrease the complexity of all available suppliers since otherwise the subsequent search and evaluation processes would last too long.[22] The supplier analysis is used to obtain and structure additional information regarding the pre-selected suppliers from internal and from external sources of information. Additional information could be generated by analysing balance sheets, company reports, published quality management certificates, online-based databases, customers´ opinions, and by conducting audits, supplier self-assessment requests, supplier interviews, etc.[23] Once supplier assessment is initiated, the remaining suppliers will be evaluated along pre-defined criteria. In order to do so, literature suggests a mix of quantitative and qualitative selection criteria to achieve a higher level of transparency in the selection process (e.g., costs, quality, delivery time, innovative capabilities, cooperation capabilities, financial power, social-, ecological-, and socio-political criteria).[24] The results of the supplier assessment are used for the final supplier selection decision and for countermeasures in case of variations in the supplier performance. Finally, the decision for the strategic supplier is made and the subsequent and additional tasks of the strategic supplier selection process (e.g., contract arrangements, supplier relation management activities) are specified.[25]

In sum, the specific process steps of the strategic supplier selection process are in line with the previously described generic process steps of the "Brim-Glass-Lavin-Goodman stage process of the decision making". This allows the further investigation of the supplier selection process in manufacturing enterprises as a specific type of decision making in business management by using the generic decision making model "Brim-Glass-Lavin-Goodman stage process of the decision making" in course of this thesis.

However, the investigation of the strategic supplier selection process further requires a precise framing of the actual decision making situation. In order to achieve a more precise terminology, the strategic supplier selection process will be further defined by using the following additional attributes:

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[21] Kummer et al. (2009), p. 153.

[22] Schuh et al. (2014), pp. 190–200.

[23] Appelfeller & Buchholz (2011), pp. 72–75, Schuh et al. (2014), pp. 198–203.

[24] Hess (2008), pp. 305–309, Disselkamp & Schüller (2004), pp. 65–200, Hartmann (1988), pp. 19–21, Rink & Wagner (2007a), pp. 42–43, Gabath (2008), pp. 76–78.

[25] Schuh et al. (2014), pp. 230–231.

1. **Non-automated:** In contrast to routine decisions[26] non-automated strategic supplier selection process is based on Pfohl´s definition and consist of "non-programmable decisions" by characterising these as "non-recurring, novel, politic/strategic, complex, mostly unstructured, and can be solved by applying heuristics and problem-solving techniques".[27]
2. **Strategic:** Strategic suppliers can be defined by having a high impact on the company´s success and by delivering a crucial product and/or service that can be hardly imitated by other suppliers.[28] Moreover, strategic suppliers can be further categorised by possessing the following attributes: The supplier is, or will be, a part of a planned, long-time, and pro-active supplier development programme, the supplier plays an important role in the core-competence-based, cooperate strategy to gain competitive advantages, and the supplier is, or will be, part of a long-time, sustainable, win-win collaboration.[29]
3. **Single decision making process:** In contrast to group decision making,[30] this investigation will focus on a single decision maker as unit of analysis,[31] meaning that one single person/entity is fully responsible for the execution of the final supplier selection decision.

In addition, the author has to define the term "manufacturing enterprises". In the context of this thesis, manufacturing enterprises can be defined as specialised companies which, mainly machine-based, produce larger quantities of goods (and services) for the larger markets within a specific timeframe, based on the economic division of labour.[32] In this thesis, we will further classify the manufacturing enterprises by using the "NACE" industrial branch classification system (respectively ÖNACE 2008 for Austrian enterprises).

[26] Routine decision can be solved by standardised procedures, daily routines, and mathematical models (e.g., models of operations research). Pfohl (1977), pp. 260–265 referring to Simon (1966), pp. 74–77.

[27] Pfohl (1977), pp. 260–265 referring to Simon (1966), pp. 74–77.

[28] Schumacher (2008), pp. 183–184.

[29] Based on Durst (2011), pp. 4–5.

[30] See e.g. Kaufmann et al. (2014) and Kocher & Sutter (2005) for an investigation of decision making behaviour in buying teams.

[31] E.g. Riedl (2012), p. 14, Dean & Sharfman (1996), p. 379, Buhrmann (2010), pp. 86–87.

[32] Dyckhoff & Spengler (2010), p. 8.

1.2. A THEORETICAL PERSPECTIVE ON DECISION MAKING IN BUSINESS MANAGEMENT

Hereinafter, the author creates the theoretical foundation to answer the previously defined research questions. In order to provide a solid theoretical foundation for this thesis, the author will evaluate "promising" organisational theories in management sciences and transfer their insights to research area of decision making in business management exemplified by the strategic supplier selection process in manufacturing enterprises.

It is important to notice, that "good research is grounded in theory".[33] Therefore, sound organisational theories can be seen as a result of successful research in management science. A theory can be used to explain and predict occurrences, structures, and cause-effect mechanisms within a pre-specified framework of reality.[34] For Popper, theories should be used in a fashion that is comparable to "fishing nets", to catch, rationalise, explain, and control the "real" world. Moreover, theories should be able to fail in empirical tests.[35] This should lead to the elimination of "false" statements, and furthermore to better and/or adapted theoretical constructs.

The conducted theoretical analyses of the author have revealed that various scholars have developed a myriad of more or less applicable, consistent or even partly contradictory, theoretical frameworks, [36] which can be used for the theoretical framework of this thesis. However, in this case, the author shares the opinion of Neuert, who claims that empirical research and the underlying theoretical frameworks, should primarily aim to construct better models instead of ending in an ad infinitum battle of theories, battle of research paradigms, and empirically unanswered assumptions.[37]

Consequently, in the following the most "promising" organisational theories for the creation of the theoretical foundation of this theses will be briefly outlined and evaluated. Therefore, a comprehensive overview is given in the following Figure 1.1.

[33] Defee et al. (2010), p. 404 referring to Mentzer et al. (2008).

[34] Tetens (2013), pp. 55–58.

[35] Popper (1935), p. 13-26.

[36] See Kirsch et al. (2007), pp. 97–172 for a further epistemological discussion reg. the pluralism of organizational theories in management sciences.

[37] Neuert (1987), pp. 145–147.

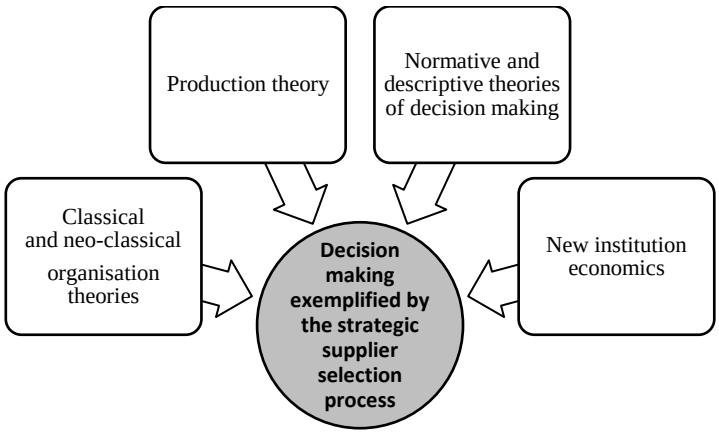

Figure 1.1: Research-subject-related organisational theories[38]

The classical and neo-classical organisational theories provide a multitude of useful information for the design of the decision making in business organisations. In particular, Adam Smith´s concept of the "division of labour" can be used to divide the decision making process in differentiated working tasks where specialised staff can achieve better economic results.[39] Fredrick W. Taylor´s scientific management approach delivers information that is meant to "rationalise" and "professionalise" managerial processes. In this context, more efficient decision making processes can be achieved by implementing standardised processes, using labour-saving devices, which nowadays would mean IT support, selecting the right workforce, utilising skill-based training, and by offering motivation incentives, and the division of labour.[40] Moreover, Henry Fayol sees decision making as one of the main functions of management. In the opinion of the author, 14 administrative principles (e.g., unity of command, unity of direction, subordination of individual interest to the general interests, remuneration of personnel, and line of authority) can provide further fruitful improvement approaches.[41] Moreover, Max Weber´s conception of bureaucracy can be considered as a foundation for efficient and rational decision making in business organisations. Rational, target-oriented rules should organise and shape company processes, while skilled workers should obtain task-necessary knowledge; in general, bureaucracy should lead to a more transparent and stabile organisation.[42] From the viewpoint of production theory, Erich Gutenberg, Edmund Heinen et

[38] Figure created by the author.

[39] Hatch & Cunliffe (2006), pp. 27–28, Shafritz et al. (2005), pp. 37–41.

[40] Scott & Davis (2007), pp. 41–43, Shafritz et al. (2005), pp. 61–72, Hatch & Cunliffe (2006), pp. 32–33, Sanders & Kianty (2006), pp. 43–58, Bea & Göbel (2002), pp. 54–63.

[41] Hungenberg & Wulf (2007), pp. 38–39, Shafritz et al. (2005), pp. 48–60, Hatch & Cunliffe (2006), pp. 34–35, Scott & Davis (2007), pp. 44–46.

[42] Hungenberg & Wulf (2007), pp. 39–40, Bea & Göbel (2002), pp. 42–53, Staehle et al. (1999), pp. 29–30, Kieser & Kubicek (1992), pp. 35–37.

al. describe the manufacturing enterprise primarily as a combination of production factors.[43] Their production process-oriented approach provides insights which can be transferred to decision making in business management.[44] In addition, the decision making theories can be divided into normative (prescriptive) decision making theory (e.g., Marschak, Hax, Laux, Liermann et al.), and into the descriptive (behavioural respectively empirically-based) decision making theory (e.g., Simon, Cyert, March et al.). The normative decision making theory focuses on the development of rules, frameworks, and logical proceedings to evaluate available alternatives based on the assumption of fully rational behaviour, complete information, and unlimited cognitive capabilities.[45] In contrast to the normative decision making theory, the descriptive theory of decision making aims to describe and predict human behaviour by including cognitive limitations, decision making biases, and company-internal respectively company-external determinants.[46] Both, normative and descriptive theory of decision making provide useful information for the present investigation of decision making in business management exemplified by the strategic supplier selection process in manufacturing enterprises. Finally, the new institutional economics (e.g., Williamson, Coase et al.) can deliver further information for the theoretical framework of this thesis. The new institutional economics can be divided into the property rights theory, the principal agent theory, and the transaction costs theory. These theories describe the interaction and cooperation between economic agents by rejecting the assumption of the "homo oeconomicus".[47] As such, they provide additional but also contradictive statements for the design of decision making in business management.

Beyond these summarised considerations of the selected organisation theories, the author has decided to focus on the descriptive decision making theory for the deduction of the theoretical framework. Despite some useful, but unfortunately more "isolated" theoretical approaches from the classical, neo-classical, and the new institution economic theories, the descriptive decision making theory seems to be the most holistic and most profound foundation for the present investigation. By focusing on a single decision maker, the descriptive decision making theory offers the most valuable information for the precise investigation of decision making in business management exemplified by the strategic supplier selection process in manufacturing

[43] Weber (2008), pp. 57–59.

[44] See Schulz (1977), pp. 1–4 for a similar approach.

[45] Laux (2007), pp. 15–19, Domschke & Scholl (2005), pp. 47–48, Bea & Göbel (2002), pp. 100–101, Bamberg et al. (2008), pp. 3–4.

[46] Domschke & Scholl (2005), pp. 47–48, Laux (2007), pp. 14–15, Bamberg et al. (2008), pp. 4–10, Kieser (2001), p. 133.

[47] Kieser (2001), pp. 199–200, Bea & Göbel (2002), pp. 119–121, Jones & Bouncken (2008), pp. 104–108.

enterprises. After a long-time and frequent usage in the field of marketing research, the descriptive decision making theory has been successfully transferred to research-subject-related areas in management science, e.g., "behavioural finance",[48] "behavioural accounting", and recently to "behavioural supply management".[49] In the following, this research will be continued by a chronological evaluation of fruitful elements of the descriptive decision making theory.

The historical development of descriptive theory of decision making

In general, the decision making theory develops approaches by focusing on the neoclassical model of the "homo oeconomicus" as rational decision maker. However, this theoretical approach seems to suffer from a lack of practical applicability.[50] In order to create a more holistic respectively a more mature decision making model, the author will enrich the neoclassical model of the "homo oeconomicus" by including the most important statements and findings from various scholars of the descriptive decision making theory. This theoretical synopsis will further be used to create the theoretical framework of this thesis.

According to Peterson, already the Greek philosophers conceptualised a basic categorisation of decision making. Thereby, they distinguished between "right", meaning more rational, and "contrary to good counsel", meaning more irrational types of decision making. If the decision maker acts "contradictory to good counsel" and by luck he gets what he had logically no right to expect; the decision was not any less foolish.[51] This can be seen as the starting point of decision making approaches in the scientific history of decision making.

The "pure theory of rational choice" postulates that all decision makers share a common set of basic preferences and that all alternatives and their consequences are certain and defined by the environment. Furthermore, the decision maker has perfect knowledge of those alternatives, their certainty, and their consequences.[52] The decision maker will consider all decision attributes and evaluate the "optimised" decision making outcome in the course of the decision making process. In this context, Kirsch refers to the rational choice theory by describing the "homo oeconomicus" as completely rational decision maker, who possesses all information, is

[48] Weber (2008), p. 62.

[49] E.g. Kaufmann et al. (2012b), Michel (2008), Riedl (2012).

[50] Argyris (1973), pp. 253–255.

[51] Peterson (2009), pp. 10–11.

[52] March & Heath (1994), pp. 3–4.

capable to calculate, rate, and judge all possible alternatives and their consequences, and is automatically focused on the ideal target system[53] by applying decision solving heuristics.[54]

The "modern" descriptive decision making theory was introduced by Barnard, Simon, March & Simon, March, Cyert & March[55] and further developed by using a broader range of empirically-based investigations by Witte[56] and Kirsch et al.[57] These scholars mainly focused on the investigation of individual decision making in business organisations in order to improve the decision making outcomes.

In "the functions of the executive" Barnard describes the organisation as a field of individual- and organisational-coordinated actions and decisions.[58] He states that depending on the environment of the decisions, more or less logical processes, including the organisational purpose and organisational objectives, the formal structure of authority and communication processes, need to be formulated in the course of organisational design activities. Furthermore, he refers to monetary and non-monetary incentives as an important success factor of decision making in order to elevate the willingness of the employees to contribute to the success of the decision making outcomes.[59]

In "administrative behaviour", Simon further explores decision making by investigating various elements of rational behaviour, defined as "the selection of preferred alternatives in terms of a system of values whereby the consequences of behaviour can be evaluated". Simon distinguishes between organisational rationality (oriented towards organisational goals) and individual rationality (oriented towards individual goals)[60] and introduces the concept of "bounded rationality" by stating that the actual behaviour can only be partly rational because all decision-relevant knowledge and the anticipation of consequences will always be limited; as the consequences of the proposed decision lie in the future, imagination will be used to

[53] In this case, the ideal target system is defined as self-interest-based utility maximisation.

[54] Kirsch (1970), pp. 27–42.

[55] Barnard (1968), Simon (1997), March et al. (1993), March (1988), Cyert & March (2005), Scott & Davis (2007), pp. 53–56, Shafritz et al. (2005), pp. 112–124, Shafritz et al. (2005), pp. 135–144.

[56] The main results of the "Projekt Columbus" are summarised in Witte et al. (1988).

[57] E.g. Kirsch (1970), Kirsch (1971a), Kirsch (1971b).

[58] Kieser (2001), pp. 134–136, Barnard (1968), pp. 55–95.

[59] Barnard (1968), pp. 139–189.

[60] Simon (1997), pp. 84–85.

imperfectly anticipate the various outcomes, and only a limited amount of alternative problem solutions can be considered by the decision maker.[61]

The previous outlined conceptual approaches were further analysed by March & Simon in "organizations". The authors state that because of humans´ limited intellective capabilities and their limited motivation, actual human problem solving processes always deviate from fully rational behaviour. Human beings solve problems by simplifying the decision problem without considering it in all its complexity. The overall "optimising" approach is replaced by the "satisficing" approach. Thereby, the requirement of the satisfactory levels is based on individual variables and all considered alternatives of potential problem solutions are discovered in the course of the information search process.[62] Furthermore, by referring to the "information processing psychology" he describes that the so-called "administrator" solves complex problems by utilising a very selective and limited search process and by applying simplified problem solving heuristics.[63]

By focusing on price and output quantity decisions, Cyert et al. have developed an empirically-based nine-step process model for strategic decision making processes which includes the theoretical concept of "organisational slack".[64] The steps can be divided into forecasting a competitor´s behaviour, forecasting demand, estimating costs, specifying objectives, evaluating plans, re-examining costs, re-examining demand, re-examining objectives, and selecting alternatives.[65] This process model should be used to support decision making by providing structure and basic decision rules for pre-defined decision making problems.

Moreover, March & Olsen have created the "garbage can model"[66] which is said to also support decision making in business management. It is based on four basic variables: The stream of choices, the stream of problems, the rate of flow of solutions, and the stream of energy from the participants. Based on the problem statement, this model recommends to solve the decision making problem through resolution (i.e. constant working on the problem), oversight (i.e. quick

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[61] Simon (1997), pp. 93–122.

[62] March et al. (1993), pp. 101–192.

[63] Simon (1978), pp. 362–363. Often described as "rules of thumb".

[64] Organisational slack is defined as "resources used in an organisation which are more than necessary for the work involved. Such resources, like excess staff, built up over a period of time, but can be cut back easily when necessary without losing too much production" Dictionary Central (2017). In the context of organisational decision making processes, the concept of "organisational slack" can be used to create possible scopes of action in uncertain decision making environments. For further information see Staehle et al. (1999), pp. 444–445.

[65] March (1988), pp. 38–41.

[66] Figuratively speaking, the „garbage can model" describes managerial decision making processes as a collection of choice-based, problem-based, solution-based, and participant-based variables.

choices in a minimum of time/energy), and flight (i.e. divide decision approaches from the interrelated problems).[67] Additionally, March & Olsen focus on decision making under "ambiguity"[68] by developing a theory of learning based on information exposure, memory, retrieval, learning incentives, and belief structures.[69] They further conclude that neither rational theories of choice nor rule-following theories of identity fulfilment deal well enough with ambiguity.[70] Therefore, they emphasise the need to develop new decision making approaches.
The most relevant studies in the German-speaking literature of descriptive decision making research are based on the project "Columbus" [71] and on Kirsch´s publication series "contributions to an empirical theory of the enterprise".[72] This research stream has analysed a multitude of decision making topics (e.g., decision targets, organisation of decision making processes, information behaviour, and decision making efficiency)[73] by using the empirical evidence from field studies, secondary data analyses, case studies, laboratory experiments, and evaluations by specialists. Especially, these investigations will provide the most useful information for this thesis.

Finally, the author further refers to the current state of the art in descriptive decision making research by considering Kahneman & Tversky´s Nobel-Price-winning "prospect theory"[74] and their ground-breaking investigations which imply the research on cognitive dissonance, decision making biases, and the application of decision making heuristics.[75] The present investigation will also evaluate insights from irrational theories of decision making behaviour in decision making processes,[76] probability approaches, and intuitive behaviour in decision making research.[77] Moreover, the investigations of Kaufmann et al. will be considered which

[67] Sanders & Kianty (2006), p. 121, March (1988), pp. 294–334.

[68] Ambiguity is defined as a lack of clarity or consistency in reality, causality, or intentionality. Ambiguous situations cannot be coded precisely into mutually exhaustive and exclusive categories. March & Heath (1994), p. 157.

[69] March (1988), pp. 335–358.

[70] March & Heath (1994), p. 192.

[71] See Witte (1988b) for a summarised overview. This project is based on investment decisions regarding the implementation of an IT-system in German enterprises.

[72] Witte (1972a), Kieser (2001), pp. 160–161. See Kirsch (1970), Kirsch (1971a), and Kirsch (1971b) for further information.

[73] Hauschildt (1977), Joost (1975), Witte (1972a), Gzuk (1975).

[74] Kahneman & Tversky (1979).

[75] Kahneman (2012), Tversky & Kahneman (1992).

[76] Ariely (2010), Ariely (2011).

[77] Brighton & Gigerenzer (2012), Gigerenzer (2008), Gigerenzer & Todd (1999).

focus on the reduction of vulnerability to judgement and decision biases,[78] the integration of human judgement and decision making concepts into the field of supply management,[79] the composition of decision making processes,[80] de-biasing strategies in supplier selection decisions,[81] etc.

The concept of situational theories

In general, decision making theory distinguishes between "open" and "closed" models of decision making in business management. Thereby, "closed" models are characterised by the fact that they ignore the environment in which decision making takes place, while "open" models consider potential cause-effect relations between the decision making and the immediate decision making environment.[82]

In order to enhance the theoretical foundation, the author will use the theoretical implications from the concept of the situational theories[83] for this investigation respectively for the theoretical foundation of the **company-internal determinants.**

The concept of the situational theories is not a theory in itself, but as opposed to some critics who reject the comprehensiveness of the theoretical foundation of the concept of the situational theories,[84] this concept will definitely enhance the descriptive decision making theory by considering additional organisational factors. Additionally, the enrichment of the decision making theory by using the concept of the situational theories has been already successfully applied and empirically tested within similar problem situations, e.g., in strategic management research.[85] Thereby, research primarily focuses on contextual (e.g., dynamism of the competitive environment), structural (e.g., size of the organisation), and personal (e.g., motivation) variables.[86]

The chronologically elaborated insights from the descriptive decision making theory and from the concept of the situational theories will now be used as a starting point for the development of the theoretical framework of this thesis. Thereby, the author divides the following theoretical

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[78] Buhrmann (2010), Kaufmann et al. (2010), Kaufmann et al. (2012a).

[79] Michel (2008), Kaufmann et al. (2009).

[80] Riedl (2012), Riedl et al. (2013).

[81] Kaufmann et al. (2009), Kaufmann et al. (2010).

[82] Also known as situational or contextual approaches. See Kirsch (1970), pp. 25–27.

[83] Kirsch et al. (2007), pp. 99–100.

[84] Staehle et al. (1999), pp. 52–55.

[85] E.g. Schenkel (2006).

[86] Staehle et al. (1999), pp. 51–52, Scherm & Pietsch (2007), pp. 40–41.

analyses into the major success factors in the decision making process, defined as the **decision making process maturity**, the evaluation of decision making outcomes, defined as the **decision making efficiency**, and the situational influencing factors, defined as **company-internal determinants**.

1.3. MAJOR SUCCESS FACTORS IN THE DECISION MAKING PROCESS: THE THEORETICAL FOUNDATION OF THE DECISION MAKING PROCESS MATURITY

Hereinafter, the author will theoretically deduce the major success factors in the decision making process which will be defined as the **decision making process maturity**. In the cause-effect model, the **decision making process maturity** will be defined as an amalgamated concept which combines various constitutional elements of rational decision making behaviour. In the end, the **decision making process maturity** will be investigated as the independent variable in the cause-effect model which describes the impact of the **decision making process maturity** and the **decision making efficiency** variables exemplified by the strategic supplier selection process in manufacturing enterprises.

The starting point of the theoretical foundation is based on the assumption that, similar to production processes, decision making in business management can also be improved by using controlled interactions in course of the decision making process.[87] In this context, Neuert states that the decision making outcomes must be interrelated with the decision making procedures, respectively with the application of particular behavioural patterns in the decision making process.[88] Decision making behaviour never shows a pattern of complete rational behaviour,[89] but it seems to be highly likely that there are various degrees of decision making rationality.[90]

By considering the outlined approach of Neuert, the author will develop the concept of the **decision making process maturity** based on the major success factors in the decision making process which will be developed by concerning a combination of constitutional elements of rational behaviour of decision making in business management.

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[87] See Schulz (1977), pp. 1–4 for similar considerations. In order to achieve a broader theoretical foundation for the investigation, the author also considers related theories from planning processes, as a special case of future-oriented, heuristic, and rational decision making processes. Klein & Scholl (2011), pp. 60–64. Furthermore, the author investigates problem solution processes which are often used synonymously with problem-oriented decision making processes. Pfohl (1977), Introduction-24.

[88] Neuert (1987), pp. 21–22.

[89] Neuert et al. (2015), pp. 301–302 refers to Simon´s concept of "bounded rationality".

[90] Neuert (1987), pp. 81–84.

In this context, the author further refers to the claim that rational behaviour in decision making cannot be seen as an objectify-able and generally valid characteristic. In fact, researchers have to define reasonable, formalised, and standardised measures for rational behaviour in decision making. Therefore, existing theoretical concepts, e.g., the concept of the "procedural rationality" defines the following basic requirements: The focus on the right problem, the efficient search and processing of decision-relevant information, the avoidance of decision making biases, and the focus on the decision maker's targets and preferences.[91]

In this context, the author considers Wild´s conceptual approach of a "generalised theory of planning" in manufacturing enterprises.[92] Wild specifies a comprehensive set of theoretical measures, which in combination with the in chapter 1.1 of this thesis described "Brim-Glass-Lavin-Goodman stage process of the decision making" will be used to identify the constitutional elements of the **decision making process maturity**. Thereby, the author refers to a set of pre-defined measures (e.g., the organisation of the process itself, the base of available information, the clarity of goals and values, the applied heuristics, the communication and interaction, and the implementation quality) [93] which will factor into the following constitutional elements:

1. The ***DMPM-target orientation*** which is deduced from step 1 of the Brim-Glass-Lavin-Goodman model and Wild´s criteria for the formalisation of targets,
2. the ***DMPM-information orientation*** which is deduced from step 2 of the Brim-Glass-Lavin-Goodman model and Wild´s criteria for the quality of the available information,
3. the ***DMPM-organisation*** which is deduced from Wild´s criteria for the organisation of the process, and
4. the ***DMPM-heuristics application*** which is deduced from step 3-5 of the Brim-Glass-Lavin-Goodman model and Wild´s criteria for the application of problem solving heuristics.

In sum, this theoretically deduced foundation of major success factors in the decision making process, which is defined as the **decision making process maturity**, is similar to previously developed success factors in strategic management research, e.g., Neuert´s "degrees of rational

[91] Eisenführ et al. (2010), pp. 5–6.

[92] Wild (1982), pp. 28–31.

[93] See Wild (1982), pp. 29–30 for the conceptualisation of theoretical success factors in managerial planning and decision making processes.

planning behaviour",[94] Schenkel´s "quality of the planning process",[95] and Wild´s "elementary components of a management system".[96]

Moreover, the author will describe the four constitutional elements of the **decision making process maturity** in detail. The four constitutional elements, ***DMPM-target orientation***, ***DMPM-information orientation***, ***DMPM-organisation***, and DMPM-***heuristics application***, form the independent variable in the cause-effect model and will be described in the following paragraphs.

The DMPM-target orientation

The first constitutional element and thus the first independent indicators of rational decision making behaviour is represented by the ***DMPM-target orientation***. The ***DMPM-target orientation*** contributes to the overall concept of **decision making process maturity**, which represents the amalgamation of the independent variable in the research model.

In general, a rational decision is not possible without clearly defined targets. A defined target system is absolutely necessary, particularly for the development and the evaluation of potential problem solutions.[97]

Basically, targets are not given by themselves. The decision maker will have to develop a specific target system by using a target definition process.[98] The process for the definition of the target system comprises the following steps:[99] The development and definition of targets and specific (sub-)targets, the operationalisation of targets (measurement items for the specific target characteristics), the analyses and prioritisation of targets (minimum level of requirements, conflicts between the sub-targets), a feasibility check, the decision for the final target system, the implementation, and a continuous review and revision. However, the developed target system should fulfil the following requirements:[100] It should be complete and comprehensive, realistic and feasible, free from redundancy and consistent, measureable, free from preferences, simple and transparent, organised, and up-to-date.

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[94] Neuert (1987), pp. 39–46.

[95] Schenkel (2006), pp. 70–73.

[96] Wild (1982), p. 32.

[97] Eisenführ et al. (2010), pp. 61–62, Laux (2007), pp. 9–10, Adam (1996), pp. 100–101, Jungermann et al. (2010), pp. 104–105.

[98] Hauschildt (1977), pp. 77–112, Eisenführ et al. (2010), pp. 61–62.

[99] Wild (1982), pp. 57–65, Ehrmann (2007), pp. 99–100, Klein & Scholl (2011), pp. 135–136.

[100] Eisenführ et al. (2010), pp. 68–69 referring to Keeney (1992) and Bamberg et al. (2008), pp. 30–32.

Additionally, it can be stated that human beings tend to avoid the effort to develop a specific target system by nature, which can be very disadvantageous in complex and difficult decision situations.[101] On the individual level, the process and the maturity of target definitions can contribute to a higher motivation, commitment and acceptance of assigned tasks, and a higher information orientation which is caused by the clearness of the targets respectively by a reduction of complexity.[102]

Unfortunately, recent literature pays little attention to the previously discussed continuous review and revision of the developed target system in the course of the decision making process. However, the specification and definition of targets should not end in itself. In fact, the continuous focus on the developed target system should be used as an additional measure to evaluate the degree of rational behaviour in the decision making process. [103]

In a nutshell, the theoretical conceptualisation of the first constitutional element ***DMPM-target orientation*** includes the degree of precision of the target system which is generated by using a target definition process, and the continuous usage of this target system in the course of the decision making process and during the final decision.

The DMPM-information orientation

The DMPM-information orientation is the second constitutional element contributing to the amalgamated independent variable **decision making process maturity.**

Basically, decision making is based on information and the processing of decision-relevant information in the course of the decision making process. Thereby, the quality of decision making process is dependent on information supply activities and on the quality and availability of the provided information.[104]

The level of sufficient information is based on the objective cognition respectively the satisfaction level of the decision maker.[105] The decision maker will evaluate the degree of sufficient information based on the relation between his subjective information demand and the

[101] Eisenführ et al. (2010), pp. 61–62 referring to Keeney (2007).

[102] Sanders & Kianty (2006), pp. 216–217.

[103] Neuert (1987), pp. 89–90.

[104] Wild (1982), p. 155, Adam (1996), pp. 35–36, Ehrmann (2007), p. 37, Gemünden (1983), pp. 103–104.

[105] March & Heath (1994), pp. 32–33. For additional information see Werth & Mayer (2008), pp. 19–32.

information currently available.[106] It must be noted that the additional supply of decision-relevant information is associated with additional costs and additional workload.[107]

The process of information supply, which allows for provision of information, can be categorised into active information creation (by the person itself) or passive information creation (by others), a one-way information supply or a bidirectional information supply, and the processing of received information.[108] This process can be improved through the following actives: Technical support for the systematic storage and usage of information, clear proceedings regarding the search of specific information, management support, additional training of the employees, incentives, support by using additional manpower, and by the pre-limitation of the information search process (focusing on costs, pre-defined limitations, etc.).[109]

Briefly summarised, the theoretical conceptualisation of the second constitutional element ***DMPM-information orientation*** is based on the intensity of the information supply activities, meaning how intensively the decision maker searches decision-relevant information.

The DMPM-organisation

The DMPM-organisation is the third constitutional element contributing to the amalgamated independent variable **decision making process maturity.**

The literature on descriptive decision making theory consequently expands the scope of the organisational activities[110] from mainly production-based processes to the field of decision making in business management.[111]

In this context, organisational activities can also be used to improve decision making. Joost further refers to the impact of organisational activities on the decision making efficiency by dividing the opportunities of organisational-based improvement activities in decision making processes into the organisation the work content and its sub-tasks (splitting up the strategic supplier selection process into smaller sub-tasks), the organisation of time schedules (sequence, duration and timing of the sub-tasks), the organisation of the structure of decision making locations (location the execution of the decision making process, e.g., conference room, online

[106] Witte (1988b), p. 227.

[107] Laux (2007), p. 337.

[108] Witte (1988b), p. 229.

[109] Laux & Liermann (2003), pp. 135–136.

[110] Defined as processes which are used to establish order. Bea & Göbel (2002), p. 3.

[111] Kosiol (1976), p. 19. Kosiol further refers to Barnard (1968) and March et al. (1993). For further information see Pfohl (1977), pp. 214–216.

meetings, storage of information), and the assignment of working packages to the individual decision makers.[112]

In a nutshell, the theoretical conceptualisation of the third constitutional element ***DMPM-organisation*** measures the level of systematically organised process activities in the decision making process.

The DMPM-heuristics application

The application of decision making heuristics concepts is the fourth constitutional element of rational decision making behaviour, which again contributes to the overall independent variable **decision making process maturity.**

According to Neuert, [113] rational decision making requires a certain amount of logical steps. In this case, Pfohl further states that the application of decision making techniques will have a significant impact on the decision making efficiency. Potential evaluation criteria for the decision making techniques are the logical structure of the method, the requirements for the input data, model restrictions, etc. [114]

In this context, Kahneman refers to the "system 2" which is used to solve complicated decision making problems by applying effortful mental activities, including complex computations.[115]

Based on the previously evaluated "Brim-Glass-Lavin-Goodman stage process of the decision making" the author will deduce the following logical process steps for the ***DMPM-heuristics application***: The production of possible solutions (the pre-selection of potential suppliers and systematic generation of alternative solutions based on pre-defined evaluation criteria), the evaluation of the potential solutions (based on the pre-defined evaluation criteria), and the final supplier decision (based on the pre-defined evaluation criteria).[116]

Summarised, the fourth constitutional element ***DMPM-heuristics application*** is based on the application of systematic heuristics, defined as the processing of logical problem-solving procedures in the course of the decision making process. Examples of decision making

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[112] Joost (1975), pp. 4–8, Pfohl (1977), pp. 216–218. For further information see Kosiol (1976), pp. 32–33, Staehle et al. (1999), pp. 675–685, Steinmann & Schreyögg (2000), pp. 406–408.

[113] Neuert (1987), pp. 102–105.

[114] Pfohl (1977), p. 187., Pfohl (1977), pp. 278–281.

[115] Kahneman (2012), p. 33.

[116] For further information see Klein & Scholl (2011), pp. 14–15, Laux (2007), pp. 10–11, Wild (1982), pp. 65–66, and Grünig & Kühn (2013), p. 66.

heuristics are the application of decision matrices, decision tables, algorithms like investment appraisal, contribution margin calculation, lot size optimisation models, etc.

As outlined above, the major success factors in the decision making process, defined as the **decision making process maturity**, will be described by the four constitutional elements ***DMPM-target orientation***, ***DMPM-information orientation***, ***DMPM-organisation***, and ***DMPM-heuristics application***. As such, the **decision making process maturity**, as the amalgamated concept of rational decision making behaviour, is comprised of the four described constitutional elements which shape the independent variable in the cause-effect model.

1.4. EVALUATION OF DECISION MAKING OUTCOMES: THE THEORETICAL FOUNDATION OF THE DECISION MAKING EFFICIENCY

Hereinafter, the author will theoretically deduce measures for the decision making outcomes. According to the above mentioned cause-effect model, the decision making outcomes form the dependent variable complex, respectively the **decision making efficiency**, influenced by the outlined independent variable **decision making process maturity**. In the cause-effect model, the outcomes respectively the **decision making efficiency** variables will be segmented into two separated dependent variables, namely the ***decision making economic efficiency*** and the ***decision making socio-psychological efficiency***.

According to Wild, the economic efficiency of a decision making is supposed to represent the minimisation of the probability of wrongful decisions and thereby maximise the probability of success based on the pre-defined targets of the decision maker. A high fulfilment of the rational behaviour should lead to a higher efficiency of decision making, which can be defined as the degree of target achievement, based on an economical of resources in comparison to intended and actual economic respectively financial outcomes (i.e. return on investment, profitability figures, costs, sales, cash inflows, etc.).[117] Those measures can be identified as the economic efficiency of decision making.

Researchers, e.g., Grabatin & Staehle, confirm this view by using the target-based approach to define organisational efficiency as the degree of target achievement based on pre-defined criteria.[118] In the context of measuring the efficiency of individual decision making, Grabatin

[117] Wild (1982), p. 15.

[118] Grabatin (1981), pp. 21–26, Staehle et al. (1999), p. 444.

refers to Gzuk´s analytical deduction of efficiency dimensions and efficiency indicators.[119] Thereby, Gzuk has developed a measurement concept which includes multiple efficiency dimensions, leading to a multitude of indicators for organisational-based efficiency and further indicators for the decision-based efficiency.[120] Moreover, the validity of those indicators was empirically tested by using factor analyses,[121] and further developed by researchers, e.g., Neuert (formal, material, and personal efficiency) and Bronner (personal, economic, and temporal efficiency).[122]

The most common method to specify the concept of economic efficiency can be achieved by using primary monetary indicators (e.g., costs, revenue, etc.), as mentioned above.[123] In the specific case of the strategic supplier selection process, the monetary indictors will capture the cost-dimensions of the supplier performance. However, based on the previously outlined target system of supply management, the author will include further non-monetary measures, in particular quality- and time-dimensions, in order to establish a holistic construct of supplier performance.

Consequently, by referring to Gzuk´s concept of target-output relation[124] (defined as the degree of achieved pre-defined targets), the concept of the ***decision making economic efficiency*** will be specified as the actual economic performance in relation to the pre-defined requirements in terms of cost-, quality-, and time-based measures.

The second dependent variable of the **decision making efficiency** in the cause-effect model is identified as the ***decision making socio-psychological efficiency***.

The theoretical framework of this thesis clearly indicates the importance of motivational aspects, especially in the creation of targets, the search of additional information,[125] and the development of potential problem solutions.Thereby, the term "motivation" is used to describe human behaviour in terms of focus, direction, intensity, and persistence.[126] In this context, Steinmann & Schreyögg refer to the Vroom model which postulates that the motivation respectively the driving force behind a specific action is based on subjective probability

[119] Grabatin (1981), p. 40.

[120] Gzuk (1975), pp. 57–110.

[121] Grabatin (1981), p. 41, Gzuk (1975), p. 289.

[122] Neuert (1987), Bronner (1973).

[123] Sanders & Kianty (2006), p. 185.

[124] Gzuk (1975), p. 57.

[125] For further information see March et al. (1993).

[126] Werth (2010), p. 188.

considerations and the subjective estimation of the process outcomes (which further refers to the subjective rationality of the individual decision maker). [127]

In order to capture these non-economic, satisfaction- and motivation-based effects in decision making, the author will introduce the ***decision making socio-psychological efficiency*** as an additional "non-economic" dimension.

In this case, Neuert refers to his concept of the personal efficiency, which describes the subjective evaluation of the results of decision making in terms of expected (group) performance, identification with the (group) performance, subjective characterisation of the (group) behaviour, the estimation of individual contribution to the (group) performance, and the subjective satisfaction with the decision making process and its outcomes per se. [128] Moreover, for Bronner, personal efficiency can be used as a subjective measure for the performance (subjective satisfaction) in the decision making process. Furthermore, it reflects the motivation to apply this process behaviour in future decision making processes. [129]

Summarised, the concept of the ***decision making socio-psychological efficiency*** will be defined herein as a subjective measure of the managers regarding their satisfaction with the decision making process and their satisfaction with the final decision alternative.

In sum, in the research model, the **decision making efficiency** will be measured by the two dependent variables ***decision making economic efficiency*** and ***decision making socio-psychological efficiency***. This context conceptualises the underlying cause-effect model of investigation, concerning the impact of the major success factors in the decision making process, measured by the four constitutional elements of rational decision making behaviour which form the independent variable **decision making process maturity**, on the dependent variable **decision making efficiency**, measured by the two variables ***decision making economic efficiency*** and ***decision making socio-psychological efficiency***.

1.5. SITUATIONAL INFLUCENCING FACTORS IN THE DECISION MAKING PROCESS: THE THEORETICAL FOUNDATION OF THE COMPANY-INTERNAL DETERMINANTS

In addition, based on the previously discussed concept of the situational theories, the author will develop the theoretical framework for the **company-internal determinants**.

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[127] Steinmann & Schreyögg (2000), pp. 484–487 referring to Vroom (1964).

[128] Neuert (1987), pp. 118–119.

[129] Bronner (1973), pp. 41–42.

In general, the determinants of the decision making process can be divided into company-external determinants (e.g., the dynamics of the external environment, market complexity, uncertainty, financial resources, competitive pressure, and firm size) and company-internal determinants (e.g., personality traits, training, education, time pressure, and experience). Furthermore, in this context Staehle distinguishes between contextual, structural, and personal variables.[130]

This thesis focuses on the in the impact of the **decision making process maturity** on the **decision making efficiency** in the strategic supplier selection process as an exemplary task of decision making in business management. The theoretical foundation of this thesis and the majority of the identified research studies clearly emphasise the importance of personal-oriented characteristics in decision making, which is why the author has decided to focus on three personal-oriented variables for the investigation of the effects of the **company-internal determinants**. Thereby, the three variables, namely the ***manager´s experience***, the ***manager´s education***, and the ***company´s reward initiatives***, is placed at the centre.

The company-internal determinants manager´s experience and manager´s education

Recent studies postulated that the evaluation of alternative solutions is mainly based on the consideration of the decision maker´s previously gained experience. In this case, a higher degree of experience tends to lower the complexity of the information search processes[131] which implies that a higher degree of experience can lead to more efficient decisions.

In order to operationalise the experience of the decision maker, the author will investigate the moderating effect of two separate determinants. The research will start out by looking at the **company-internal determinant *manager´s experience***, defined as gained expert knowledge employed to evaluate the effects of the decision maker´s specific on-job experience.

According to Staehle, training and further education activities can be used as an important strategy besides the practical experience from learning by doing to increase an employee´s abilities and skills.[132] Therefore, the ***manager´s education*** is used to evaluate the effects of the decision maker´s specific education in terms of acquired and/or educated skills and knowledge.

[130] Staehle et al. (1999), pp. 51–52, Scherm & Pietsch (2007), pp. 40–41.

[131] Betsch et al. (2011), pp. 110–120 who refers to Aarts et al. (1997) and Verplanken et al. (1997).

[132] Staehle et al. (1999), p. 179.

The company-internal determinant company´s reward initiatives

Literature highlights several opportunities which can be used to boost employees´ process-orientation and process efficiency through motivational-based activities.[133] In this case, Staehle distinguishes between motivation trough incentives, motivation trough work content, and motivation trough the design and regulation of working time.[134] Based on inducement-contribution theory[135] the author suggests that incentives, defined as one possible method to increase the extrinsic motivation,[136] can be used to improve the decision making process. Therefore, we will investigate the effects of ***company´s reward initiatives***, conceptualised as performance-based incentives and/or bonus systems which are implemented to increase the manager´s extrinsic motivation.

In sum, the research model will be enriched by adding the three **company-internal determinants** ***manager´s experience***, ***manager´s education***, and ***company´s reward initiatives*** as situational influencing factors based on the concept of the situational theories. Thereby, the author will analyse the impact of the three previously outlined **company-internal determinants** on the proposed relationship between the **decision making process maturity** and the **decision making efficiency** variables.

1.6. RESULTS OF THE THEORETICAL ANALYSES: SYNOPSIS OF THE THEORETICAL FRAMEWORK

In chapter 1 of this thesis, the author has established the theoretical foundation for this thesis. In general, this thesis focuses on the impact of the major success factors in the decision making process, defined as the **decision making process maturity**, on the decision making outcomes, defined as the **decision making efficiency** variables. Moreover, the author analyses the impact of situational influencing factors on the proposed relationship between the **decision making process maturity** and the **decision making efficiency** which will be described by the moderating effects of three **company-internal determinants**.

Thereby, the author focuses on the strategic supplier selection process as an exemplary task of decision making in business management. The strategic supplier selection process can be identified as one of the most important functions for manufacturing enterprises to ensure

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[133] See Heinen (1991), pp. 814–815, Laux & Liermann (2003), pp. 496–502.

[134] Wild (1982), pp. 817–838.

[135] Kieser refers to Barnard, Simon, and March as the most important representatives of the inducement-contribution theory. Kieser (2001), pp. 136–138, Sanders & Kianty (2006), pp. 148–151.

[136] Werth (2010), pp. 203–207, Laux & Liermann (2003), pp. 502–503.

sustainable growth and competitive advantage. The strategic supplier selection process effects the target system of supply management which includes cost-, quality-, and time- targets. This relationship will be examined as an important part of the cause-effect model between the independent variable **decision making process maturity** and the dependent variables of the **decision making efficiency** later on.

Moreover, the author has discussed research-subject-related organisational theories for the creation of the theoretical framework for this investigation. Put in a nutshell, the author has decided to use the descriptive decision making theory for the development of both the **decision making process maturity** and the **decision making efficiency** variables. Moreover, the concept of the situational theories has been applied to create the theoretical framework for the **company-internal determinants**.

By referring to the descriptive decision making theory, the author has identified theoretical measures for the major success factors in the decision making process, defined as the **decision making process maturity**. In the cause-effect model, the **decision making process maturity** is defined as an amalgamated concept which combines four constitutional elements of rational decision making behaviour. As such, the **decision making process maturity**, as the amalgamated concept of the four constitutional elements ***DMPM-target orientation***, ***DMPM-information orientation***, ***DMPM-organisation***, and ***DMPM-heuristics application***, shapes the independent variable in the cause-effect model.

Descriptive decision making theory has also offered valuable insights for the measurement of the decision making outcomes. In the cause-effect model, the decision making outcomes form the dependent variable complex, defined as the **decision making efficiency**. Thereby, the author has decided to measure both the economic effects, defined as the ***decision making economic efficiency***, and the socio-psychological effects, defined as the ***decision making socio-psychological efficiency***, which are both part of the **decision making efficiency**.

In addition, the concept of the situational theories was used for the theoretical design of the three **company-internal determinants**. This conceptual framework will be applied in order to explore the moderating effects of ***manager´s experience***, ***manager´s education***, and ***company´s reward initiatives*** on the proposed relationship between the **decision making process maturity** and the **decision making efficiency** exemplified by the strategic supplier selection process in manufacturing enterprises.

2. CONCEPTUAL FRAMEWORK OF THE DECISION MAKING PROCESS MATURITY, THE DECISION MAKING EFFICIENCY, AND THE COMPANY-INTERNAL DETERMINANTS: AN ANALYTICAL REVIEW OF EXISTING MODELS

In the second chapter, the author develops the conceptual framework of this thesis by conducting three structured content analyses on the major success factors in the decision making process, defined as the **decision making process maturity**, on the evaluation of decision making outcomes, defined as the **decision making efficiency**, and on the situational influencing factors in decision making processes, defined as **company-internal determinants** in order to evaluate the research-subject-related state of the art in management research. For this purpose, the author focused on decision making behaviour-oriented studies published over the timeframe from 1970 to 2016.

2.1. METHODOLOGICAL BACKGROUND: STRUCTURED CONTENT ANALYSIS

In general, this thesis is grounded in the notion of "critical rationalism" which implies that the step-wise deduced research model and the underlying hypotheses, as an output of both the theoretical and conceptual analyses, have to be tested in an empirical environment.[137] Therefore, the author will further refer to the previously developed theoretical research model which is depicted in Figure 2.1.

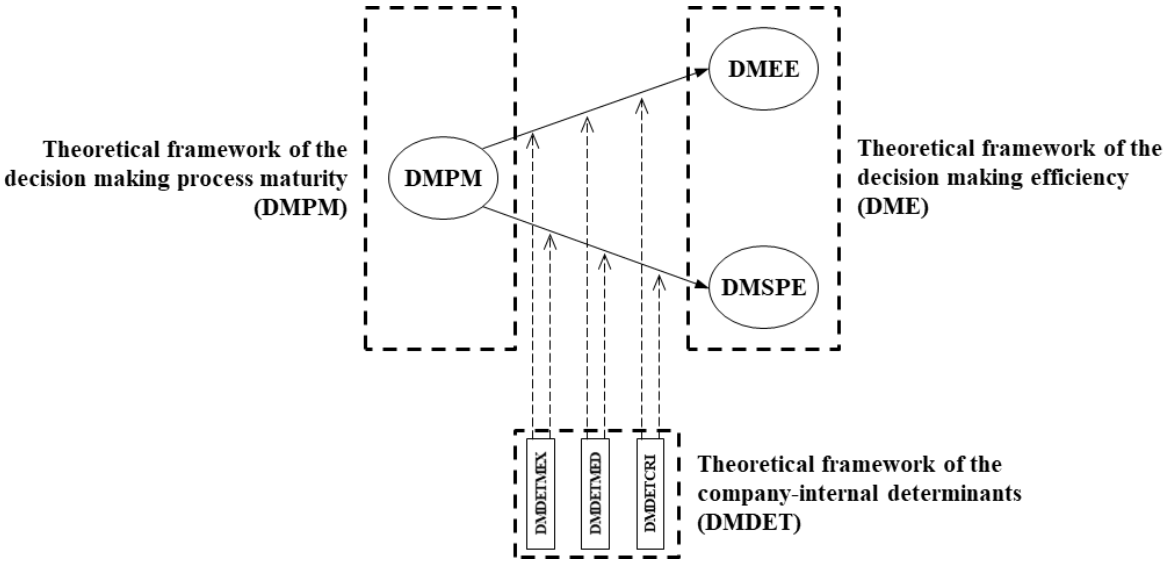

Figure 2.1: Theoretical research model[138]

[137] Kromrey (2009), pp. 28–29.

[138] Figure created by the author.

As previously outlined, the conceptual framework of this thesis is based on the theoretical research model which is depicted in Figure 2.1. In general, this thesis will investigate the impact of the major success factors in the decision making process, defined as the independent variable **decision making process maturity** (DMPM), on the decision making outcomes, defined as the **decision making efficiency** (DME) complex. The **decision making efficiency** (DME) complex is measured by the two dependent variables ***decision making economic efficiency*** (DMEE) and ***decision making socio-psychological efficiency*** (DMSPE). In addition, the model further includes three **company-internal determinants** (DMDET), namely the ***manager´s experience*** (DMDETMEX), the ***manager´s education*** (DMDETMED), and the ***company´s reward initiatives*** (DMDETCRI) which have a moderating effect on the relationship between the **decision making process maturity** (DMPM) and the **decision making efficiency** (DME) complex. Thereby, the theoretical research model is based on the theoretical framework of the **decision making process maturity** (DMPM), the theoretical framework of the **decision making efficiency** (DME), and the theoretical framework of the **company-internal determinants** (DMDET).

Analogous to the previously developed theoretical research model the author will divide the structured content analyses for the conceptual framework of this thesis into three parts:

- Literature review on concepts and measures of the **decision making process maturity**,
- literature review on concepts and measures of the **decision making efficiency**, and
- literature review on concepts and measures of the **company-internal determinants**.

Figure 2.2 displays research-subject-related areas in management science.

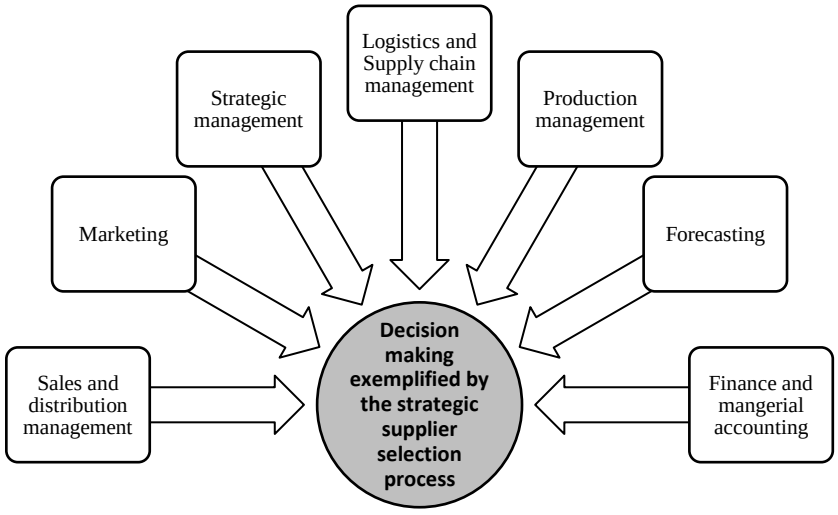

Figure 2.2: Research-subject-related areas in management science[139]

[139] Figure created by the author, based on the methodological approach by Schenkel (2006), p. 21.

As depicted in Figure 2.2, the author expands the focus of the structured content analyses to the research-subject-related areas in management science. This will be necessary, because due to the novelty of the research, only a handful of strategic-supplier-selection-process-oriented studies exist. However, from a theoretical point of view, the strategic supplier selection process can also be seen as a specific form of a decision making process, or more generally speaking as a problem-solving process[140] which allows a broader investigation in the research-subject-related areas of sales and distribution management (e.g., sales policy decisions, bonus-malus systems, and promotion decisions), marketing (e.g., communication channel decisions, service level decisions, and the exploration of buying behaviour), strategic management (e.g., strategic planning processes, the choice of production-/service-locations, and decisions regarding the design of production-/service-systems), logistics and supply chain management (e.g., make or buy decisions, decisions regarding the production depth, and decisions regarding the supply chain configuration), production management (e.g., lot size and sequencing decisions), forecasting (e.g., decisions regarding sales respectively production volumes, and decisions regarding the selection of the appropriate forecasting method), as well as finance and managerial accounting (e.g., financing and investment decisions) in order to generate a sound conceptual framework for this thesis.

By using this broader view, the author expects benefits such as learning from the experience of other related disciplines. Knowledge which perhaps might not have been considered otherwise might prove fruitful. Moreover, the inclusion of insights from other disciplines may enhance the future linkage between the research subject and research-subject-related areas in management science.[141]

The research process

The conceptual research model of this thesis was developed based on the results won by three structured content analyses.[142] This process contains the identification, screening, clustering, and evaluation of research-relevant studies in research-subject-related areas in management science. As previously outlined, the author has information from studies in supply management, sales and distribution management, marketing, strategic management, logistics and supply chain management, production management, and finance and managerial accounting which

[140] See Pfohl (1977), pp. 17–24.

[141] See Stock (1997), p. 516. Transferred from a logistics management-oriented view to the conceptual framework of this thesis.

[142] For further information see Kromrey (2009), pp. 300–304.

mainly focused on the descriptive investigation of planning, decision making, and problem-solving processes. The research process of the structured content analyses is illustrated in the following Figure 2.3.

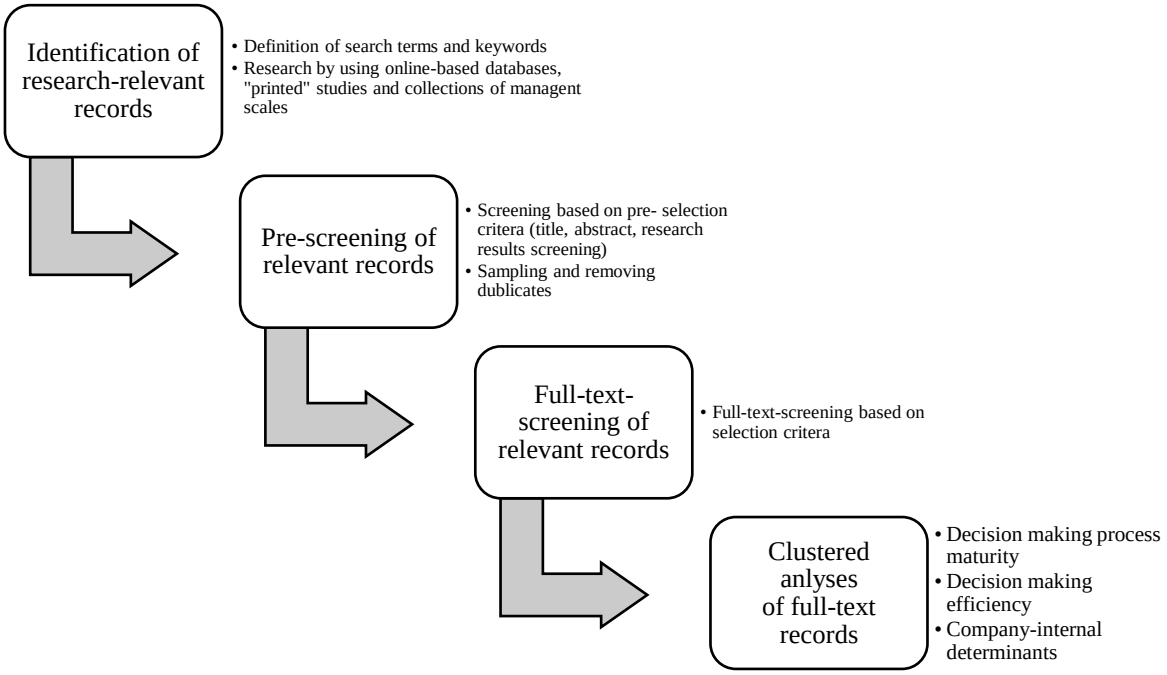

Figure 2.3: Research process (structured content analyses)[143]

Step 1, the "identification of research-relevant records", detects records based on the pre-defined search criteria. The author used meta-search queries based on search terms and keywords which were developed by consulting a thesaurus[144] in scientific databases. Moreover, the author analysed printed studies which could not be accessed via online-based databases, and three additional collections of management scales.[145]

In step 2, the "pre-screening of relevant records", the author analysed the title, the abstract and the main research results of the identified studies by using selected pre-defined criteria. Furthermore, existing duplicates were removed.

In step 3, the "full-text-screening of relevant records", the remaining studies were fully accessed, analysed, and stored in the research database.

In step 4, the "clustered analyses of full-text records", the resulting research studies were clustered into 73 **decision making process maturity**-related research studies, 67 **decision**

[143] Figure created by the author, based on Hokka et al. (2014), p. 1957.

[144] The author used Dictionary.com (2017) for the development of the search criteria and key words. Exemplary results: Decision quality, rationality, procedural rationality, process maturity, process quality, comprehensiveness, extent of analysis, etc.

[145] See Bearden et al. (2011), Wieland (2017), Inter-Nomological Network (INN) (2017).

making efficiency-related research studies, and 16 **company-internal determinants**-related research studies. The total number of 156 full-text research studies were completely analysed by the author.

Based on the recommended process standards for structured content analysis, the author has divided the investigated variables into direct content variables and indirect content variables. A direct content variable is defined as a content which can be directly and/or explicitly found in the research studies. In contrast, the indirect content variable is defined as content which cannot be directly and/or explicitly found in the research studies and has to be evaluated by further interpretation respectively by "reading between the lines".[146]

By using this classification system the analysis of the 156 research studies led to 139 direct content variables and 111 indirect content variables which were divided in 46 direct content variables and 96 indirect content variables for the **decision making process maturity**, 72 direct content variables and 14 indirect content variables for the **decision making efficiency**, and 21 direct content variables and one indirect content variable for the **company-internal determinants**.

2.2. LITERATURE REVIEW ON THE CONCEPTS AND MEASURES OF THE DECISION MAKING PROCESS MATURITY (INDEPENDENT VARIABLE)

The first part of the literature review describes the research study-based conceptualisation of the major success factors in decision making process, defined as the **decision making process maturity** by conducting a structured content analysis on the concepts and measures of the **decision making process maturity**-related variables.

By focusing on the in chapter 2.1 of this thesis developed classification of research-subject-related areas in management science, the author concludes that most of the identified studies were found in the areas of strategic management (69.9%), marketing (11.0%), and supply management (11.0%) research. Figure 2.4 shows the chronological development of the research studies dealing with **decision making process maturity**-related variables.

The resulting 73 studies[147] can be classified by type of study into 59 field studies (80.8%), 7 laboratory experiments (9.6%), and 7 conceptual studies (9.6%). Most of the ***decision process maturity***-related studies were empirically evaluated using primary or secondary data from field

[146] Kromrey (2009), pp. 301–304.

[147] The total evaluation of the 73 **decision making process maturity**-related studies is summarised in Table A1.-1-1 in appendix 1.1 of this thesis.

studies. Only a handful of laboratory experiments and conceptual studies exist. However, most of the research-relevant studies were published between 1980 and 1990.

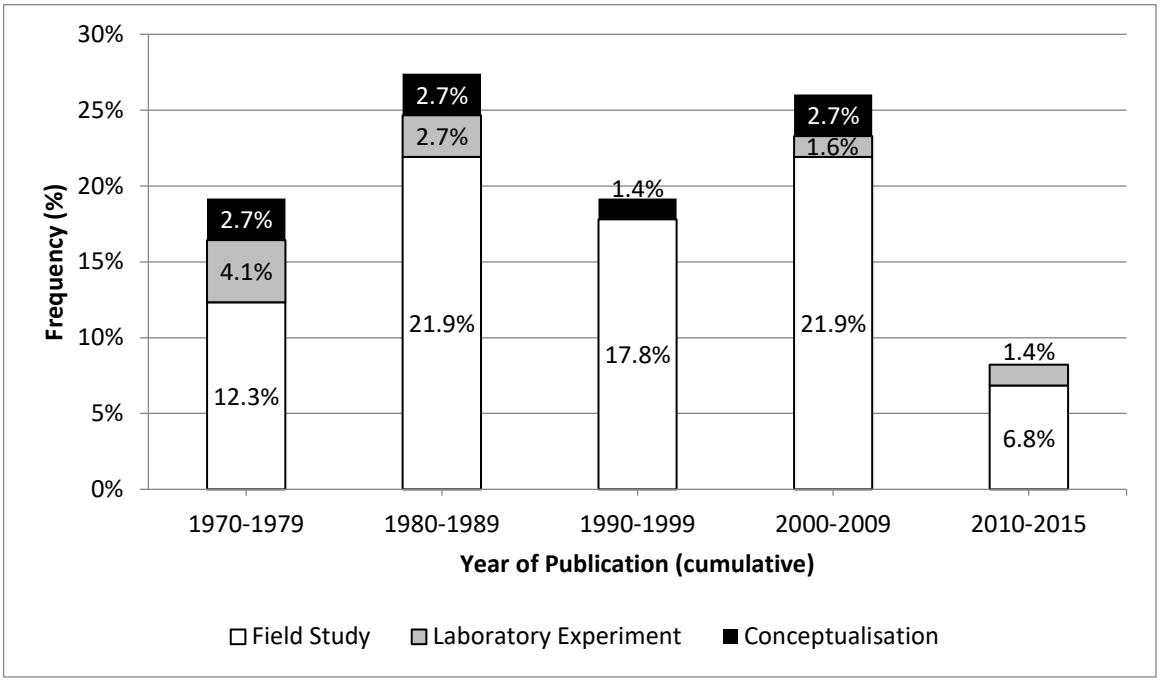

Figure 2.4: Chronological summary of decision making process maturity-related research studies[148]

Figure 2.5 displays the first structured content analysis for the conceptual framework of this thesis by focusing on the independent variable **decision making process maturity** (DMPM).

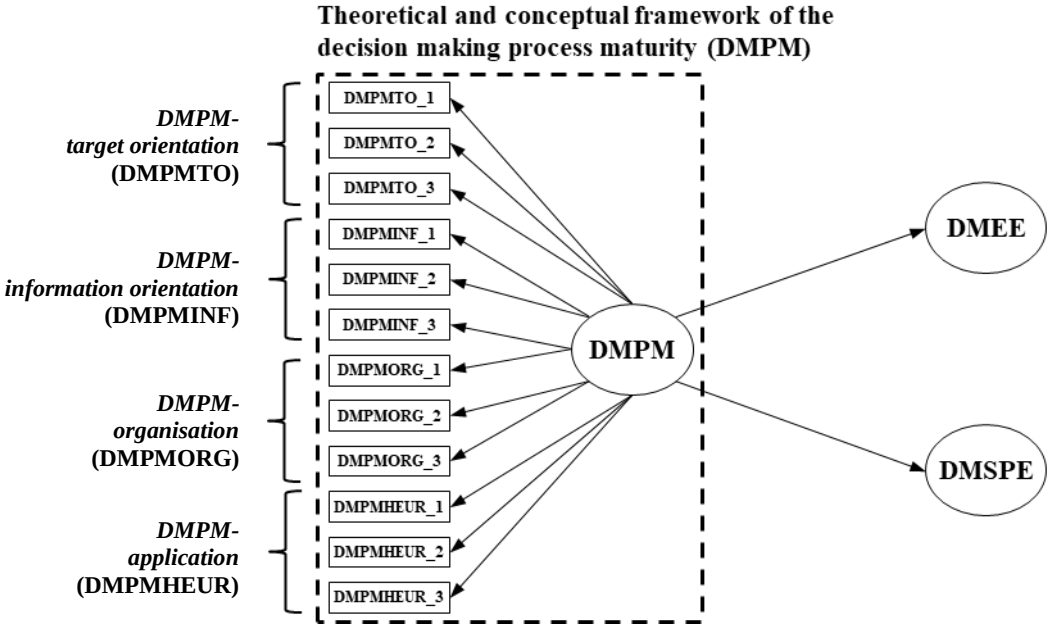

Figure 2.5: Segmented conceptual research model – decision making process maturity[149]

[148] Figure created by the author (systematic literature analyses).

[149] Figure created by the author.

In general, this thesis will investigate the impact of the major success factors in the decision making process, defined as the independent variable **decision making process maturity** (DMPM), on the decision making outcomes, defined as the **decision making efficiency** (DME) complex. The **decision making efficiency** (DME) complex will be measured by the two dependent variables ***decision making economic efficiency*** (DMEE) and ***decision making socio-psychological efficiency*** (DMSPE). As outlined in Figure 2.5, according to the theoretical conceptualisation, the **decision making process maturity** (DMPM) is an amalgamated concept of four constitutional elements of rational decision making behaviour which will be used to describe the major success factors in the decision making process. Thereby, the **decision making process maturity** (DMPM) consists of the four constitutional elements ***DMPM-target orientation*** (DMPMTO), ***DMPM-information orientation*** (DMPMINF), ***DMPM-organisation*** (DMPMORG), and ***DMPM-heuristics application*** (DMPMHEUR). As such, the **decision making process maturity** (DMPM), as the amalgamated concept of rational decision making behavior, is comprised of the four described constitutional elements which shape the independent variable in the cause-effect model. The underlying indicators (e.g., DMPMTO_1, etc.) of the four constitutional elements of the independent variable will be operationalised later on.

Moreover, the identified studies will be divided into unidimensional studies, which are mainly focus on one or two characteristics within the theoretical conceptualisation of the constitutional elements of the **decision making process maturity**, and more holistic studies, which directly and/or indirectly include more than two characteristics of the constitutional elements of the **decision making process maturity**.

The DMPM-target orientation

However, only 13.4% of all identified direct and/or indirect variables focus on characteristics of the ***DMPM-target orientation***. Based on the theoretical conceptualisation proposed herein, the ***DMPM-target orientation*** includes the degree of precision of the target system which is generated by using a target definition process, and the continuous usage of this target system in the course of the decision making process and during the final decision.[150]

Besides some basic theoretical and empirically-based conceptualisations (e.g., Weihe, Bourgeois & Eisenhard, Onsi, Segars & Grover, and Venkatraman & Ramanujam)[151] the author has identified several field studies and laboratory experiments which contain characteristics of

[150] See chapter 1.3 of this thesis for the theoretical conceptualisation.

[151] Weihe (1976), Bourgeois & Eisenhardt (1988), Onsi (1973), Segars & Grover (1998), Venkatraman & Ramanujam (1987).

the ***DMPM-target orientation***. In this context, Hauschildt emphasises the importance of the target building process in managerial decision making as decision targets may not given by themselves nor may they fit the overall targets of the enterprise. Furthermore, he states that a higher degree of complexity will cause a higher amount of coordination activities in target-building processes.[152] Researchers like Conant & White, Dyson & Foster, Kenis, and Schenkel show a significant relationship between the clarity respectively the formalisation of targets in managerial decision making and various efficiency-related measures.[153] In this context, Claycomb et al. highlight a clear interaction between the degree of formalisation in decision making processes and the market performance respectively the financial performance of an enterprise.[154] According to Geißler, a missing definition of targets can be the starting point of bad decisions by causing constitutional, procedural, and personal problems in decision making processes.[155] Based on the investigations by Hamel, the initial creation effort will have to be taken into account in order to establish a target system that is strongly related to the complexity of the final decision. Decision makers may have to redefine their target system in terms of target objectives, target characteristics, and target functions in course of the decision making process.[156]

More recent studies identify a significant relationship between the determination of relevant decision criteria prior to the supplier selection as part of a decision process decomposition strategy which is linked to the residual uncertainty that affects the supplier strategic capabilities and the financial supplier performance.[157] Moreover, Buhrmann acknowledges a significant impact of the decision task decomposition variable, on the non-financial decision effectiveness respectively on the financial decision effectiveness. Thereby, the decision task decomposition variable includes the determination of relevant decision criteria, the splitting of the decision in smaller pieces, and the determination of specifications prior to the supplier selection.[158]

The DMPM-information orientation

Most of the identified studies (35.9% of all identified direct and/or indirect variables) contained direct and/or indirect variables which can be related to the ***DMPM-information orientation***.

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[152] Hauschildt (1977), Hauschildt (1983), Hauschildt (1988).

[153] Conant & White (1999), Dyson & Foster (1982), Kenis (1979), Schenkel (2006).

[154] Claycomb et al. (2000).

[155] Geißler (1986).

[156] Hamel (1974).

[157] E.g. Riedl (2012), Buhrmann (2010).

[158] Buhrmann (2010).

According to the theoretical conceptualisation proposed in this thesis, the ***DMPM-information orientation*** is based on the intensity of the information supply activities.[159]

The basic theoretical and empirically-based conceptualisations of the ***DMPM-information orientation*** can be found in the studies by e.g., Bourgeois & Eisenhardt, Segars & Grover, Dyson & Foster, Greenley & Bayus, Premkumar & King, and Wild.[160]

In the context of decision making information-related research studies, Bronner et al. have investigated that participants in laboratory experiments never used all theoretically available information. There were no significant differences in the information demand between groups even though some groups were encouraged to request additional information while other groups were not.[161] Furthermore, Bronner and Bronner et al. have investigated significant differences in information demand between groups with and without time pressure respectively predefined time limits in decision making processes. Results indicate that the time pressure leads to a reduction of the participants´ information demand activities.[162] The investigations by Cramme show a significant correlation between the information demand activities, coming from personal resources (e.g., suppliers) and the decision making efficiency but do not suggest any significant correlation between the information demand activities from impersonal resources (e.g., market data) and the decision making efficiency.[163]

Moreover, the studies by Witte et al. provide valuable, but sometimes controversial insights. For example, the researchers found no significant relationship between the information demand and supply activities and the efficiency of the decision making processes. Not even a positive trend between information activities and the efficiency of the decision making processes could be identified by analysing the secondary data from the field studies.[164] The information supply behaviour shows tendencies to a concave relationship between the information supply and the decision making efficiency. Strangely enough, the highest decision making efficiency was achieved by the lowest information supply activities.[165] In additional laboratory experiments, participants tended to request more precise problem-based information in course of the

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[159] See chapter 1.3 of this thesis for the theoretical conceptualisation.

[160] Bourgeois & Eisenhardt (1988), Segars & Grover (1998), Dyson & Foster (1982), Greenley & Bayus (1993), Premkumar & King (1994), Wild (1982).

[161] Bronner et al. (1972).

[162] Bronner (1973), Bronner & Wossidlo (1988).

[163] Cramme (2005).

[164] Witte (1972b), Witte (1972d), Witte (1972c), Witte (1988b).

[165] Witte (1972d).

simulations.[166] The participants showed highly significant differences in information behaviour activities between different types of information (e.g., economic, organisational, and technical information).[167] Further studies support that fact that the extended use of information technology and/or reference processes generally contribute to an increase in the decision making efficiency.[168]

The DMPM-organisation

In addition, 21.8% of the identified direct and/or indirect variables focused on characteristics of the ***DMPM-organisation***. Therefore, the thesis´ theoretical conceptualisation defines the ***DMPM-organisation*** as a measure of the maturity level of systematically organised process activities in decision making processes.[169] Some basic conceptualisation of organisational activities in decision making processes can be found in the studies by Pfohl, Grover & Segars, Segars & Grover, and Venkatraman & Ramanujam.[170] Joost notes that organisational activities are distributed over the whole duration of the decision making process. Increased organisational activities will lead to a higher transparency and to a higher efficiency in decision making processes. However, the over-organisation of decision making processes could decrease the overall efficiency.[171] In this context, John & Martin postulate that the organisational structure significantly influences the credibility and utilisation of planning and decision making activities.[172] Witte notes that the organisation of decision making processes is important, but empirical evidence clearly indicates that the different, theoretically sequential phases of the decision making process will not be processed in a consistent, stepwise, and uni-sequential way.[173] Moreover, Langley states that the formal analysis of problem-solving processes acts as glue within the interactive processing of the necessary process activities, generating organisational commitment and ensuring continuing action.[174] Moreover, Schenkel postulates that the clarification of frameworks and tasks as well as the personal and temporal assignment

[166] Witte (1972e).

[167] Grün (1973).

[168] Molloy & Schwenk (1995), Moon et al. (2003), Premkumar & King (1992), Venkatraman & Ramanujam (1987).

[169] See chapter 1.3 of this thesis for the theoretical conceptualisation.

[170] Pfohl (1977), Grover & Segars (2005), Segars & Grover (1998).

[171] Joost (1975).

[172] John & Martin (1984).

[173] Witte (1988a). For further information see Wossidlo (1975).

[174] Langley (1989).

of tasks need to be perceived as indicators for the formal quality which directly affects the quality of the planning process.[175]

The DMPM- heuristics application

The remaining 28.9% of all identified direct and/or indirect variables were primarily focused on the characteristics of the ***DMPM-heuristics application***. In line with the theoretical conceptualisation, the ***DMPM-heuristics application*** is perceived as the processing of logical problem-solving procedures in the course of the decision making process.[176] According to Witte these process steps will not be processed in a consistent, stepwise, and uni-sequential way.[177] Various theoretical investigations, e.g., Moon et al., Wild, Bourgeois & Eisenhardt, and Pfohl, recommend the usage of reference processes and reference models in managerial planning and decision making activities.[178]

For Buhrmann, both the prioritisation of evaluation criteria and the assignment of weight prior to the supplier evaluation are part of the concept of the decision task composing variable which significantly impacts the non-financial decision effectiveness respectively the financial decision effectiveness.[179] In this case, Riedl also defines the prioritisation of evaluation criteria and the assignment of weight prior to the supplier evaluation as part of his conceptualisation of the decision process decomposition which significantly affects the residual uncertainty respectively the supplier´s strategic capabilities and the financial supplier performance.[180] Additional studies note a positive relationship between the application of problem-solving techniques and decision making efficiency.[181] It should be noted that the number of dominant alternative solutions significantly affects the choice accuracy and the choice effort.[182]

Holistic investigations regarding the decision making process maturity Moreover, the author has investigated holistic research studies which directly and/or indirectly include more than two characteristics of the **constitutional elements** of the decision making process maturity.

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[175] Schenkel (2006).

[176] See chapter 1.3 of this thesis for the theoretical conceptualisation.

[177] Witte (1988a).

[178] Moon et al. (2003), Wild (1982), Bourgeois & Eisenhardt (1988), Pfohl (1977).

[179] Riedl (2012).

[180] Buhrmann (2010).

[181] E.g. Neuert (1987), Elbanna & Child (2007).

[182] Klein & Yadav (1989).

In fact, only a few of the holistic conceptualisations of rational decision making approaches exist. The identified concepts (e.g., the procedural rationality, the comprehensiveness, the rationality in strategic decision making)[183] are quite frequently applied in diverse management-oriented research studies. Therefore, their main findings will be briefly summarised in the following paragraphs.

The concept of procedural rationality was introduced by Dean & Sharfman in 1993. The authors state that procedural rationality, which is primarily based on information-oriented measures, is influenced by the environment (e.g., competitive threats), by the organisation, and by strategic issues (e.g., uncertainty of the environment).[184] Dean & Sharfman have mainly investigated the relation between the procedural rationality and the decision making success. Their results indicate that managers who have systematically collected information and have used analytical techniques were more effective than those who did not. Furthermore, environmental instability and the quality of the decision implementation have a bearing on the decision effectiveness.[185] Elbanna & Child share this view, stating that the procedural rationality has an impact on the organisational performance. Furthermore, they identified decision, firm, and environmental characteristics which influence the level of rationality. [186] By using the concept of procedural rationality in a laboratory experiment, Acharya investigated that in isolation, both the availability of information and the procedural rationality did not have any effect on the total costs of the supply chain. The interaction of information availability and procedural rationality influenced the overall supply chain performance[187] which is clearly a further indication for the usage of more holistic models in decision making research.

In recent studies, Kaufmann et al. used the concept of procedural rationality in supplier selection decisions. The analyses showed a significant impact of the procedural rationality on the financial performance as well as the non-financial performance. These analyses further revealed benefits of the procedural rationality across different levels of dynamism and stability of environments.[188] Moreover, Kaufmann et al. found that procedural rationality in sourcing teams enhances the cost performance,[189] and Riedl et al. showed additional significant effects of the

[183] Dean & Sharfman (1993), Dean & Sharfman (1996), Fredrickson (1983), Fredrickson (1984), Miller (1987), Miller (2008).

[184] Dean & Sharfman (1993).

[185] Dean & Sharfman (1996).

[186] Elbanna & Child (2007).

[187] Acharya (2012).

[188] Kaufmann et al. (2012b).

[189] Kaufmann et al. (2014).

procedural rationality in supplier selection decisions on the reduction of residual uncertainty in Chinese and in US samples. Thereby, the residual uncertainty significantly influenced the financial and the non-financial performance. [190]

Besides the procedural rationality, the heuristics-based concept of (decision) comprehensiveness by Fredrickson is one of the most frequently applied approaches in decision making research. Fredrickson demonstrates that rational models are not appropriate to be applied to all types of competitive environments. His analyses revealed a negative relationship between comprehensiveness and performance in unstable environments, and a positive relationship between comprehensiveness and performance in stable environments. [191] Moreover, Fredrickson & Iaquinto found out that changes in organisational size, executive team tenure, and the level of team continuity were associated with changes in the comprehensiveness. [192] In another context, Atuahene-Gima & Li discovered a positive relationship between comprehensiveness and new product performance, [193] while Nooraie demonstrated that the decision magnitude is significantly associated with the level of comprehensiveness in the decision making process; [194] likewise Simons et al. pinpoint that comprehensiveness partly moderates the relationship between team diversity variables and financial performance. [195]

Literature shows a multitude of additional models which partly refer to the conceptualisations described above. For example, Grover & Segars use the concept of comprehensiveness to identify different maturity stages in strategic information system planning processes, [196] whereas Goll & Rasheed employ their rationality model to explore the impact of environmental variables on decision making rationality and performance. [197] Pulendran et al. defined a concept of the quality of market planning, which contains the process formality, process rationality, process comprehensiveness, and interaction to demonstrate a significant positive relationship between market planning quality and business performance. [198] Papke-Shields et al. learned that

[190] Kaufmann et al. (2014).

[191] Fredrickson (1984), Fredrickson (1983).

[192] Fredrickson & Iaquinto (1989).

[193] Atuahene-Gima & Li (2004).

[194] Nooraie (2008).

[195] Simons et al. (1999).

[196] Grover & Segars (2005), Segars & Grover (1998).

[197] Goll & Rasheed (1997), Goll & Rasheed (2005).

[198] Pulendran & Speed (1996), Pulendran et al. (2003).

consistent patterns of strategic planning exist which can be related to planning success and to business performance.[199]

Priem et al. used the rationality concept by Miller[200] to investigate the impact of contextual variables on the decision making rationality. In this case, process rationality was positively related to the firm size. Surprisingly, their analyses indicated a positive rationality-performance relationship for firms operating in dynamic environments and no rationality-performance relationship for firms operating in stable environments.[201] Furthermore, Miller found out that comprehensiveness and performance are connected through a U-shaped function in non-turbulent environments and that organisations will have to move to an at least moderate level of comprehensiveness before reporting any benefit.[202]

Additional maturity models for planning systems were developed by Venkatraman & Ramanujam,[203] who defined 12 indicators for the key capabilities of a planning system, and by Schenkel, who perceives the quality of the planning process to consist of the formal quality, the quality of the information base, the quality of the interaction, and the efficiency of the planning process.[204]

One of the most comprehensive models based on the theoretical considerations of rational behaviour from of Max Weber was developed by Neuert. He has isolated five variables for his conceptualisation of rational planning behaviour in managerial planning processes. These five formative variables were amalgamated to the multidimensional degree of planning rationality. Neuert was able to illustrate a significant impact of the degree of planning efficiency on the total efficiency. The total efficiency is also an amalgamated measure which includes the formal efficiency (forecasting accuracy), material efficiency (financial performance), and personal efficiency (personal satisfaction).[205]

Summarised, most of the identified holistic studies cannot provide the desired comprehensive view on the major success factors in the decision making process because they mainly focus on information-based variables. According to the identified studies, a primarily information-based view does not always influence the **decision making efficiency**. There is a tremendous need for more holistic studies. The most comprehensive model, in line with this thesis´ theoretical

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[199] Papke-Shields et al. (2006).

[200] Miller (1987).

[201] Priem et al. (1995).

[202] Miller (2008).

[203] Venkatraman & Ramanujam (1987).

[204] Schenkel (2006).

[205] Neuert (1987).

conceptualisation, was developed by Neuert[206] for the investigation of rational behaviour in managerial planning processes. It should be further noted that most of the studies are based on the application of more "conservative" statistical methods (e.g., correlation and/or regression analyses) which can be seen as another methodological limitation of the existing **decision making process maturity**-related research studies.

2.3. LITERATURE REVIEW ON THE CONCEPTS AND MEASURES OF THE DECISION MAKING EFFICIENCY (DEPENDENT VARIABLES)

The second part of the literature review describes the conceptualisation of the evaluation of decision making outcomes, defined as the **decision making efficiency** by conducting a structured content analysis on the concepts and measures of the **decision making efficiency**-related variables.

By focusing on the in chapter 2.1 of this thesis developed classification of research-subject-related areas in management science, the author concludes that most of the identified studies were found in the areas of supply chain management (34.3%), strategic management (29.9%), and supply management (20.9%) research. Figure 2.6 depicts the chronological development of research-related studies for the investigated **decision making efficiency**-related variables.

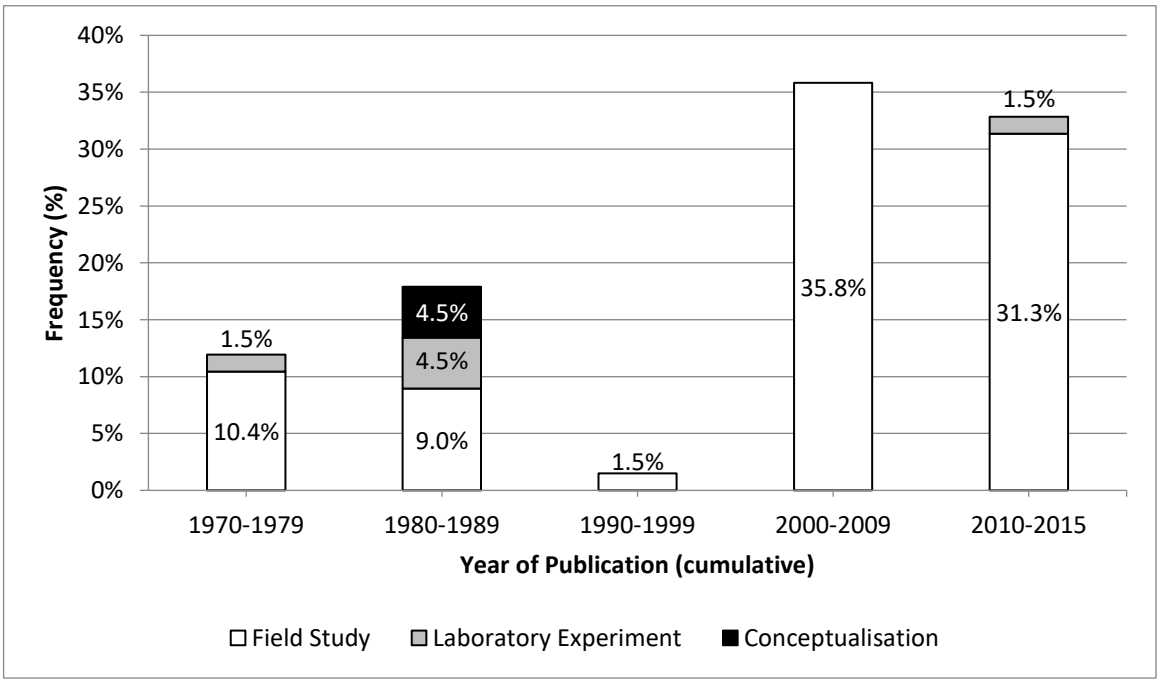

Figure 2.6: Chronological summary of decision making efficiency-related research studies[207]

[206] Neuert (1987).

[207] Figure created by the author (systematic literature analyses).

The resulting 67 studies[208] can be classified by type of study into 59 field studies (88.1%), 5 laboratory experiments (7.4%), and 3 conceptual studies (4.5%). Most of the **decision making efficiency**-related studies were empirically evaluated by using primary or secondary data from field studies. Only very few laboratory experiments and conceptual studies exist. However, most of the research-relevant studies were published between 2000 and 2010.

Figure 2.7 displays the second structured content analysis for the conceptual framework of this thesis by focusing on the **decision making efficiency** (DME) complex.

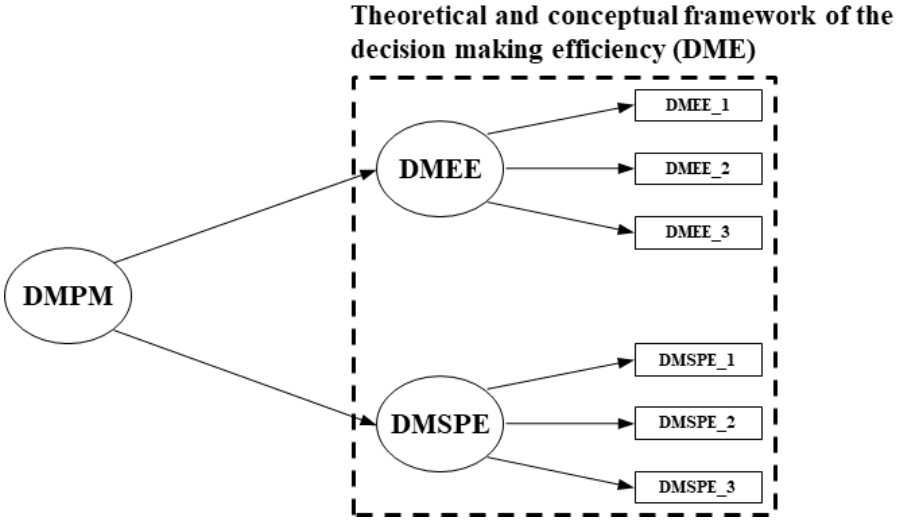

Figure 2.7: Segmented conceptual research model – decision making efficiency[209]

In general, this thesis will investigate the impact of the major success factors in the decision making process, defined as the independent variable **decision making process maturity** (DMPM), on the decision making outcomes, defined as the **decision making efficiency** (DME) complex. According to the theoretical conceptualisation, the author segments the **decision making efficiency** (DME) complex into two separated dependent variables, namely the ***decision making economic efficiency*** (DMEE) and the ***decision making socio-psychological efficiency*** (DMSPE). Consequently, the underlying indicators (e.g., DMEE_1, etc.) of the two dependent variables will be operationalised later on.

The decision making economic efficiency

Consequently, according to the theoretical framework, the ***decision making economic efficiency*** is defined as the actual economic performance in relation to the pre-defined

[208] The total evaluation of the 67 **decision making efficiency**-related studies is summarised in Table A1.-2-1 in appendix 1.2 of this thesis.

[209] Figure created by the author.

requirements in terms of cost-, quality-, and time-based measures.[210] Therefore, 70.9% of all identified direct and/or indirect variables focus on characteristics of the ***decision making economic efficiency***.

By generally reviewing the identified studies, we can distinguish between four different levels to measure effects of the actual supplier performance in the strategic supplier selection process. These four levels can be divided into the overall supply chain level, the company level, the department or product performance level, and the level of the individual decision.

In general, there is a future potential for studies which plan to measure the effects of the strategic supplier selection approaches respectively the supplier performance on the supply chain level. This can be explained by the complexity of the supply management system and by the availability of cross-company performance data. In this case, laboratory experimentations, e.g., the investigation by Acharya,[211] could be used as a starting point for further supply chain-oriented measurement approaches.

Most of the identified approaches of the ***decision making economic efficiency***-related studies measure the effects on the company level or, less frequently, on the department level. For example, Schenkel used the market success on the company level as an external measure and the company-internal efficiency for an additional internal perspective,[212] whilst Hsu et al. investigated the financial and the overall-performance of the company.[213] Likewise, Wentzel used the managerial performance and the budgetary performance in his measurement approach.[214]

In fact, most of the descriptive-oriented studies use the level of the individual decision maker for their analyses of the decision making economic efficiency. For example, Bronner, Hering, and Joost used similar approaches for the temporal efficiency and the economic efficiency.[215] Neuert, on the other hand, conceptualised and differentiated between the formal efficiency which measures the forecasting accuracy of the planning processes, and the material efficiency which measures the financial performance of the company.[216]

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[210] See chapter 1.4 of this thesis for the theoretical conceptualisation.

[211] Acharya (2012).

[212] Schenkel (2006).

[213] Hsu et al. (2008).

[214] Wentzel (2002).

[215] Bronner (1973), Hering (1986), Joost (1975).

[216] Neuert (1987).

The application of standardised self-rating scales might present another fruitful approach which also contains measures for evaluation of the decision making economic efficiency. Researchers like Chong & Chong developed a nine-item self-rating scale for the job performance,[217] while Gul et al. came up with a seven-point and eight-dimensional self-evaluation scale for the measurement of managerial performance.[218]

In the specific research-subject-related area of this thesis with regard to the individual decision maker, the author has identified only a handful of studies which use quite similar measures. However, these studies offer highly applicable scales. Their previous usage resulted in a high fit, implying a high validity and a high reliability of the measurement instruments. For example, Buhrmann used the non-financial decision effectiveness which includes quality- and time-based measures, and the financial decision effectiveness which includes cost-based measures of the supplier performance.[219] A similar approach is used by Kaufmann et al. who measure the cost-based supplier financial performance together with the quality- and time-based supplier non-financial performance.[220] Moreover, Riedl investigates the cost-based financial supplier performance and the supplier´s technical-, innovation-, management-, service-, and financial-strength-based strategic capabilities.[221] Furthermore, Riedl et al. measured the cost-based supplier financial performance and the quality- and time-based supplier non-financial performance.[222] Similar measures are applied in studies by Kaufmann & Crater (non-financial performance on the supplier relationship),[223] Kaufmann et al. (financial decision effectiveness),[224] and in the context of cross-functional teams by Kaufmann et al. (cost performance and quality/delivery/innovativeness performance).[225]

An additional approach for the measurement of the ***decision making economic efficiency*** is the usage of an expert solution. Thereby, the researcher compares the achieved decision making results with a pre-defined, objectified expert solution in order to establish a comparison of an actual solution that is checked against an idealistic solution. This approach was taken for

[217] Chong & Chong (2002).

[218] Gul et al. (1995).

[219] Buhrmann (2010).

[220] Kaufmann et al. (2012b).

[221] Riedl (2012).

[222] Riedl et al. (2013).

[223] Kaufmann & Carter (2006).

[224] Kaufmann et al. (2012a).

[225] Kaufmann et al. (2014).

instance by Witte et al. in various ***decision making economic efficiency***-related research studies.[226]

The decision making socio-psychological efficiency

Based on the theoretical conceptualisation, the ***decision making socio-psychological efficiency*** is conceptualised as a subjective measure of the decision makers´ subjective satisfaction with the decision making process and their subjective satisfaction with the final decision.[227] Consequently, the remaining 29.1% of all identified direct and/or indirect variables of the **decision making efficiency**-related studies included characteristics of the ***decision making socio-psychological efficiency***.

In this case, Bronner uses personal efficiency, as a measure for the satisfaction with the decision making results.[228] Neuert refers to his more advanced concept of the personal efficiency which measures the satisfaction of the decision maker in terms of process satisfaction and identification with the achieved results.[229] Schröder measures the satisfaction with the group results,[230] and in a more holistic concept, Hering discusses the satisfaction with one´s own and the group results, the mental state after the final decision, and the subjective judgment of the achieved solution.[231]

Moreover, Joost uses the occurrence of complaints as a measure for the satisfaction in his decision efficiency concept.[232] Of course, the previously mentioned approaches regarding the application of standardised self-rating scales also contain social-psychological measures. Again, in this case, the author refers to the self-evaluation scales used by Chong & Chong,[233] Gul et al.,[234] and Brouër.[235] In another context, researcher like Piercy & Morgan and Schenkel measure the satisfaction with the established plan,[236] while researcher like Juga et al., Saura et

[226] Witte (1972b), Witte (1972d), Witte (1972c), Witte (1988b).

[227] See chapter 1.4 of this thesis for the theoretical conceptualisation.

[228] Bronner (1973).

[229] Neuert (1987).

[230] Schröder (1986).

[231] Hering (1986).

[232] Joost (1975).

[233] Chong & Chong (2002).

[234] Gul et al. (1995).

[235] Brouër (2014).

[236] Piercy & Morgan (1990), Schenkel (2006).

al., and Zhang et al. turn to various dimensions of the service satisfaction and/or customer satisfaction as a socio-psychological indicator for the results of the decision making process.[237]

To sum up, most of the identified studies have only considered the economic measures for the evaluation of decision making outcomes, defined as the **decision making efficiency**. By referring to the theoretical part of this thesis, the author states that motivational and satisfaction-based aspects play an important role in the decision making process (e.g., during the information search processes and in the development of potential solutions). Therefore, the author will measure both, the economic and the socio-psychological perspectives of the decision making outcomes. In this thesis, the ***decision making economic efficiency*** will address the cost-, quality- and time- performance. Similar to most descriptive-oriented studies the focus is placed on the level on the individual decision as unit of analysis[238] in order to investigate the most precise and undisturbed cause-effect relationships. Moreover, the author will attempt to capture non-economic, satisfaction- and motivation-based effects, defined as the ***decision making socio-psychological efficiency***.

2.4. LITERATURE REVIEW ON THE CONCEPTS AND MEASURES OF THE COMPANY-INTERNAL DETERMINANTS (MODERATING VARIABLES)

The third part of the literature review describes the conceptualisation of the situational influencing factors in decision making processes, defined as the **company-internal determinants** of the decision making process by conducting a structured content analysis on the concepts and measures of the **company-internal determinant**-related variables.

By focusing on the in chapter 2.1 of this thesis developed classification research-subject-related areas in management science, the author concludes that most of the identified studies were found in the areas of supply management (31.3%), strategic management (25.0%), and sales and distribution management (12.5%) research. Figure 2.8 depicts the chronological development of field studies and laboratory experiments for the investigated **company-internal determinant**-related variables.

The resulting 16 studies[239] can be classified by type of study into 13 field studies (81.3%) and in 3 laboratory experiments (18.7%). No conceptual studies were identified in the course of the structured content analysis. Most of the **company-internal determinant**-related studies were

[237] Juga et al. (2010), Gil Saura et al. (2008), Zhang et al. (2005).

[238] E.g. Bronner & Wossidlo (1988), Riedl (2012), Buhrmann (2010).

[239] The total evaluation of the 16 company-internal determinant-related studies is summarised in Table A1.-3-1 in appendix 1.3 of this thesis.

empirically evaluated by using data from field studies. Only a handful of laboratory experiments exist. No conceptual approaches were identified in the course of the structured content analysis. However, most of the research-relevant studies were published between 2000 and 2010.

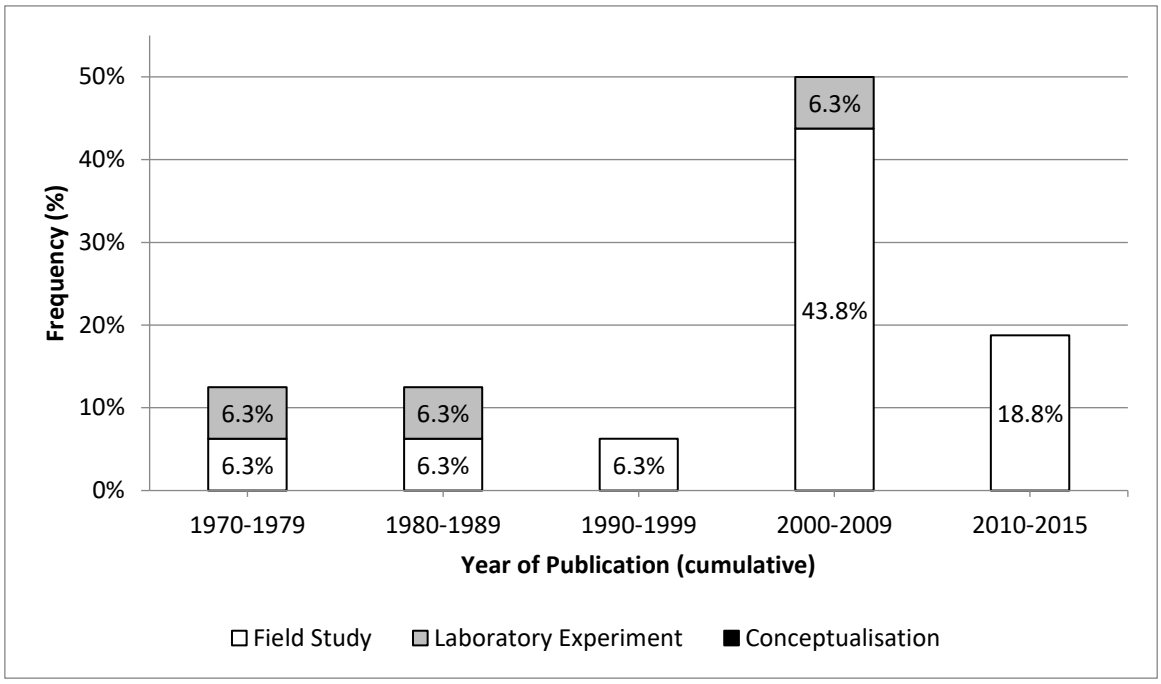

Figure 2.8: Chronological summary of company-internal determinants-related research studies[240]

Figure 2.9 displays the third structured content analysis for the conceptual framework of this thesis by focusing on the **company-internal determinants** (DMDET).

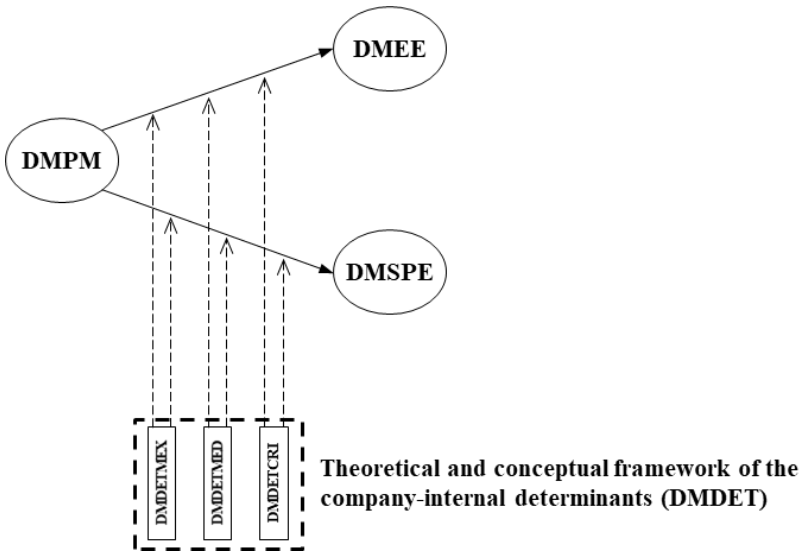

Figure 2.9: Segmented conceptual research model – company-internal determinants[241]

[240] Figure created by the author (systematic literature analyses).

[241] Figure created by the author.

In general, this thesis will investigate the impact of the major success factors in the decision making process, defined as the independent variable **decision making process maturity** (DMPM), on the decision making outcomes, defined as the **decision making efficiency** (DME) complex. In addition, the research model further includes three **company-internal determinants** (DMDET) which have a moderating effect on the relationship between the **decision making process maturity** (DMPM) and the **decision making efficiency** (DME) complex. As previously outlined, Figure 2.9 displays the moderating effects of the **company-internal determinants** (DMDET) on the relationship between the independent variable **decision making process maturity** (DMPM) and the two dependent variables of the **decision making efficiency** (DME) complex. The **company-internal determinants** (DMDET) will be divided into the ***manager´s experience*** (DMDETMEX), the ***manager´s education*** (DMDETMED), and into the ***company´s reward initiatives*** (DMDETCRI). Furthermore, the underlying indicators (e.g., DMDETMEX, etc.) of the three moderating variables will be operationalised later on.

The company-internal determinant manager´s experience

According to the here presented theoretical conceptualisation, the **company-internal determinant *manager´s experience*** is defined as the expert knowledge gained and evaluates the effects of specific on-job training of the decision maker.[242] However, 40.9% of all the identified studies can be assigned to characteristics of the ***manager´s experience***.

In the area of supplier selection decisions, Buhrmann discovered a significant relationship between the supplier selection knowledge, defined as experience with the purchasing item, and the abilities of challenging supplier alternatives, the perspective shifting intensity, and the decision task composition which significantly affect the financial and non-financial decision effectiveness.[243] Moreover, Riedl also underlines that the purchasing familiarity and the work experience have an impact on the decision process decomposition, but only in the Chinese sample and not in the US sample.[244] The empirical data revealed a significant relationship between product familiarity and procedural rationality respectively between work experience and procedural rationality.[245] In this context, Kaufmann et al. further ascertained that the experience-based intuition has a positive effect on both supplier costs performance and quality

[242] See chapter 1.5 of this thesis for the theoretical conceptualisation of this thesis.

[243] Buhrmann (2010).

[244] Riedl (2012).

[245] Riedl et al. (2013).

performance, delivery performance, and innovativeness performance in sourcing teams.[246] Park & Krishnan explored that the executive´s age is a significant moderator of the relationship between objective criteria and selection of suppliers.[247]

However, another set of studies shows no effect of the experience on various decision-relevant measures. In detail, Neuert found no significant differences in the problem solving times and no significant differences in the planning-effort-planning-outcome-ratio between more and less experienced participants.[248] Hence, Neuert concluded that there is no significant relation between age and decision making rationality.[249] Winklhofer´s research showed no significant impact of the (export) experience on the export sales forecasting resources, but a significant impact of the (export) experience on the export sales forecasting commitment.[250]

The company-internal determinant manager´s education

The **company-internal determinant *manager´s education*** captures all skills and knowledge obtained through training and/or education of the decision maker.[251] In the course of the systematic literature analysis, 27.3% of the identified studies can be assigned to characteristics of the ***manager´s education***.

Thereby, the majority of the identified studies show a positive effect of education and training initiatives on various performance measures.

In detail, Goll & Rasheed found a significant relationship between the managers´ educational level and the decision making rationality.[252] Neuert found significant differences in the degrees of planning behaviour between the "instructions" and the "no instructions" groups, significant differences in target orientation-, information-, and control-behaviour between the "instructions" and the "no instructions" groups, but could not make out any significant differences in organisation- and cognition-behaviour between the "instructions" and the "no instructions" groups.[253]

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[246] Kaufmann et al. (2014).

[247] Park & Krishnan (2001).

[248] Neuert (1987).

[249] Goll & Rasheed (2005).

[250] Winklhofer & Diamantopoulos (2003).

[251] See chapter 1.5 of this thesis for the theoretical conceptualisation.

[252] Goll & Rasheed (2005).

[253] Neuert (1987).

Mentzer & Cox have detected significant positive relationship between formal training and an increased forecasting accuracy. Thereby, the formal training had the largest coefficient affecting forecasting accuracy among other factors (i.e. the level at which forecast was prepared).[254]

Park & Krishnan Executive´s found that the executive´s education is a statistically significant moderator of the relationship between objective criteria and selection of suppliers.[255] Ahire et al. further stated that trained employees will significantly contribute to quality initiatives and to the consistent use of quality information, [256] while in Kaynak & Hartley´s view training is directly related to employee relations, but does not have a bearing on quality data and reporting respectively customer focus.[257]

The company-internal determinant company´s reward

The **company-internal determinant *company´s reward initiatives*** defined as performance-based incentives and/or bonus systems which are implemented to elevate the manager´s extrinsic motivation.[258] 31.8% of the identified studies can be assigned to characteristics of the ***company´s reward initiatives***.

Most of the identified studies show a significant impact of company´s incentives on various efficiency measures. In detail, Buhrmann demonstrates a significant relationship between the supplier selection incentives and the challenging of supplier alternatives respectively the perspective shifting intensity.[259] Riedl shows that incentives have a significant impact on the decision process decomposition[260] and that decision makers who anticipate rewards for strong decision performance are more likely to use procedural rationality.[261] Additionally, Ergliu & Knemeyer found that female forecasters who are motivated by financial rewards perform better in judgmental adjustments, whereas male forecasters who are motivated by financial rewards

[254] Mentzer & Cox (1984).

[255] Park & Krishnan (2001).

[256] Ahire et al. (1996).

[257] Kaynak & Hartley (2008).

[258] See chapter 1.5 of this thesis for the theoretical conceptualisation.

[259] Buhrmann (2010).

[260] Riedl (2012).

[261] Riedl et al. (2013).

perform worse.[262] In contradiction to the above described results, Davis & Mentzer concluded that there is no incentive to strive for forecasting accuracy; quite the opposite is the case.[263]

To sum up, the three selected **company-internal determinants** postulate a positive moderating effect on the relationship between the independent variable **decision making process maturity** and the two dependent variables of the **decision making efficiency**, namely the ***decision making economic efficiency*** and the ***decision making socio-psychological efficiency***. The ***manager´s experience*** might be able to enhance the abilities of challenging potential alternatives. The ***manager´s education*** can eventually be used as an approach to increase the target-orientation and the information-orientation in the decision making process and the ***company´s reward initiatives*** could perhaps elevate higher the manager´s motivation to achieve better decision making outcomes.

2.5. RESULTS OF THE CONCEPTUAL FRAMEWORK

In chapter 2 of this thesis, the author developed the conceptual framework of this thesis. Based on three structured content analyses he has identified more than 150 studies which include direct or indirect measures for the independent variable **decision making process maturity**, for the two dependent variables of the **decision making efficiency**, namely the ***decision making economic efficiency***, the ***decision making socio-psychological efficiency***, and for the three **company-internal determinants** ***manager´s experience***, ***manager´s education***, and ***company´s reward initiatives***. The studies were furthermore divided by according to type of study into field studies, laboratory experiments, and conceptual studies.

Most the identified studies support the proposition that a set of certain success factors in the decision making process, defined as constitutional elements of the **decision making process maturity**, will have an positive impact on the economic performance in terms of quality, cost, time dimensions. These performance indicators will be investigated on the level of the individual decisions and, therefore, measured by the ***decision making economic efficiency***.

Moreover, the ***decision making socio-psychological efficiency*** will determine the motivational perspectives in the decision making process in order to develop a more holistic evaluation model the decision making outcomes, defined as the **decision making efficiency**.

Based on the conceptual framework author further postulates positive moderating effects of the three **company-internal determinants** ***manager´s education***, ***manager´s experience***, and

[262] Eroglu & Knemeyer (2010).

[263] Davis & Mentzer (2007).

company´s reward initiatives on the relationship between the independent variable **decision making process maturity** and the two dependent variables ***decision making economic efficiency*** and the ***decision making socio-psychological efficiency***.

3. THE INVESTIGATION OF THE STRATEGIC SUPPLIER SELECTION PROCESS IN MANUFACTURING ENTERPRISES: MODEL DEVELOPMENT, RESEARCH METHODOLOGY, RESEARCH DESIGN, AND RESEARCH RESULTS OF THE TWO EMPIRICAL STUDIES

In the third chapter, the author will describe the research design, the research methodology, the research hypotheses, and the operationalisation of the independent and dependent variables. Thereby, he will further discuss the application of various research methods in order to answer the research question of this thesis and outline the applied research approach in more detail.

3.1. BASIC HYPOTHESIS AND DEVELOPMENT OF THE MODEL FRAMEWORK

Basically, the author´s research philosophy is based on the following statements. The author does not understand scientific research as self-serving acquisition of knowledge but is rather of the notion that successful research studies should help to develop application-oriented solutions based on substantial empirical findings in order to support practical operations.[264]

Therefore, the author applies scientific theories which represent a system of statements, axioms, and/or theorems based on a set of logically-interconnected hypotheses. These hypotheses postulate a more or less precise relationship between two or more variables based on a predefined population with comparable characteristics.[265] Again, for Popper theories respectively their underlying hypotheses should be used comparable to "fishing nets", to catch, rationalise, explain, and control the "real" world.[266] In the end, this approach should lead to the explanation and to the prediction of occurrences, structures, and cause-effect mechanisms within a pre-specified framework of reality.[267]

Summarised, the precise formulation of the hypotheses can be seen as the starting point for empirical research.[268] Therefore, the author will formulate the basic hypothesis and consequently derive the sub-hypotheses in the next paragraphs.

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[264] Neuert (2014), p. 41.

[265] Friedrichs (1980), pp. 62–63, Bortz & Döring (2007), pp. 8–9.

[266] Popper (1935), p. 26.

[267] Tetens (2013), pp. 55–58.

[268] Kromrey (2009), p. 44.

Development of the basic hypothesis

Generally, researchers distinguish between three different types of hypotheses. The first type of hypothesis postulates a significant correlation between one or more variables, the second type of hypothesis postulates a significant difference in a variable between two or more populations, and the third type of hypothesis postulates a significant change of the variable over the course of time.[269] In the course of this thesis, the author will primarily use correlation hypothesis in order to explore the effects of the **decision making process maturity** on the **decision making efficiency**, and furthermore utilise distinct hypotheses in order to investigate the effects of the three **company-internal determinants *manager´s experience***, ***manager´s education***, *and* ***company´s reward initiatives***.

Based on the theoretical analysis and referring to the conceptual framework of this thesis, the basic hypothesis H_B will investigate the proposed relationship between the **decision making process maturity** and the **decision making efficiency** exemplified by the strategic supplier selection process. Therefore, the basic hypothesis H_B is formulated as follows:

> **H_B:** There is a significant relationship between the **decision making process maturity** and the **decision making efficiency** in the strategic supplier selection process.

The aim of this research is to investigate the impact of the independent variable **decision making process maturity**, defined by the four constitutional elements ***DMPM-target orientation***, ***DMPM-information orientation***, ***DMPM-organisation***, and ***DMPM-heuristics application*** on the **decision making efficiency** which consists of the two dependent variables ***decision making economic efficiency*** and the ***decision making socio-psychological efficiency*** in the strategic supplier selection process.

In order to explore this relationship, the author has developed a cause-effect model which investigates the relationship between the (latent exogenous) independent variable on the (latent endogenous) dependent variables.

This cause-effect model and the underlying theoretical and conceptual framework are displayed in the following Figure 3.1.

[269] Bortz & Döring (2007), p. 492.

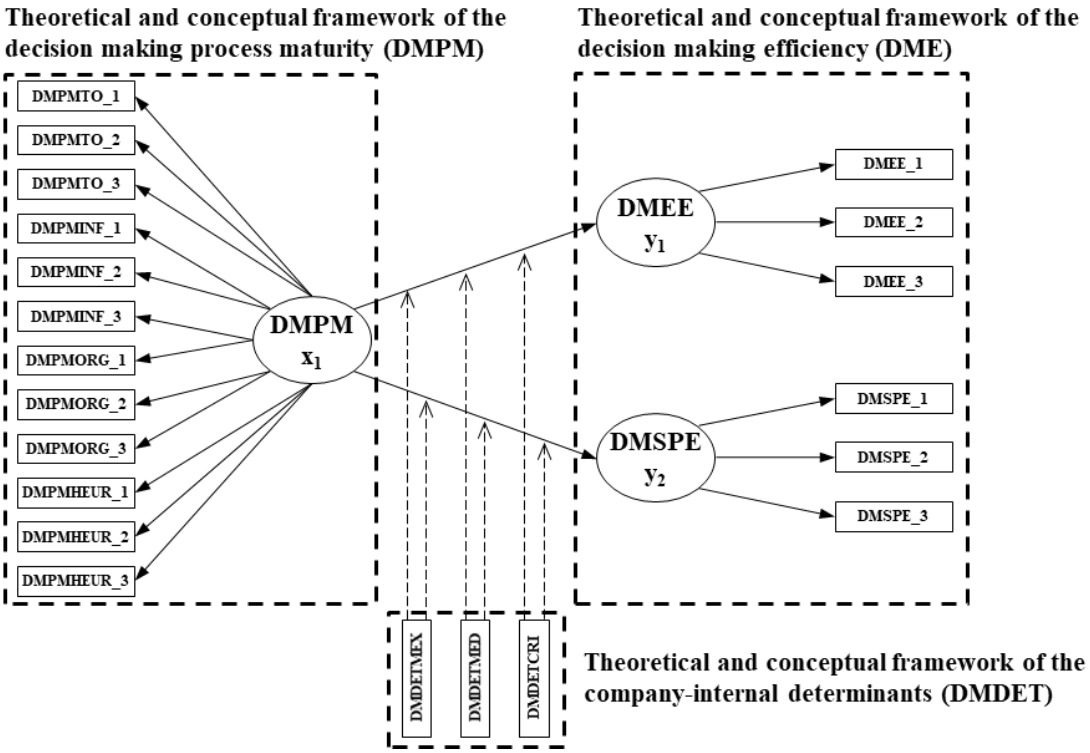

Figure 3.1: Conceptual research model[270]

Figure 3.1 postulates that major success factors in the decision making process, defined as the independent variable **decision making process maturity** (DMPM) will have a significant impact on the decision making outcomes, defined as the **decision making efficiency** (DME) complex. The **decision making efficiency** (DME) complex will be measured by the two dependent variables ***decision making economic efficiency*** (DMEE) and ***decision making socio-psychological efficiency*** (DMSPE). Moreover, the three moderating effects of **company-internal determinants** (DMDET), in particular the ***manager´s experience*** (DMDETMEX), the ***manager´s education*** (DMDETMED), and the ***company´s reward initiatives*** (DMDETCRI), will be further investigated in the empirical research process.

The independent variable x_1 **decision making process maturity** (DMPM) describes conceptualisation of success factors in the decision making process based on the amalgamation of four constitutional elements of rational decision making behaviour. The, **decision making process maturity** (DMPM) is operationalised and therefore measured by indicators of the four constitutional elements DMPMTO_1…3 (***DMPM-target orientation*** indicators 1-3), DMPMINF_1…3 (***DMPM-information orientation*** indicators 1-3), DMPMORG_1…3 (***DMPM-organisation*** indicators 1-3), and DMPMHEUR_1…3 (***DMPM-heuristics application*** indicators 1-3). The two dependent variables of the **decision making efficiency**, in particular y_1 ***decision making economic efficiency*** and y_2 ***decision making socio-psychological efficiency***, are

[270] Figure created by the author.

operationalised and therefore measured by using the indicators DMEE_1…3 (***decision making economic efficiency*** indicators 1-3), and DMESPE_1…3 (***decision making socio-psychological efficiency*** indicators 1-3). In addition, the author will briefly describe the developed independent and dependent variables of the cause-effect model.

The independent variable (x_1): The decision making process maturity

Based on the theoretical analysis and on the conceptual framework of this thesis, the **decision making process maturity** is comprised of four constitutional elements of rational behaviour and therefore describes the major success factors in the decision making process. Thereby the **decision making process maturity** includes the ***DMPM-target orientation***, the ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***. The ***DMPM- target orientation*** in the strategic supplier selection process is defined by the target system´s degree of precision, which is generated by using a target definition process, and the continuous usage of this target system in the course of the strategic supplier selection process and during the final supplier selection decision. The ***DMPM-information orientation*** in the strategic supplier selection process is based on the intensity of the information supply activities, meaning how intensively the decision maker searches for decision-relevant information. ***DMPM-organisation*** in the strategic supplier selection process is defined by the maturity level of systematically organised process activities in the strategic supplier selection process. ***DMPM-heuristics application*** in the strategic supplier selection process is based on the application of systematic heuristics, defined as the processing of logical problem-solving procedures, in the course of the strategic supplier selection process.[271]

Moreover, it is necessary to further define the two variables of the **decision making efficiency**, in particular ***the decision making economic efficiency*** and the ***decision making socio-psychological efficiency***.

The dependent variable (y_1): The decision making economic efficiency

The ***decision making economic efficiency*** variable is conceptualised as the economic performance caused by the **decision making process maturity** in the strategic supplier selection process. Therefore, the economic efficiency as a first measure for **decision making efficiency** in the strategic supplier selection process refers to the actual strategic supplier

[271] See chapter 1.3 of this thesis.

performance in relation to the pre-defined strategic supplier requirements in terms of cost-, quality-, and time-based measures.[272]

The dependent variable (y_2): The decision making socio-psychological efficiency

The ***decision making socio-psychological efficiency*** variable will be introduced as the second measure for the **decision making efficiency** in the strategic supplier selection process. It is based on a subjective measure of the supply managers´ satisfaction with the strategic supplier selection process and their satisfaction with the final strategic supplier selection decision. [273]

The company-internal determinants

Furthermore, the three **company-internal determinants**, in particular the ***manager´s experience***, the ***manager´s education***, and the ***company´s reward initiatives*** need to be differentiated. The ***manager´s experience*** describes the expert knowledge gained and evaluates the effects of specific on-job experience of the decision maker. Moreover, ***manager´s education*** is used to evaluate the effects of the decision makers´ specific education in terms of trained and/or acquired skills and knowledge, and the determinant ***company´s reward initiatives*** is used to investigate all performance-based incentives and/or bonus systems which are implemented to elevate the supply manager´s extrinsic motivation. [274]

3.2. SUB-HYPOTHESES DEVELOPMENT: DEVELOPMENT OF THE RESEARCH MODEL

Consequently, the sub-hypotheses H_{01}-H_{08} will be derived in the following. H_{01} will test the proposed relationship between the independent variable x_1 **decision making process maturity** and the dependent variable y_1 ***decision making economic efficiency***.

Therefore, H_{01} is formulated as follows:

> **H_{01}:** There is a significant relationship between the **decision making process maturity** and the ***decision making economic efficiency*** in the strategic supplier selection process.

H_{02} investigates the proposed causal relationship between the independent variable x1 **decision making process maturity** and the dependent variable y_2 d***ecision making socio-psychological efficiency***.

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[272] See chapter 1.4 of this thesis.

[273] See chapter 1.4 of this thesis.

[274] See chapter 1.5 of this thesis.

H_{02}: There is a significant relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency*** in the strategic supplier selection process.

H_{03} will test the proposed effect of the ***manager´s experience*** on the relationship between the **decision making process maturity** and the ***decision making economic efficiency***.

H_{03}: There is a significant effect of the ***manager´s experience*** on the relationship between the **decision making process maturity** and the ***decision making economic efficiency*** in the strategic supplier selection process.

H_{04} is used to investigate the proposed effect of the ***manager´s experience*** on the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency***.

H_{04}: There is a significant effect of the ***manager´s experience*** the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency*** in the strategic supplier selection process.

H_{05} will test the proposed effect of the ***manager´s education*** on the relationship between the **decision making process maturity** and the ***decision making economic efficiency***.

H_{05}: There is a significant effect of the ***manager´s education*** on the relationship between the **decision making process maturity** and the ***decision making economic efficiency*** in the strategic supplier selection process.

H_{06} is used to test the proposed effect of the ***manager´s education*** on the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency***.

H_{06}: There is a significant effect of the ***manager´s education*** on the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency*** in the strategic supplier selection process.

H_{07} will test the proposed effect of the ***company´s reward initiatives*** on the relationship between the **decision making process maturity** and the ***decision making economic efficiency***.

H_{07}: There is a significant effect of the ***company´s reward initiatives*** on the relationship between the **decision making process maturity** and the ***decision making economic efficiency*** in the strategic supplier selection process.

Finally, H_{08} is used to test the proposed effect ***company´s reward initiatives*** on the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency***.

> **H_{08}:** There is a significant effect of the ***company´s reward initiatives*** on the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency*** in the strategic supplier selection process.

3.3. RESEARCH METHODOLOGY

In general, the research process can be divided into following steps: The definition of research targets, the research design, the execution and coordination of the thesis, and the description of research results.[275] Thereby, the research methodology describes the strategy which is used to answer the predefined research questions.[276] Based on the overall research philosophy of "critical rationalism",[277] the author will define the appropriate research methods and develop an appropriate research design.

3.3.1. THE SELECTED RESEARCH APPROACH: A TRIANGULATION OF A LABORATORY EXPERIMENT AND A FIELD STUDY

The author has decided to use a triangulated approach which combines the advantages of a laboratory experiment with the advantages of a field study. This approach allows for a more holistic in-depth analysis of the strategic supplier selection process. By using this triangulated approach, the author will obtain valuable information from a laboratory experiment which ensures a high level of internal validity, control, and offers the opportunity to isolate confounding variables; the thesis also benefits from a field study which offers a high level of external validity, transferability, and generalisability of the research results.

This selected research approach is further supported by additional analysis on the modern state of the art research in the areas of supply management, logistics management, and supply chain management. The analysis of recent studies recommends the usage of expert surveys,[278] the application of structural equation modelling methods,[279] the usage of laboratory experiments,[280]

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[275] Maylor & Blackmon (2005), pp. 26–27.

[276] Greener (2008), p. 10.

[277] See Kromrey (2009), pp. 28–33 and Schneider (1998), pp. 127–137.

[278] Kotzab (2005), Grant et al. (2005).

[279] Sachan & Datta (2005), Gimenez et al. (2005), Wallenburg & Weber (2005).

[280] Deck & Smith (2013).

and especially the use of triangulation, meaning the combination of various research approaches.[281] The main advantages of the selected research approach will be briefly discussed within the next paragraphs.

Laboratory experiment

In general, (laboratory) experiments can be seen as the most exact scientific toolset of all available empirical research methods. Experiments allow the control of relevant variables, the manipulation of test conditions to explore the influence of one or more independent variables on a dependent variable, causal analysis, and the measurement of the dependencies between variables based on mathematical approaches.[282]

In contrast to field studies, laboratory experiments are rank high in control but low in realism. Laboratory experiments, which are conducted in an artificial setting, allow for the most control over participants, the experimental treatment, and the experimental settings. An extreme example of a laboratory experiment is a computer simulation where the experimenter can control all aspects of the experiment. Laboratory experiments are often criticised as unrepresentative of what actually is happening in organisations, because their setting can be artificial and simplified compared to real organisations, while the treatment may not even remotely represent people´s actual tasks in organisations. Often business management students are used as participants rather than typical members of the organisational population. However, laboratory experiments are most appropriate when the researcher investigates basic aspects of behaviour rather than complex social and organisational phenomena. In fact, experiments investigating human behaviour mostly require a high degree of control over the experimental settings. For some time now, researchers have recognised the increased importance of laboratory experiments for business management research. Thereby, they analyse human behaviour by comparing theoretical predictions with the actual behaviour. Additionally, the repeatability of laboratory investigations allows for a step by step development and modification of the underlying theoretical approaches.[283]

Summarised, laboratory experiments offer a high level of internal validity, control, adjustment, repeatability and the possibility to isolate confounding variables because of their artificial

[281] Soni & Kodali (2012), Mangan et al. (2004), Golicic & Davis (2012), Boyer & Swink (2008), Bak (2005).

[282] Friedrichs (1980), pp. 333–334.

[283] Maylor & Blackmon (2005), p. 207-247.

setting. Unfortunately, laboratory experiments have the disadvantage that their results may be limited in terms of transferability and generalisability.[284]

Field study

Field studies, which are mainly based on questionnaires, gain information directly from people or organisations when secondary data is not available. Therefore, the processing of surveys is structured, standardised and mostly not associated with very high costs. Yet, researchers usually underestimate the difficulty and necessary time for the design of a survey. Moreover, very few or even no responses present the worst case scenario. Field studies trade off some control of the environment for a more realistic setting. Even if the researcher studies people and organisations in natural settings, misleading effects of behavioural patterns and misinterpretations of research findings can occur.[285]

Summarised, field studies offer a high level of external validity, transferability, and generalisability of the research results because of their realistic setting, but with the disadvantage that confounding variables may influence the results of the research process.[286]

The process of triangulated research

In the research process, the author will to perform following research steps:

1. The author will analyse theoretical concepts and fundamental organisational theories of decision making in business management with a particular focus on the strategic supplier selection process in manufacturing enterprises. The author will perform three structured content analyses by focusing on research-subject-related studies from 1972 to 2016 in order to create the conceptual framework in which this research is grounded. These analyses will be divided into the literature review on concepts and measures of the **decision making process maturity**, the **decision making efficiency**, and the **company-internal determinants**.
2. The findings from the theoretical analyses and the results from the conceptual framework will be used to formulate the basic hypothesis, to develop the model framework, and to define the sub-hypotheses of the research model. For testing the hypothetical cause-effect relationships, the author will select and develop an appropriate research methodology and research design.

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[284] See Bortz & Schuster (2010), p. 8.

[285] Maylor & Blackmon (2005), p. 181–208.

[286] See Bortz & Schuster (2010), p. 8.

3. In the first empirical study, the author will conduct a laboratory experiment in order to investigate the cause-effect relations in the strategic supplier selection process within a controllable environment. The developed questionnaire and the preliminary results of the laboratory experiment will be analysed, evaluated, pre-tested, and developed further by specialists working in the field of strategic supplier selection processes, in order to ensure their applicability in the following field study. In the second empirical study, the author will conduct a field study by directly contacting supply managers in manufacturing enterprises.
4. The collected data will be analysed by executing a variety of statistical procedures (e.g., normal distribution tests, confidence intervals, correlation analyses, regression analyses, non-parametric group comparison tests, and structural equation modelling) by using state of the art software technology.
5. Finally, the author will derive implications the optimisation of decision making in business management, exemplified by the strategic supplier selection process in manufacturing enterprises. Moreover, the author will work out recommendations for future fields of decision making research and highlight possible directions that can be of relevance to practitioners, universities, and governmental institutions.

3.3.2. THE SELECTED MODELLING APPROACH: STRUCTURAL EQUATION MODELLING

The author will use the structural equation modelling approach for the analysis of the impact of the independent variable **decision making process maturity** on the two dependent variables of the **decision making efficiency**, and for the investigation of the **company-internal determinants**. The general advantages of structural equation modelling and the advantages of the selected variance-based approach will be explained within the next paragraphs.

Structural Equation Modelling

The methods of structural equation modelling contain a multitude of statistical procedures (e.g., path analysis, covariance structure analysis, regression analysis, factor analysis) to investigate complex relationships between manifest and/or latent variables. Structural equation modelling allows the quantitative description of the hypothetically proposed cause-effect relationships. The structural equation modelling approach aims to test the a priori formulated cause-effect

relationships by using a system of linear equations, while also attempting to optimise the estimation of the model parameters based on empirical data of the measurement variables.[287]

According to Urban & Mayerl, the advantages of the structural equation modelling approaches can be summarised with the following statements: Structural equation modelling allows for the analyses of dependence between independent and dependent variables including the simultaneous influence of multiple predictors. The modelling approach handles manifest (directly observable) and/or latent (not directly observable) variables and single-indicator- and/or multiple-indicator-measurement models. The modelling approach further enables a simultaneous estimation of all model parameter values, including model coefficients, path coefficients, co-variances, variances, as well as the mean values of the manifest and of the latent model variables. Structural equation modelling provides a multitude of measurement criteria for the evaluation of a proposed model. It further considers measurement errors which are included in the model analysis. Moreover, structural equation modelling can be used for modelling non-linear relationships and state of the art algorithms secure the processing of not-multivariate-normal-distributed and/or non-continuously-distributed data.[288]

In this thesis, structural equation modelling is used to test proposed relationships between a well-founded theoretical system of hypotheses and empirically-obtained data based on causal analysis. The special characteristic of structural equation models is their possibility to analyse latent variables. In contrast to manifest variables, latent variables can be seen as hypothetical constructs, characterised by more abstract descriptions which cannot be directly observed in reality. Latent variables play an important role in economics and management sciences, psychology, and in social sciences, e.g., especially when investigating attitudes, motivation, self-realisation. [289]

Summarised, latent variables, e.g., the ***decision making economic efficiency***, cannot be measured directly and therefore they require an operationalisation which develops an appropriate measurement system consisting of direct observable indicators.

The following Figure 3.2 displays a standardised structural equation model. This model consists of the structural model, the measurement model of the independent (latent exogenous) variable, and the measurement model of the dependent (latent endogenous) variables.

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[287] Weiber & Mühlhaus (2010), p. 17.

[288] Urban & Mayerl (2014), pp. 15–16.

[289] Backhaus et al. (2011), pp. 65–66, Backhaus et al. (2003), pp. 333–339.

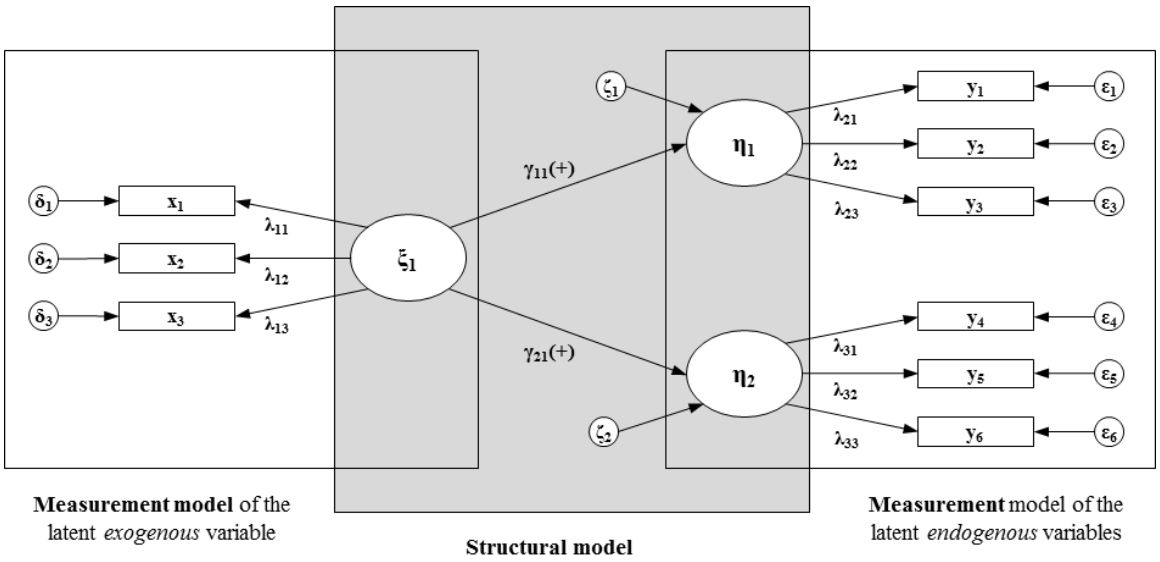

Figure 3.2: Standardised structural equation model[290]

As displayed in Figure 3.2, the structural model displays the theoretically proposed relationships between the independent and the dependent variables. In the present case, the standardised structural equation model consists of one independent variable ξ_1 and two dependent variables η_1 and η_2. The measurement model of the independent (latent exogenous) variable ξ_1 includes indicators (x_1, x_2, x_3) which are used for the operationalisation of the independent variable. It reflects the proposed relationships between those indicators and the independent variable. Moreover, Figure 3.2 displays the (factor) loadings λ_{11}, λ_{12}, λ_{13} and the indicators´ residuals δ_1, δ_2, δ_3 for the indicators of the independent variable ξ_1. Analogously, the dependent (latent endogenous) variables include the indicators (y_1, y_2, y_3) for the operationalization of the dependent variable η_1 as well as the indicators (y_4, y_5, y_6) for the operationalization of the dependent variable η_2. Moreover, Figure 3.2 displays the (factor) loadings λ_{21}, λ_{22}, λ_{23} and indicators´ residuals ε_1, ε_2, ε_3 for the indicators of the dependent variable η_1 and the (factor) loadings λ_{31}, λ_{32}, λ_{33} and indicators´ residuals ε_4, ε_5, ε_6 for the indicators of the dependent variable η_2. The relationship between the independent variable ξ_1 and two dependent variables η_1 and η_2 will be displayed by the path coefficients $\gamma_{11}(+)$ and $\gamma_{21}(+)$ respectively by the residuals ζ_1 and ζ_2. In this case, the notation (+) indicates a proposed positive relationship between the independent and the dependent variables.

A latent variable can be measured by various indicators which are developed in the operationalisation process. In general, formative and reflective indicators can be distinguished.[291] Formative measurement models are based on the assumption that causal

[290] Figure created by the author, based on Backhaus et al. (2011), p. 76.

[291] Töpfer (2012), pp. 283–284, Backhaus et al. (2011), pp. 120–122.

indicators form the variable by means of linear combinations. Formative indicators are not interchangeable. Each indicator of a formative variable captures a specific aspect of the variable´s domain, and taken together, these indicators ultimately determine the meaning of the variable, implying that omitting an indicator potentially alters the nature of the variable. In contrast to formative indicators, reflexive indicators measures represent the effects or manifestations, of an underlying variable. Reflexive indicators associated with a particular variable should be highly correlated and interchangeable with each other. Therefore, the relationship goes from the variable to its indicators, which implies that if the latent variable changes, all indicators will change at the same time.[292]

Within the structural equation modelling techniques, co-variance-based and variance-based structural equation modelling approaches can be distinguished. AMOS (Analyses of Moment Structures) and LISREL (Linear Structural Relationships) are the most common software tools of the co-variance-based structural equation modelling approach which allow for the evaluation of the path diagram-based model and its hypotheses based on factor analyses and multiple regression analyses. In contrast to the co-variance-based approach, the variance-based approach (e.g., the software SmartPLS) uses an algorithm which minimises the measurement errors of the model by maximising the relationship between the explained variance of the dependent endogenous variables and the variance of the independent exogenous variables.[293]

In summary, the co-variance-based approach aims to achieve an optimal fit in the empirical variance-co-variance-matrix based on hard modelling respectively theory-testing approaches. The target function minimises the difference between the empirical and the theoretical co-variances by using factor analysis-based approaches combined with a simultaneous estimation of all parameters in the causal model. The measurement models are primarily reflective and the method assumes a multi-normal distribution. This approach requires large sample sizes. The variance-based approach aims to maximise the prediction of the data matrix respectively the prediction of the target variable based on soft modelling respectively data- and prediction-oriented approaches. The target function minimises the difference between the empirical and the estimated data by using regression analysis-based approaches combined with a two-step estimation of the measurement model and the structural model. The measurement models are

[292] Hair (2014), pp. 46–47.

[293] Töpfer (2012), pp. 294–303.

reflective and formative and do not require a certain type of distribution. The variance-based approach also works well with smaller sample sizes.[294]

SmartPLS as a variance-based approach of structural equation modelling

The author has decided to use the variance-based structure equation modelling approach for the analysis of the dependencies between the independent variable **decision making process maturity** and the two dependent variables of the **decision making efficiency**, as well as for the investigation of the **company-internal determinants**.

This decision is supported by the following advantages of variance-based structural equation modelling approaches: In general, these approaches have no issues with smaller sample sizes and larger samples increase the precision of the partial least squares estimations. Furthermore, the variance-based approach is a non-parametric method which requires no distributional assumptions. The method is highly robust as long as the missing values are below a reasonable level and it works with metric, quasi-metric, or ordinal scaled data, and/or binary coded variables. The method handles single- und multi-item constructs as well as formative and reflexive measurement models. SmartPLS can calculate more complex models with many structural model relations. The toolset offers a multitude of evaluation criteria for the measurement models and for the evaluation of the structural model. Additionally, the multi group analysis toolset can be used for the investigation of the **company-internal determinants**.[295]

The standardised SmartPLS model evaluation procedure

Basically, empirical research requires the fulfilment of four essential quality criteria, namely the objectivity, the reliability, the validity and the generalisability of the research results.[296]
Therefore, the partial least square structural equation modelling approach offers criteria which allow for the assessment of the results based on the evaluation of the reflective and/or formative measurement models, the evaluation of the structural model, and additional model evaluation analyses.
Based on the recommendations by Hair et al.,[297] the author has conducted a standardised model evaluation procedure which is displayed in Figure 3.3.

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[294] Weiber & Mühlhaus (2010), pp. 65–69.

[295] Hair (2014), pp. 18–22, Jahn (2007), pp. 15–17. See appendix 6.3.3 for the standardised SmartPLS calculation settings of this thesis.

[296] Töpfer (2012), pp. 233–236.

[297] Hair (2014), pp. 104–226.

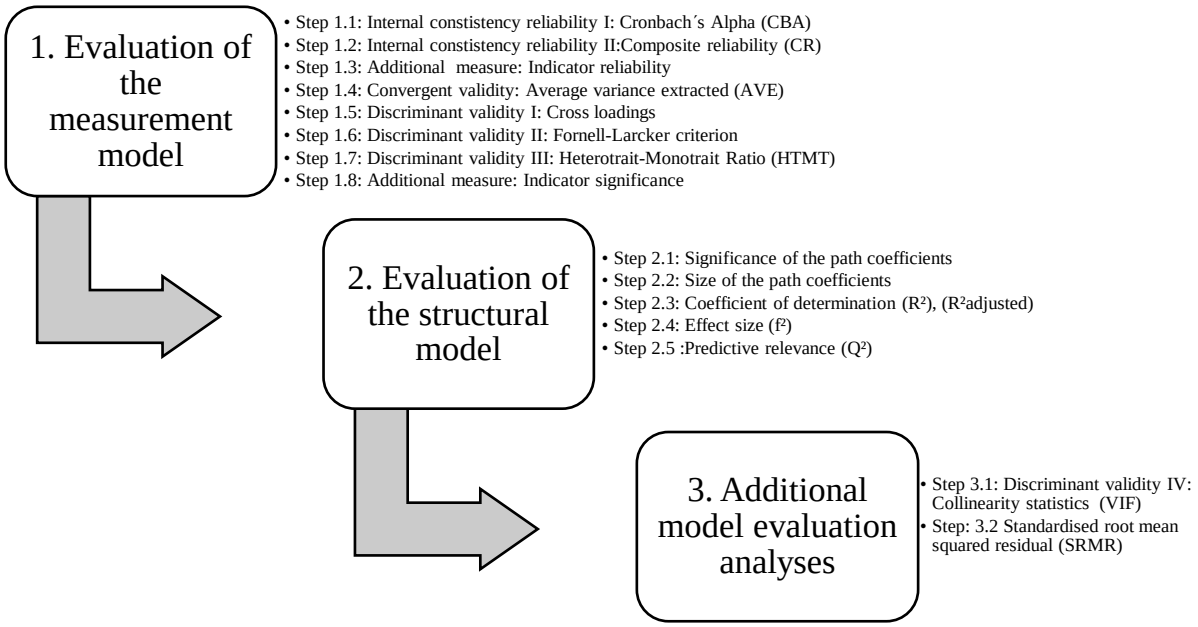

Figure 3.3: Standardised model evaluation procedure[298]

As outlined, Figure 3.3 displays the standardised model evaluation procedure which includes the evaluation of the measurement model, the evaluation of the structural model, and additional model evaluation analyses.

Evaluation of the measurement model

The first part of the standardised model evaluation procedure is focused on the evaluation of the measurement model. Thereby, the reliability describes the consistency and the accuracy of the measurement model while the validity measures the degree to which the measurement model measures what it is conceptually supposed to do.[299]

Step 1.1 of the evaluation of the measurement model measures the Cronbach´s alpha (CBA) value as a standardised criterion for the internal consistency reliability. The CBA value provides an estimate of the reliability based on the inter-correlations of the observed indicator variables. The CBA value assumes that all indicators are equally reliable, meaning that all of the indicators have equal outer loadings on the latent variable. Moreover, the modelling approach prioritizes the indicators according to their individual reliability. CBA value is sensitive to the number of items in the scale and generally tends to underestimate the internal consistency reliability. It is recommended to use the CBA as a more conservative measure of the internal consistency reliability. According the literature, the recommended values for the CBA should be at least

[298] Figure created by the author, based on Hair (2014), pp. 104–226.

[299] Weiber & Mühlhaus (2010), p. 103.

0.600 or more conservatively above 0.700 respectively 0.600 in exploratory research studies.[300] Step 1.2 of the standardised model, an evaluation procedure will be used to evaluate the composite reliability (CR) of the measurement model. CR is additional measure for the internal consistency reliability of reflective measurement models. CR considers different outer loadings of the indicator variables. According to the literature, recommended values for the CR should be higher than 0.7 respectively higher than 0.600 in exploratory research studies. Step 1.3 evaluates the indicator reliability. High outer loadings on a variable indicate that the associated indicators share a lot of similarities with the measure which is captured by the latent variable. This characteristic is called indicator reliability. According to literature, the recommended values for indicator reliability should be not below 0.400. If the indicator reliability is between 0.400 to 0.700 it should be optimised only if the deletion of an indicator leads to an increase of the composite reliability and an increase of the average variance extracted. Ideally, the indicator reliability should be above 0.700. Step 1.4 measures the average variance extracted (AVE) in order to assess the convergent validity. Convergent validity describes the extent to which a measure correlates positively with alternative measures of the same variable. In order to evaluate convergent validity, researchers consider the outer loadings and the AVE as an additional quality measure for convergent validity. According to the literature, the recommended values for the AVE should not be below 0.400 or more conservatively defined above 0.500. Step 1.5 evaluates the cross loadings as another potential method to assess discriminant validity. Discriminant validity refers to the extent to which a variable is truly distinct from other constructs in the research model. In this case, an indicator's outer loadings on the associated variable should be greater than any of its cross loadings. Step 1.6 measures the Fornell-Larcker criterion as a more conservative approach to assess discriminant validity. This criterion compares the square root of the AVE values with the latent variable´s correlations. The square root of each variable's AVE values should be greater than its highest correlation with any other construct. The logic of this method is based on the idea that a variable shares more variance with its associated indicators than with any other construct. Step 1.7 uses the Heterotrait-Monotrait Ratio (HTMT) to evaluate discriminant validity as an additional measure besides the cross loadings and the Fornell-Larcker criterion. According to the literature, the HTMT values should be above 0.850.[301]

[300] Heath & Jean (1997), p. 81, Hair et al. (2014), p. 111–123.

[301] Hair (2014), pp. 111–619. For further information see Fornell & Larcker (1981b), Peter (1979), Krasnova et al. (2008), p. 7, Homburg & Baumgartner (1995a), and Bagozzi & Youjae (1988), pp. 375–381.

The final step of the evaluation of the measurement model, step 1.8, recommends that indicator significance should result in a p-Value below 0.050.[302]

Evaluation of the structural model

The second part of the standardised model evaluation procedure is focused on the evaluation of the structural model.

Step 2.1 of the evaluation of the structural model assesses the significance of the path coefficients. According to the literature, the recommended values for the path coefficients to be significant should be below the p-value of 0.05 for a significant relationship or below the p-value of 0.01 for a highly significant relationship.[303] Step 2.2 determines the size of the path coefficients. Path coefficients should be in line with the hypothesized relationships. The values can range from -1.000 to +1.000. Positive values indicate a positive relationship and negative values indicate a negative relationship. Step 2.3 is concerned with the coefficient of determination R^2 as a measure of the proportion regarding the variance of the endogenous latent variable, explained by the exogenous variable(s). According to the literature, the recommended R^2 values are weak when below 0.250, moderate when between 0.250 and 0.500, and strong when above 0.500. Step 2.4 calculates the effect size (f^2) which indicates the importance of the effect an exogenous latent variable has on an endogenous latent variable. Hereby, literature suggests that the values of 0.02, 0.15 respectively 0.35 represent small, medium respectively large effects. Step 2.5 assesses the predictive relevance (Q^2). In addition to the evaluation of the magnitude of the R^2-values as a criterion of predictive accuracy, researchers should also examine Stone-Geisser's Q^2-value. This measure is an indicator of the model's predictive relevance. In the structural model, Q^2-values larger than zero for a certain reflective endogenous latent variable indicate the path model's predictive relevance for this particular construct. Therefore, the Q^2 recommended values should be above 0.000.[304]

Additional model evaluation analyses

The third part of the standardised model evaluation procedure is focused on additional model evaluation analyses. Thereby, the author will use two additional state of the art measures for the analysis of the research model.

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[302] Gefen & Straub (2005), p. 93.

[303] Bortz & Schuster (2010), pp. 106–107.

[304] Hair (2014), pp. 195–209. For further information see Cohen (1988), Stone (1974), and Geisser (1975).

Step 3.1 of the additional model evaluation analyses assesses the collinearity statistics (VIF) in order to measure collinearity issues. According to the literature, the recommended values for the VIF measures should be below 5.000 and above 0.200. Finally, step 3.2 computes the standardized root mean square residual (SRMR). The SRMR is used as a new evaluation criterion for the overall model fit, which is defined as root mean square discrepancy between the observed correlations and the model-implied correlations. Because SRMR is an absolute measure of fit, a value of 0.000 indicates a perfect fit. Furthermore, a value less than 0.10 respectively of 0.08 is considered a good fit.[305]

3.4. THE USAGE OF A LABORATORY EXPERIMENT FOR THE INVESTIGATION OF THE STRATEGIC SUPPLIER SELECTION PROCESS

For the first empirical test of the proposed cause-effect model, the author has decided to conduct a laboratory experiment. Therefore, the advantages of the laboratory settings, namely the high level of internal validity, control, adjustment, repeatability and the possibility to isolate confounding variables because of the artificial settings[306] will be used for the investigation of the impact of the **decision making process maturity** on the **decision making efficiency** variables in the strategic supplier selection process.[307]

In the laboratory experiment, the participants will be introduced to a specific strategic supplier selection case study[308] whereby they will receive quotations from a set of different suppliers. These quotations include basic information based cost-, time-, quality, and additional measures (e.g., prices, discount rates, quality of the offered products, delivery times) from the supplier and from their products offered. Moreover, the participants will have the opportunity to request additional and more specific information by using an optional information request sheet. In the end, the participants will have to develop a transparent solution to the strategic supplier selection case study by ranking the four suppliers regarding their final selection and by completing a post-experimental questionnaire. Finally, the participants will have to report the process used for the development of the solution to the strategic supplier selection case study which will be measured by the amalgamated constitutional elements of the **decision making process maturity**. The submitted solution to the strategic supplier selection case study will be compared to an expert solution which is based on the outlined above cost-, time-, and quality

[305] Hair (2014), p. 143–208. For further information see Kock & Lynn (2012) and Hu & Bentler (1999).

[306] Bortz & Schuster (2010), p. 8.

[307] For further information see Mittenecker (1968) and König (1972).

[308] See appendix 3.1 and appendix 3.2 for the experimental treatment (problem definition, tasks, and information request sheet of the strategic supplier selection case study).

measures of the supplier performance, defined as the ***decision making economic efficiency***. Moreover, the ***decision making socio-psychological efficiency***, introduced as a subjective measure of the supply manager regarding their satisfaction with the strategic supplier selection process and their satisfaction with the final supplier selection decision, will be measured by the post-experimental questionnaire.[309]

3.4.1. RESEARCH DESIGN AND RESEARCH PROCESS

Consequently, the author will describe the laboratory experiment in more detail. Therefore, the structure of the participants and the organisation of the laboratory experiment will be explained.

Structure of the participants

The main purpose of the laboratory experiment is to investigate the relationship between the **decision making process maturity** and the **decision making efficiency** variables, in particular the ***decision making economic efficiency*** and the ***decision making socio-psychological efficiency*** in the strategic supplier selection process in the context of a "simulated" industrial environment.

The laboratory experimental proceedings will be divided into three sessions and will be conducted by the author at the Fulda University in Germany. Each session performed the laboratory experiment with one test group. The groups will be classified as the "pre-test" group, the "main-test" group, and the "post-test" group.[310]

Several studies have already highlighted the fact that, in laboratory experiments, students and business management professionals produce almost similar results.[311]

Therefore, the author will use a randomly selected combination of students with professional background and business professionals as the analysed objects of this research. The "pre-test" group and the "post-test" group will be comprised of advanced bachelor students in the field of international management sciences who all have some professional background in management. The "main-test" group will be comprised of master students in the field of international management sciences who all have professional background in business management as well.

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[309] See appendix 3.3 and appendix 3.4 for the questionnaire of the strategic supplier selection case study.

[310] Coding: "Pre-test" group=group 0, "main-test" group=group 1, and "post-test" group=group 2.

[311] E.g., Neuert (1987), Bronner et al. (1972).

Procedure and organisation of the laboratory experiment

As described before, participants will be divided into three test groups in order to handle the experimental procedures in a more efficient way. The groups will be marked as the "pre-test" group, the "main-test" group, and the "post-test" group.[312]

Table 3.1 shows the experimental procedure and time schedule of the laboratory experiment.

Table 3.1: Experimental procedure (laboratory experiment)[313]

Standardised process steps	Timeframe
1. Introduction	5-10 min
2. Processing	10-15 min
3. Information request	5 min
4. Processing	no time limit (recommended: 15-20 min)
5. Results	no time limit (recommended: 15 min)
6. Survey	no time limit (recommended: 10 min)

Step 1: Introduction

The participants will be introduced to the problem situation. As a member of the supply management team they will be asked to select a new strategic supplier (respectively rank the existing suppliers with regard to their preference) for the product with the highest sales in their company.

The experimental task is based on a modified version of the strategic supplier selection case study "Bid Comparison and Suppler Selection".[314] This case study was tested in an academic and practical environment and further developed for the usage in the proposed laboratory experiment. This modification is used to provide an isomorphic or at least a homomorphic projection of a "realistic" strategic supplier selection process.[315]

Step 2: Processing

Initially, the participants will receive quotations from four suppliers. After that, the participants will be asked to evaluate the four quotations and deliver their solution to this strategic supplier selection process.

Step 3: Information request

After 10-15 minutes, participants will have the possibility to request additional supplier information by delivering the information request sheet. The request of additional information

[312] Coding: "Pre-test" group=group 0, "main-test" group=group 1, and "post-test" group=group 2.

[313] Table created by the author.

[314] See appendix 3.1 and appendix 3.2. The experimental task is based on the case study Institut für Ökonomische Bildung gemeinnützige GmbH (IÖB).

[315] See Neuert et al. (2015), p. 318 for further information regarding the modification and application of business simulations and case studies in decision making research.

causes a 10% delay to the total decision time, meaning that the requests of all available information will double their decision time in the end.

Step 4: Processing

After this step, the participants will be informed that there are no more time limits to complete the task and to answer the questions in the survey.

Step 5: Results

After the analysis, the participants will be asked to develop a transparent solution to the strategic supplier selection task by ranking the four suppliers regarding their final supplier selection decision and by justifying their ranking as an important part of their solution. Moreover, they will also have to describe their supplier selection process in detail by adding all calculations and notes to the protocol.

Step 6: Survey

Finally, participants will be asked to complete the attached questionnaire in order to investigate the relationship between ***the*** **decision making process maturity** and the **decision making efficiency** variables in the strategic supplier selection process.

3.4.2. OPERATIONALISATION OF VARIABLES

Based on the theoretical foundation and the conceptual framework, the author has precisely defined the hypotheses and the variables of this thesis.

In order to measure the latent variables, the researcher will have to develop measurement indicators in the process of operationalisation. The operationalisation develops measureable indicators which can be directly observed in the empirical reality. [316] In the course of the operationalisation, the author refers to the operationalisation process proposed by Esser, which contains several steps: The specification of the concept, the specification of variables, the specification of indicators, and the selection and/or the development of appropriate indicators based on indexation.[317]

Measurement theory generally distinguishes between nominal scales, ordinal scales, interval scales, and ratio scales.[318] In the course of this thesis, the author will primarily use pre-tested scales from prior research and develop some new measures based on standardised 5 point Likert scales which are most frequently used in modern empirical research. The main advantages of this scale type are its popularity, easiness, and the time-efficient conceptualisation process.

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[316] Kromrey (2009), pp. 161–189. For further information see Friedrichs (1980).

[317] Schnell et al. (2011), pp. 293–330.

[318] Bortz & Döring (2007), pp. 67–69.

Likert scales are probably more reliable and provide a greater volume of data than other scales. [319] Consequently, the author will operationalise the variables of the conceptual framework for the laboratory experiment. This will be achieved by formulating the indicators for the independent variable x_1 **decision making process maturity**, the dependent variable y_1 ***decision making economic efficiency***, and the dependent variable y_2 ***decision making socio-psychological efficiency***.

Figure 3.4 displays the operationalisation of the variables in the laboratory experiment based on the notation of a standardised structural equation model as described in chapter 3.3.2 of this thesis.

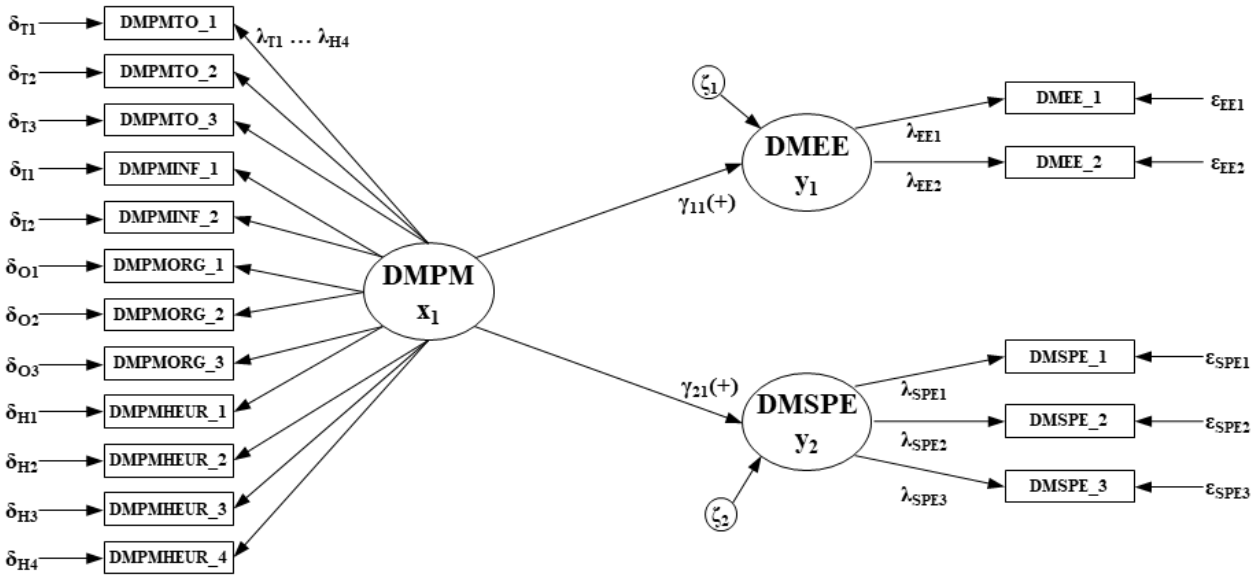

Figure 3.4: Operationalisation of the variables (laboratory experiment)[320]

As discussed, the independent variable x_1 **decision making process maturity** (DMPM) describes conceptualisation of success factors in the decision making process based on the amalgamation of four constitutional elements of rational decision making behaviour. Therefore, the **decision making process maturity** (DMPM) will be measured by defining the indicators (DMPMTO_1 … DMPMHEU_4) for its constitutional elements, namely the ***DMPM-target orientation***, the ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***. Moreover, the two depended variables of the **decision making efficiency** will be measured by the indicators (DMEE_1 … DMEE_2) for the dependent variable y_1 ***decision making economic efficiency*** (DMEE) and by the indicators (DMSPE_1 … DMEE_3) for the dependent variable y_2 ***decision making socio-psychological efficiency*** (DMSPE).

[319] Bortz & Döring (2007), p. 224, Cooper & Schindler (2014), p. 278.

[320] Figure created by the author.

Operationalisation of the independent variable (x_1): The decision making process maturity[321]

The independent variable **decision making process maturity** will be measured as an amalgamation of the four constitutional variables ***DMPM-target orientation***, the ***DMPM-information orientation***, **the** ***DMPM-organisation***, and the ***DMPM-heuristics application***. Thereby, the ***DMPM-target orientation*** in the strategic supplier selection process is defined by the degree of precision of the target system which is generated by using a target definition process and the continuous usage of this target system in the course of the strategic supplier selection process and during the final strategic supplier selection decision. Thereby, the author mainly refers to the studies by Hausschildt, Claycomb, Neuert, Riedl, and Buhrmann for the operationalisation of the first constitutional element ***DMPM-target orientation***. The ***DMPM-target orientation*** is operationalised by using the following indicators which were measured by using a 5 point Likert scale ranging from 1=completely disagree to 5=completely agree: [322]

- DMPMTO_1: I had well-defined targets for the supplier selection
- DMPMTO_2: I have reviewed the defined targets during the supplier selection process
- DMPMTO_3: I have reviewed the defined targets in the course of the final supplier selection decision

The ***DMPM-information orientation*** in the strategic supplier selection process is based on the intensity of the information supply activities, meaning how intensively the decision maker searches for decision-relevant information. Studies by Dean & Sharfman´s concept of procedural rationality are of relevance in this context as is Kaufmann et al. with regard to the operationalisation of the second constitutional element ***DMPM-information orientation***. The ***DMPM-information orientation*** is operationalised by using the following indicators which were measured by using a 5 point Likert scale ranging from 1=completely disagree to 5= completely agree: [323]

- DMPMINF_1: I have searched for decision-relevant information in the course of the supplier selection process
- DMPMINF_2: I have focused on decision-relevant information in the course of the supplier selection process

The ***DMPM-organisation*** in the strategic supplier selection process is defined by the maturity level of systematically organised process activities in the strategic supplier selection process. Neuert, Schenkel, and Joost´s study was consulted for the operationalisation of the third constitutional element ***DMPM-organisation***. The ***DMPM-organisation*** is operationalised by

[321] The theoretical framework of the **decision making process maturity** is described in chapter 1.3 of this thesis.

[322] Hauschildt (1988), Claycomb et al. (2000), Neuert (1987), Riedl (2012), Buhrmann (2010).

[323]Dean & Sharfman (1993), Dean & Sharfman (1996), Kaufmann et al. (2012b).

using the following indicators which were measured by using a 5 point Likert scale ranging from 1=completely disagree to 5=completely agree: [324]

- DMPMORG_1: I have used a well-defined process for the supplier selection
- DMPMORG_2: I have strictly organised the supplier selection process
- DMPMORG_3: I have used a pragmatic approach (facts & figure-oriented process) for the supplier section

The ***DMPM-heuristics application*** is based on the application of systematic heuristics, defined as the processing of logical problem-solving procedures in the course of the in the strategic supplier selection process. Studies by Neuert, Dean & Sharfman, Kaufmann et al., Riedl, Buhrmann, and Elbanna & Child were used for the operationalisation of the fourth constitutional element ***DMPM-heuristics application***. The ***DMPM-heuristics application*** is operationalised by using the following indicators which were measured by using a 5 point Likert scale ranging from 1=completely disagree to 5=completely agree: [325]

- DMPMHEUR_1: I have used well-defined evaluation criteria for the supplier selection
- DMPMHEUR_2: I have evaluated all suppliers based on defined evaluation criteria
- DMPMHEUR_3: I have accurately elaborated all consequences of an alternative choice
- DMPMHEUR_4: I have accurately elaborated all differences between all suppliers

Operationalisation of the dependent variable (y_1): The decision making economic efficiency[326]

The ***decision making economic efficiency*** is defined as the actual strategic supplier performance in relation to the pre-defined strategic supplier requirements in terms of cost-, quality-, and time-based measures. Therefore, the conceptualisation of ***decision making economic efficiency*** will include financial indicators (cost measures) and non-financial indicators (quality, time and flexibility measures). The ***decision making economic efficiency*** is operationalised by using an expert solution for the DMEE_1 indicator and by taking the required time from the laboratory experiment protocol sheets. The expert solution for the indicator DMEE_1 was computed by applying the following process: Calculate the total costs per unit for all the suppliers, use all information available, and calculate the total scoring points based on (total) costs-, time- and quality-measures, use a permutation algorithm to generate all combinations of supplier rakings from best to worst combination. [327] This expert-based

[324] Neuert (1987), Schenkel (2006), Joost (1975).

[325] Neuert (1987), Dean & Sharfman (1996), Kaufmann et al. (2012b), Riedl (2012), Buhrmann (2010), Elbanna & Child (2007).

[326] The theoretical framework of the ***decision making economic efficiency*** is described in chapter 1.4 of this thesis.

[327] See appendix 3.5.

approach was frequently used in similar empirical field studies and laboratory investigations.[328] In addition, we will measures the required time of the supplier selection process by using the indicator DMEE_2.

Summarised, the ***decision making economic efficiency*** is operationalised as follows:

- DMEE_1: Total supplier performance (based on costs-, time-, and quality-measures)[329]
- DMEE_2: Required time of the supplier selection process (equivalent to process costs)[330]

Operationalisation of the dependent variable (y_2): The decision making socio-psychological efficiency[331]

The ***decision making socio-psychological efficiency*** variable is operationalised as the second measure for the **decision making efficiency** in the strategic supplier selection process, where it is introduced as a subjective measure of the supply manager regarding their satisfaction with the strategic supplier selection process and their satisfaction with the final strategic supplier selection decision. The author thereby refers to the studies by Neuert, Bronner, and Schröder. The ***decision making socio-psychological efficiency*** is operationalised by using the following indicators which were measured by using a 5 point Likert scale ranging from 1=completely unsatisfied/no commitment to 5=completely satisfied/full commitment: [332]

- DMSPE_1: How satisfied are you with the supplier selection decision
- DMSPE_2: How do you commit to supplier selection decision
- DMSPE_3: How satisfied are you with the process of supplier selection

3.4.3. METHODS OF DATA COLLECTION AND QUALITY EVALUATION CRITERIA

Subsequently, the author will briefly discuss the selected method of data collection and the quality criteria for the research approach selected.

Method of data collection for the laboratory experiment

The testing of the proposed hypothesis and the application of proposed structural equation modelling approach require a high quality of the underlying research model in terms of validity

[328] E.g. Witte (1972b), Witte (1972d), Witte (1972c), Witte (1988b).

[329] See appendix 3.5 for the calculation of the expert solution.

[330] Bronner (1973).

[331] The theoretical framework of the ***decision making socio-psychological efficiency*** is described in chapter 1.4 of this thesis.

[332] Neuert (1987), Bronner (1973), Schröder (1986).

and reliability.[333] In this case, a standardised questionnaire, as an inexpensive, highly structured instrument which additionally avoids the personal influence of the interviewer,[334] will be used as the preferred method of data collection. Therefore, the author will develop a questionnaire based on the state of the art guidelines for empirical research studies.[335]

Evaluation criteria to assess the quality of the applied research method "laboratory experiment"

According to Töpfer, four quality criteria can be distinguished which are used to evaluate the quality of the selected research method. Thereby, objectivity should prevent a distortion or a manipulation of the research results by the researcher in the course of the data collection. Validity demands that a variable exactly measures its proposed conceptualisation. Reliability further describes the consistency and the accuracy of the measurement model, while generalisability describes the extent to which the specific research results can be transferred to generic research findings.[336]

The objectivity of the research method is ensured by the standardised research process which guarantees the objective processing of the experimental procedures.[337] Furthermore, a standardised method will be applied for the evaluation of the research results (including the evaluation of the descriptive results, the evaluation of the measurement model, the evaluation of the structural model, the structural analysis, and the hypothesis testing processes) and standardised guidelines for the interpretation of the research results. Moreover, the experimental procures were conducted by a team of researchers in different sessions which further contributes to the objectivity of the selected research method.

Validity evaluates to which extent a measure or a set of measures correctly represents the concept of the study, meaning the degree to which it is free from any systematic or non-random errors.[338]

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[333] Homburg & Baumgartner (1995b), pp. 1091–1108.

[334] Bortz & Döring (2007), pp. 252–253.

[335] In this case, the author is referring to the recommendations of Moosbrugger & Kelava (2012), Kirchhoff et al. (2010), and Porst (2011).

[336] Töpfer (2012), pp. 233–236, Bortz & Döring (2007), pp. 195–202.

[337] The experimental procedures are based on the recommendations of König (1972), Mittenecker (1968), and Friedrichs (1980).

[338] Hair et al. (2014), p. 92. See chapter 3.3.2 of the thesis.

As discussed, laboratory experiments offer a high control over the participants, the experimental treatment, and the experimental settings.[339] In detail, the artificial setting allows repetitive tests, the control of all research-relevant variables, an isolation of confounding variables, the variation of the experimental settings in order to explore additional effects, and in-depth cause-effect analyses due to their artificial set-up.[340]

In fact, all of the above mentioned criteria ensure a high internal validity of the selected research method. The issues of the external validity of laboratory investigations will be discussed in the generalisability section later on.

In order to evaluate the internal validity of the measurement instruments of the research model, it is vital to distinguish between content validity and construct validity.[341] Content validity requires a precise semantic definition of all constructs included. All measures indicators will have to reflect the defined substantial content of the variables. [342]

Content validity can be ensured by the structured research process which is based on the theoretical analyses and on the systematically deduced conceptual framework. The operationalised indicators are objectively generated in the course the operationalisation procedures and most of the selected indicators were used in previous studies within a similar context, which further contributes to the enhancement of the content validity.

Moreover, construct validity can be evaluated by primarily reviewing both the research model´s convergent validity and discriminant validity.[343] Convergent validity assesses the degree to which two measures of the same concept are correlated by looking for alternative measures of a concept and then correlate them with the summated scales. In this case, high correlations indicate that the scale measures its intended concept. Discriminant validity is defined as the degree to which two conceptually similar concepts are distinct. The summated scale is correlated with a similar, but conceptually distinct measure. In this case, the resulting correlations should be low and therefore indicate a sufficiently difference from other concepts. [344] Construct validity will be assessed in the model evaluation procedures. The selected structural equation modelling approach will be used to calculate measures for the

[339] Maylor & Blackmon (2005), p. 247.

[340] Friedrichs (1980), pp. 333–338.

[341] Hair et al. (2014), p. 123.

[342] Weiber & Mühlhaus (2010), pp. 127–138.

[343] Schnell et al. (2011), pp. 341–351.

[344] Hair et al. (2014), p. 124.

assessment of convergent validity (e.g., the average variance extracted (AVE)) and discriminant validity (e.g., the Fornell-Larcker criterion).

Reliability is defined as the extent according to which a variable or a set of variables is consistent in what it is intended to measure. In contrast to the previously defined validity, reliability does not relate to what should be measured, but instead to how it is measured.[345] In general, reliability can be assessed by testing the stability of the instruments with test-retest methods, by testing the equivalence of the instruments with parallel form tests, or by testing the internal consistency of the instruments.[346] Reliability will also be assessed in the model evaluation procedures. In this case, the selected structural equation modelling approach will be used to calculate measures for assessment of the internal consistency reliability (e.g., the Cronbach´s alpha (CBA) and/or the composite reliability (CR)).

Finally, generalisability must be considered as another criterion in order to assess the quality of the applied research method. Therefore, it is important to discuss the often controversially evaluated external validity[347] of laboratory investigations.

The experimental procedures will include three randomly selected test groups. The "pre-test" group and the "post-test" group will be comprised of advanced bachelor students in the field of international management sciences who all have some professional background in management. The "main-test" group will be comprised of master students in the field of international management sciences who all have some professional background in business management as well. The "pre-test" group will be used to ensure a flawless operation of the experimental procedures and the "post-test" group will be used to revalidate the research results. The focus of the research will be placed on the "main-test" group due to their professional background and their practical experience in strategic supplier selections. Similar to previous research studies,[348] the author proposes that business students with work experience and managers will behave in a similar manner and therefore produce similar results. This will be further ensured by the fact that the selected problem situation is both, an essential part of the business management education and research and a typical working procedure in the field of supply management professionals. Of course, the author will evaluate this postulated

[345] Hair et al. (2014), p. 92.

[346] Cooper & Schindler (2014), pp. 260–261.

[347] For further information see Bortz & Döring (2007), pp. 74–75 and Cooper & Schindler (2014), pp. 193–194.

[348] Neuert (1987), pp. 330–331, Bronner et al. (1972), pp. 183–186.

relationship by using non-paramedic group analyses and non-parametric group comparison tests later on.

Generally, laboratory investigations have been designed with the intention of representing an isomorphic or at least a homomorphic object of economic reality.[349] Therefore, the problem situation in the laboratory experiment should be similar to a "real life" decision situation.[350] As previously discussed, this will be ensured by a careful selection of the underlying strategic supplier selection case study.

Additionally, and in contrast to "real life" decision situations, the participants of the laboratory experiment will not be affected by the results and by the consequences of their behaviour. In order to achieve a better "ego-involvement", the author refers to the guideline of previously conducted experiments in which researchers have discovered that precise instructions can be used to eliminate playful behaviour.[351]

Furthermore, the guidelines of the selected structural equation modelling approach suggest that the minimum sample size can be calculated by taking ten times the largest number of structural paths directed at a particular variable in the structural model. Moreover, research offers decision tables for the minimum sample size in order to guarantee a flawless operation of the statistical test procedures.[352] In the present study, the proposed sample size of the laboratory experiment, which plans to involve more than 120 participants, is much higher than the recommended threshold of 33.

Moreover, state of the art empirical research studies[353] use the non-response-bias method by Armstrong & Overton to evaluate the representability based on significant differences in earlier and later responses. This approach is based on the fact that the behaviour of the non-responding sample is more similar to later respondents than to earlier respondents.[354] Although this evaluation approach will be primarily used to evaluate the results of the field study presented herein, the author will refer to the idea that a higher degree of homogeneity in the responses will enhance the transferability and the representability of the research results.[355] Therefore, the

[349] Neuert & Woschank (2014), p. 45.

[350] Bronner et al. (1972), p. 180.

[351] See Bronner et al. (1972), p. 180.

[352] Hair (2014), pp. 24–27.

[353] Kaufmann et al. (2014), Schenkel (2006).

[354] Armstrong & Overton (1977), pp. 396–402.

[355] For further information see Lippe (2011).

homogeneity in the responses between the three test groups will be investigated by using non-paramedic group comparison tests in the course of the evaluation procedures.

Based on the previously discussed quality criteria of the laboratory experiment, the author concludes that the selected research method will provide acceptable data based on the criteria of objectivity, validity, reliability, and generalisability.

3.4.4. DESCRIPTIVE RESULTS

The experimental procedures were conducted in May 2015 and in January 2016 at the Fulda University in Germany. In total, the overall sample of this laboratory experiment included 117 randomly selected participants which were divided into three test groups: The "pre-test" group (group 0, n=32 participants, May 2015, Fulda University, Germany), the "main-test" group (group 1, n=62 participants, May 2015, Fulda University, Germany), and the "post-test" group (group 2, n=23 participants, January 2016, Fulda University, Germany).

The "pre-test" group and the "post-test" group were comprised of advanced bachelor students in the field of international management sciences who had some professional background (< 3 years) in management. The "main-test" group was comprised of master students in the field of international management sciences who had a professional background in business management (> 3 years). The "pre-test" group was used to ensure the flawless operation of the experimental procedures (including the experimental process by itself and the quality respectively the accuracy of the questionnaire), and to receive a first indication of estimated cause-effect relationships. In order to increase the representability, the author has decided to focus on the "main-test" group due to their professional background and their practical experience. Moreover, the "pre-test" group and "post-test" group were used to re-validate the outcomes of the "main-test" group results and to explore potential deviations in decision making behaviour between managers ("main-test" group) and advanced international management science students with some professional background ("pre-test" and "post-test" groups).[356]

In total, the experimental procedures generated 2,229 data records which were analysed in the course of this thesis.

Distribution of gender (within the "main-test" group)

The "main-test" group included 62 participants. Therefore, group-specific demographic data will be discussed within the next paragraphs.

[356] See Neuert (1987), pp. 181–182 for a similar approach.

Out of the 62 participants in the "main-test" group, 34 participants (54.8%) were female and 26 participants (41.9%) were male. Additionally, 2 participants (3.2%) did not provide any information on their gender.

Distribution of age (within the "main-test" group)

Figure 3.5 shows the distribution of age among the "main-test" group in the laboratory experiment.

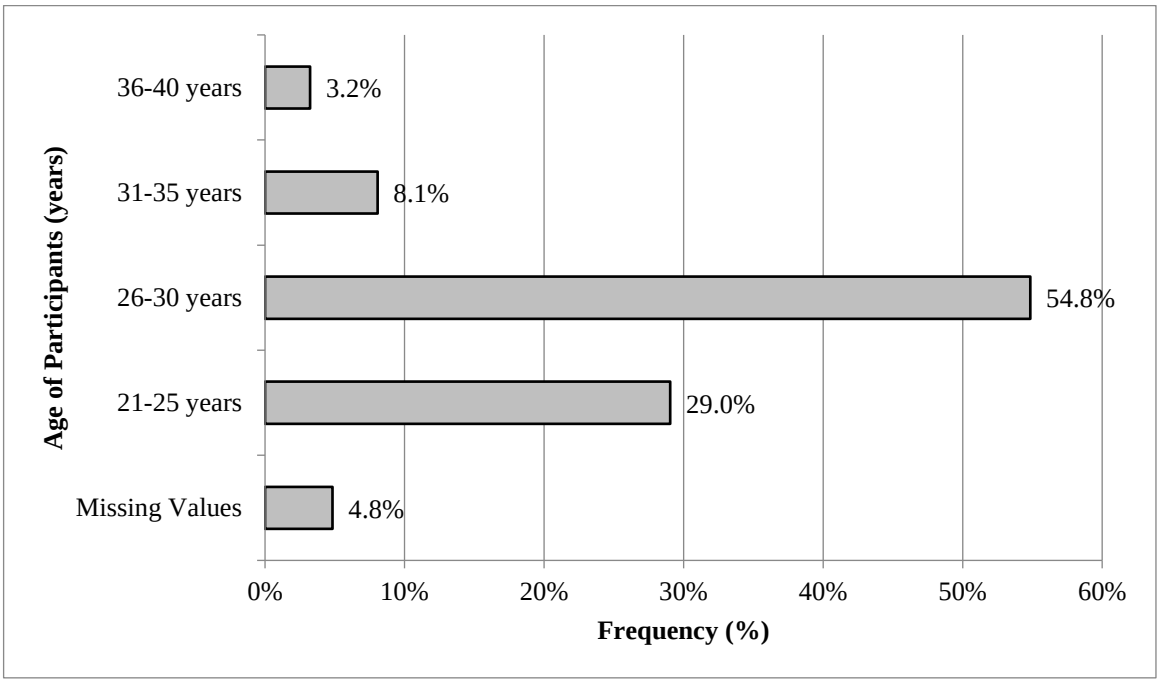

Figure 3.5: Distribution of age within the "main-test" group (laboratory experiment)[357]

Out of the total 62 participants, 18 participants (29.0%) were between 21 and 25 years old, 34 participants (54.8%) were between 26 and 30 years old, 5 participants (8.1%) were between 31 and 35 years old, 2 participants (3.2%) were between 36 and 40 years old, and 3 participants (4.8%) participants did not provide any information on their age.

Furthermore, the results provide the following descriptive data regarding the distribution of age among the participants of the "main-test" group in the laboratory experiment: Mean 27.296, median 27.000, minimum value: 23.000, maximum value: 39.000, standard deviation: 3.112.

[357] Figure created by the author (survey data – laboratory experiment, SPSS output, n=62, missing values: 3).

Distribution of processing time (within the "main-test" group)

In general, the participants had no time limit for their strategic supplier selection process in course of the experimental procedures. Figure 3.6 provides information on the processing time needed among the "main-test" group in the laboratory experiment.

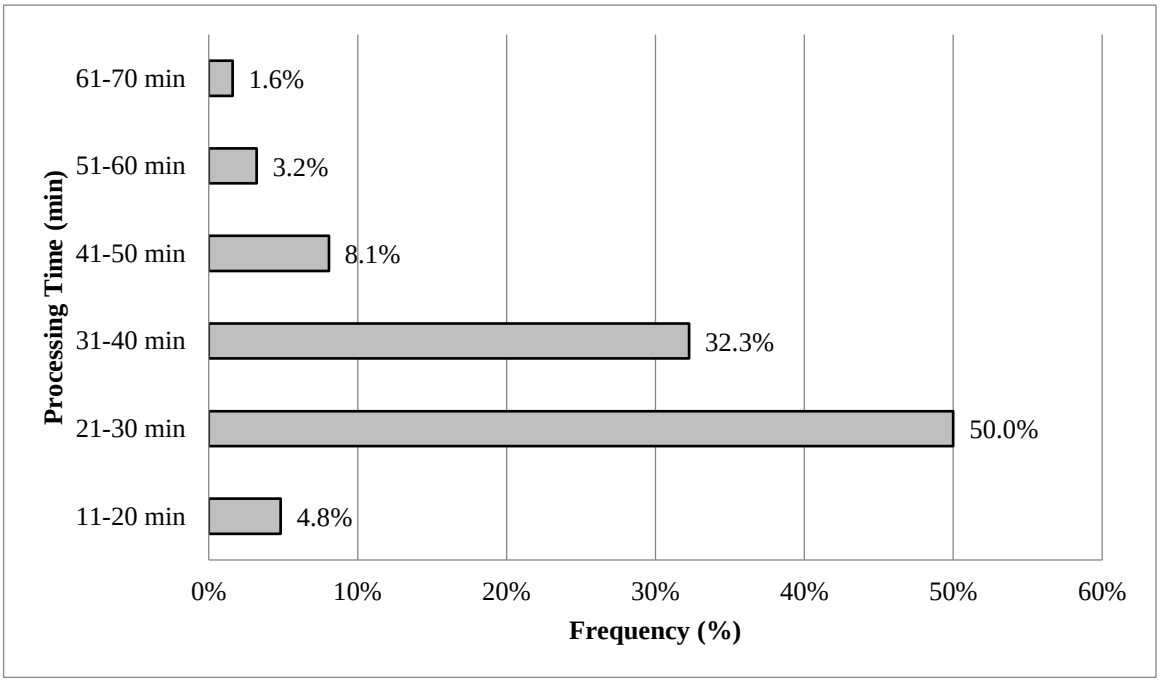

Figure 3.6: Distribution of processing time within the "main-test" group (laboratory experiment)[358]

Out of the 62 participants in the "main-test" group, 3 participants (4.8%) completed the experiment in 11 to 20 min, 31 participants (50.0%) have 21 to 30 minutes, 20 participants (32.3%) completed the experiment in 31 to 40 minutes, 5 participants (8.1%) finished in 41 to 50 minutes, 2 participants (3.2%) completed the experiment in 51 to 60 minutes, and only 1 participant (1.6%) took between 61 and 70 minutes.

Furthermore, the results provide the following descriptive data regarding the distribution of processing time among the "main-test" group in the laboratory experiment: Mean 31.518, median 28.000, minimum value: 18.000, maximum value: 64.000, standard deviation: 9.209.

[358] Figure created by the author (survey data – laboratory experiment, n=62, SPSS output).

Summarised mean values of all indicators (within the "main-test" group)

Table 3.2 displays the mean values of individual responses to all indicators in the laboratory experiment for the "main-test" group.

Table 3.2: Mean values of all indicators (laboratory experiment)[359]

Indicator	Missing	Mean	Median	Min	Max	Standard deviation
DMPMTO_1	0.000	3.554	4.000	1.000	5.000	1.347
DMPMTO_2	0.000	3.375	3.500	1.000	5.000	1.184
DMPMTO_3	0.000	3.411	4.000	1.000	5.000	1.276
DMPMINF_1	0.000	3.768	4.000	2.000	5.000	1.027
DMPMORG_1	0.000	3.107	3.000	1.000	5.000	1.186
DMPMORG_2	0.000	2.982	3.000	1.000	5.000	1.018
DMPMORG_3	0.000	4.000	4.000	1.000	5.000	0.972
DMPMHEUR_1	0.000	4.054	4.000	1.000	5.000	1.086
DMPMHEUR_2	0.000	3.911	4.000	1.000	5.000	0.959
DMPMHEUR_3	0.000	3.250	3.000	1.000	5.000	1.132
DMPMHEUR_4	0.000	3.518	4.000	2.000	5.000	0.953
DMEE_1	0.000	3.944	4.304	1.000	5.000	1.065
DMSPE_1	0.000	3.946	4.000	1.000	5.000	1.086
DMSPE_2	0.000	3.964	4.000	1.000	5.000	1.061
DMSPE_3	0.000	3.500	4.000	2.000	5.000	0.853

No indicator values were missing (missing values: 0) which provides a perfect foundation for the structural equation modelling procedures. Most of the indicators (variables: DMPM, DMEE, DMSPE) deviate from 1-5 on 5-point Likert scales. This means that the empirical data provides the entire range from less to more mature respectively from less to more efficient strategic supplier selection processes for the subsequent analyses.

In addition, (normal) distribution tests of all indicator values were performed. For this reason, a Kolmogorov-Smirnov test and a Shapiro-Wilk test were conducted to evaluate the (normal) distribution of all indicator values (variables: DMPM, DMEE, DMSPE). The results revealed significant differences in all indicator values between (empirical) data and not normally distributed data.[360] All indicators are not normally distributed.

Furthermore, the author investigated the homogeneity in the responses between the three test groups by using a non-parametric Kruskal-Wallis test. The results showed no significant differences in all indicator values between the "pre-test", the "main-test", and the "post-test"

[359] Table created by the author (survey data – laboratory experiment, SPSS output).

[360] See appendix 6.1.2.

group.[361] This can be seen as a further indication for the representability respectively the external validity of the research results in the laboratory experiment.

3.4.5. MODEL EVALUATION FINDINGS

Furthermore, the "quality" of the research model from the laboratory experiment has to be evaluated. This evaluation will be divided into three steps: The evaluation of the measurement model, the evaluation of the structural model, and additional model evaluation analyses.

Evaluation of the measurement model (laboratory experiment)

The in step 1.1 of the evaluation process computed Cronbach´s alpha (CBA) values of 0.851 for the **decision making process maturity**, 1.000 for the ***decision making economic efficiency***, and 0.806 for the ***decision making socio-psychological efficiency*** are all above the recommend values of 0.600, respectively 0.700, thus ensuring internal consistency reliability.[362]

Step 1.2 further measures the composite reliability (CR) as a second measure for the internal consistency reliability. The computed values come out at 0.879 for the **decision making process maturity**, 1.000 for the ***decision making economic efficiency***, and 0.883 for the ***decision making socio-psychological efficiency***. Again, all of the computed values are above the recommend threshold of 0.700,[363] confirming the internal consistency reliability.

In step 1.3 of the evaluation procedure, the indicator reliability is computed. Table 3.3 displays the indicator loadings. According to literature, the recommended values for the indictor loadings should not be below 0.400.[364] If indicator reliability score are between 0.400 and 0.700, they should only be optimised if the deletion of an indicator leads to an increase of both the composite reliability and the average variance extracted. Ideally, the indicator reliability should be above 0.700.[365] In the present case, the **decision making process maturity** indicator DMPMINF_2 (indicator loading=0.353) and the decision making socio-psychological efficiency indicator DMEE_2 (indicator loading=0.347) had to be eliminated from the model. All remaining indicator values are above the recommended threshold and therefore are considered as reliable measures.

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[361] See appendix 6.1.1.

[362] Heath & Jean (1997), p. 81, Hair et al. (2014), p. 123.

[363] Hair (2014), p. 122. For further information see Fornell & Larcker (1981b) and Peter (1979).

[364] Krasnova et al. (2008), p. 7. For further information see Homburg & Baumgartner (1995a).

[365] Hair (2014), p. 122.

Table 3.3: Indicator loadings (laboratory experiment)[366]

DMPM		DME (DMEE, DMSPE)	
Indicator	***Loadings***	***Indicator***	***Loadings***
DMPMTO_1	0.689	DMEE_1	1.000
DMPMTO_2	0.636	~~DMEE_2~~	~~0.347~~
DMPMTO_3	0.621	DMSPE_1	0.904
DMPMINF_1	0.487	DMSPE_2	0.862
~~DMPMINF_2~~	~~0.353~~	DMSPE_3	0.768
DMPMORG_1	0.562		
DMPMORG_2	0.550		
DMPMORG_3	0.580		
DMPMHEUR_1	0.728		
DMPMHEUR_2	0.736		
DMPMHEUR_3	0.689		
DMPMHEUR_4	0.636		

Step 1.4 calculates the average variance extracted (AVE). In this case, the AVE values are 0.401 for the **decision making process maturity**, 1.000 for the ***decision making economic efficiency***, and 0.717 for the ***decision making socio-psychological efficiency***. Although, the value of the **decision making process maturity** is quite low, all values are above the minimum criteria of 0.400.[367] The ***decision making economic efficiency*** and the ***decision making socio-psychological efficiency*** are above the more conservatively defined value of 0.500[368] ensuring the convergent validity of the research model.

The "low" AVE value of the **decision making process maturity** is mainly caused by the indicator loading of the DMPMINF_1 indicator (0.487). In order to explore the causes of this low indicator loading, the author compared the subjective DMPMINF_1 indicator values from the survey with the actually accessed decision-relevant information, which was recorded by a research assistant during the strategic supplier selection process. In this case, the Mann-Whitney U test shows significant differences in all indicator values between subjective estimated DMPMINF_1 values from the survey and the actually accessed decision-relevant information from the data records. This means that the participants of the laboratory experiment significantly overestimated their ability to search for useful (decision-relevant) information.[369]

[366] Table created by the author (survey data – laboratory experiment, SmartPLS output).

[367] Bagozzi & Youjae (1988), pp. 375–381.

[368] Hair et al. (2014), p. 619, Hair (2014), p. 122.

[369] See appendix 6.1.3 and appendix 6.1.4 for further information.

Step 1.5 evaluates the cross loadings. Table 3.4 shows the cross loadings from the laboratory experiment. Literature suggests that an indicator's outer loading on the associated variable should be greater than any of its cross loadings.[370] This the chase for all of the tested indicators. Therefore, the computed results confirm the discriminant validity of the research model.

Table 3.4: Discriminant validity I: Cross loadings (laboratory experiment)[371]

	DMPM → DMEE		**DMPM → DMSPE**	
Indicator	***Outer Loadings***	***Cross Loadings***	***Outer Loadings***	***Cross Loadings***
DMPMTO_1	0.689	0.267	0.689	0.138
DMPMTO_2	0.636	0.044	0.636	0.190
DMPMTO_3	0.621	0.113	0.621	0.314
DMPMINF_1	0.487	0.260	0.487	0.208
DMPMORG_1	0.562	0.174	0.562	0.411
DMPMORG_2	0.550	0.113	0.550	0.314
DMPMORG_3	0.580	0.211	0.580	0.254
DMPMHEUR_1	0.728	0.285	0.728	0.310
DMPMHEUR_2	0.736	0.349	0.736	0.241
DMPMHEUR_3	0.689	0.359	0.689	0.477
DMPMHEUR_4	0.636	0.190	0.636	0.280

Step 1.6 of the model assessment procedure calculates the Fornell-Larcker criterion as another measure for discriminant validity. The results of this calculation are given in Table 3.5.

Table 3.5: Discriminant validity II: Fornell-Larcker criterion (laboratory experiment)[372]

DMPM - DMEE		**DMPM - DMSPE**	
$\sqrt{AVE}$	***Lat. Var. Corr.***	$\sqrt{AVE}$	***Lat. Var. Corr.***
0.633	0.369	0.633	0.484

According to the literature, the square root of each construct's average variance extracted value should be greater than its highest correlation with any other construct.[373] This holds true for all of the computed values, therefore confirming the discriminant validity of the research model.

During step 1.7 the Heterotrait-Monotrait Ratio (HTMT) is generated as a third measure for the discriminant validity. The calculations result in the following values: DMPM→DMEE: HTMT=0.368, DMSPE→DMEE: HTMT=0.107, DMSPE→DMPM: HTMT=0.526. All values

[370] Hair (2014), 115–122.

[371] Table created by the author (survey data – laboratory experiment, SmartPLS output).

[372] Table created by the author (survey data – laboratory experiment, SmartPLS output).

[373] Hair (2014), pp. 115–122.

are above the recommended value of 0.850 [374] leading to a third confirmation for the discriminant validity of the underlying research model.

The last step of the measurement model evaluation procedure, step 1.8, calculates the indicator significance. According to Table 3.6 all indicator values are significant, meaning below the recommended p-value of 0.050.[375]

Table 3.6: Indicator significance (laboratory experiment)[376]

DMPM			**DMEE, DMSPE**		
Indicator	***T-values***	***p-values***	***Indicator***	***T-values***	***p-values***
DMPMTO_1	4.899	0.000	DMEE_1	-	-
DMPMTO_2	4.779	0.000	DMSPE_1	11.948	0.000
DMPMTO_3	4.530	0.000	DMSPE_2	7.385	0.000
DMPMINF_1	3.213	0.002	DMSPE_3	4.672	0.000
DMPMORG_1	4.077	0.000			
DMPMORG_2	4.556	0.000			
DMPMORG_3	4.403	0.000			
DMPMHEUR_1	7.350	0.000			
DMPMHEUR_2	6.683	0.000			
DMPMHEUR_3	8.882	0.000			
DMPMHEUR_4	5.588	0.000			

Evaluation of the structural model (laboratory experiment)

Step 2.1 computes the significance of the path coefficients. The results of this calculation are displayed in Table 3.7.

Table 3.7: Significance of the path coefficients (laboratory experiment)[377]

Path coefficient	**T-values**	**p-values**
DMPM → DMEE	2.493	0.013
DMPM → DMSPE	3.511	0.000

The results show a significant path coefficient for the **decision making process maturity** on the ***decision making economic efficiency*** and a highly significant path coefficient for the **decision making process maturity** on the ***decision making socio-psychological efficiency***.

[374] Hair (2014), pp. 129–132.

[375] Gefen & Straub (2005), p. 93.

[376] Table created by the author (survey data – laboratory experiment, SmartPLS output).

[377] Table created by the author (survey data – laboratory experiment, SmartPLS output).

This means that the proposed cause-effect relationships are confirmed in the structural model of the laboratory experiment.[378]

Step 2.2 evaluates the size of the path coefficients. The resulting values (0.369 for DMPM→DMEE respectively 0.484 for DMPM→DMSPE) are positive and therefore in line with the hypothesized relationships.[379]

Additionally, the in step 2.3 calculated R^2-values show positive and weak to almost moderate values. [380] In detail, the results are: R^2-value for the ***decision making economic efficiency***=0.136, R^2-value for the ***decision making social-psychological efficiency***=0.234.

The effect size (f^2) is calculated in step 2.4 of the structural model evaluation procedures. In line with literature,[381] the relationship between the **decision making process maturity** and the ***decision making economic efficiency*** shows a medium effect (f^2=0.158) and the relationship between the **decision making process maturity** and the ***decision making social-psychological efficiency*** also shows a medium, almost large effect (f^2=0.306).

The last step (2.5) of the structural model evaluation procedures calculates the predictive relevance (Q^2). The results of this calculation are displayed in Table 3.8.

Table 3.8: Computed Q^2-values (laboratory experiment)[382]

Construct cross-validated redundancy				**Construct cross-validated communality**			
Indicator	***SSO***	***SSE***	***Q^2(=1-SSE/SSO)***	***Indicator***	***SSO***	***SSE***	***Q^2(=1-SSE/SSO)***
DMPM	616.000	616.000	---	DMPM	616.000	446.589	0.275
DMEE	56.000	51.379	0.083	DMEE	56.000	---	1.000
DMSPE	168.000	146.061	0.131	DMSPE	168.000	95.610	0.431

All computed Q^2 levels are above the recommended threshold of 0.000.[383] The predictive relevance of the research model is ensured.

Additional model evaluation analyses (laboratory experiment)

Step 3.1 calculates the collinearity statistics (VIF) in order to further assess discriminant validity. All resulting valuesare higher than the recommend minimum value of 0.200 and lower

[378] Bortz & Schuster (2010), pp. 106–107. See chapter 3.4 of this thesis.

[379] See chapter 3.4 of this thesis.

[380] Hair (2014), p. 208.

[381] Hair (2014), p. 201-208. For further information see Cohen (1988).

[382] Table created by the author (survey data – laboratory experiment, SmartPLS output).

[383] Hair (2014), pp. 202–209. For further information see Stone (1974) and Geisser (1975).

than the recommended maximum value of 5.000,[384] again confirming the discriminant validity of the research model.[385]

Step 3.2 calculates the standardised root mean squared residual (SRMR) for the composite model. In this case, the SRMR value is 0.069 which, according to recommendations taken from literature, [386] can be considered as a good model fit.

3.4.6. STRUCTURAL ANALYSES AND HYPOTHESES TESTING

The positive results of the model evaluation procedure, which were used to ensure the validity and reliability of the research model, allow for a further testing of the proposed cause-effect relationships by using the empirical data from the laboratory experiment.[387]

Moreover, the results of the structural analysis of the research model will be briefly elaborated on. They will be divided into the evaluation of p-values and the evaluation of R^2-values.

Evaluation of p-values

The p-value is defined as the probability of observing a sample value as extreme as, or more extreme than, the actual value observed, given that the null-hypothesis is true. This also represents the probability of a type I error[388] that must be assumed if the null hypothesis is rejected. The p-value is compared to the significance level (α) and on this basis, the hypothesis is either rejected or confirmed (respectively tentatively corroborated).[389]

According to the literature, the recommended significance levels (α) are:[390]

- p-value ≤ 0.05 respectively 5% statistically significant
- p-value ≤ 0.01 respectively 1% statistically highly significant

The following Figure 3.7 displays the calculated p-values for the laboratory experiment. As already discussed in the model evaluation findings section, all indicators of the independent variable **decision making process maturity** (DMPM), the dependent variable ***decision making economic efficiency*** (DMEE), and the dependent variable decision making ***socio-psychological***

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[384] See Table A.6.3.1-1 Computed VIF values (laboratory experiment) in appendix 6.3.1 of this thesis.

[385] Hair (2014), p. 208. For further information see Kock & Lynn (2012).

[386] Hair (2014), p. 208. For further information see Hu & Bentler (1999).

[387] Jahn (2007), p. 30.

[388] A type I error defines the probability of incorrectly rejecting the null hypothesis, which in most cases means that a difference respectively a correlation exists, when it actually does not. Hair et al. (2014), p. 3.

[389] Cooper & Schindler (2014), pp. 438–440.

[390] Bortz & Döring (2007), pp. 495–496, Bortz & Schuster (2010), pp. 100–101, Töpfer (2012), p. 307.

efficiency (DMSPE) consistently show highly significant relationships (p-value≤0.01), meaning that in this research model all indicators highly significantly influence their associated latent variables.

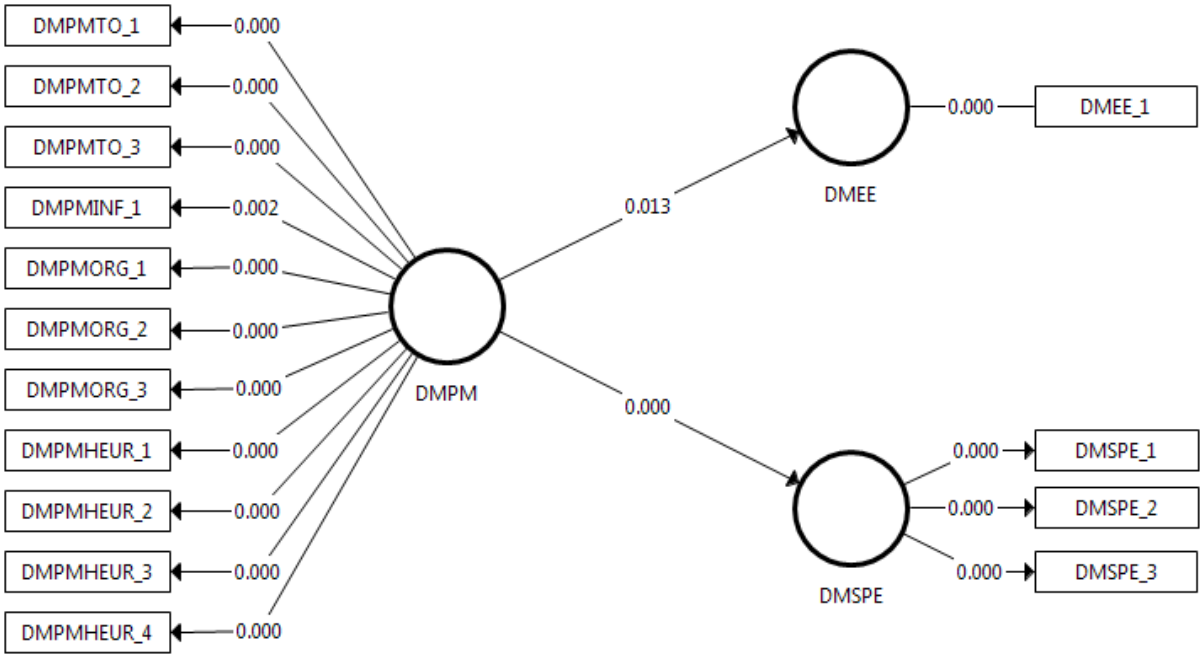

Figure 3.7: SmartPLS-SEM results: p-values (laboratory experiment)[391]

Moreover, the author will analyse the significance of the path coefficients. As displayed in Figure 3.7, the path coefficients of the structural model show significant relationships between the independent and the dependent variables of the research model in the laboratory experiment.

The empirical results show that the independent variable **decision making process maturity** (DMPM) has a statistically significant impact (p-value=0.013) on the dependent variable ***decision making economic efficiency*** (DMEE). The independent variable **decision making process maturity** has a statistically highly significant impact (p-value=0.000) on the dependent variable ***decision making socio-psychological efficiency*** (DMSPE).

Furthermore, the author has decided to calculate the **decision making efficiency** variable, as an amalgamated measure of the ***decision making economic efficiency*** with the ***decision making socio-psychological efficiency***. In the laboratory experiment, the **decision making process maturity** has a statistically highly significant impact (p-value=0.000) on the amalgamated **decision making efficiency** variable. The results of the p-value evaluation will be further discussed during the final test of the research hypotheses later on.

[391] Figure created by the author (survey data – laboratory experiment, SmartPLS output).

Evaluation of R^2-values

The coefficient of determination (R^2) measures the proportion of the variation in the dependent variable explained by the variation in the independent variable which can be calculated by computing the square root of the product moment correlation coefficient.[392]

Figure 3.8 displays the calculated R^2-values for the laboratory experiment.

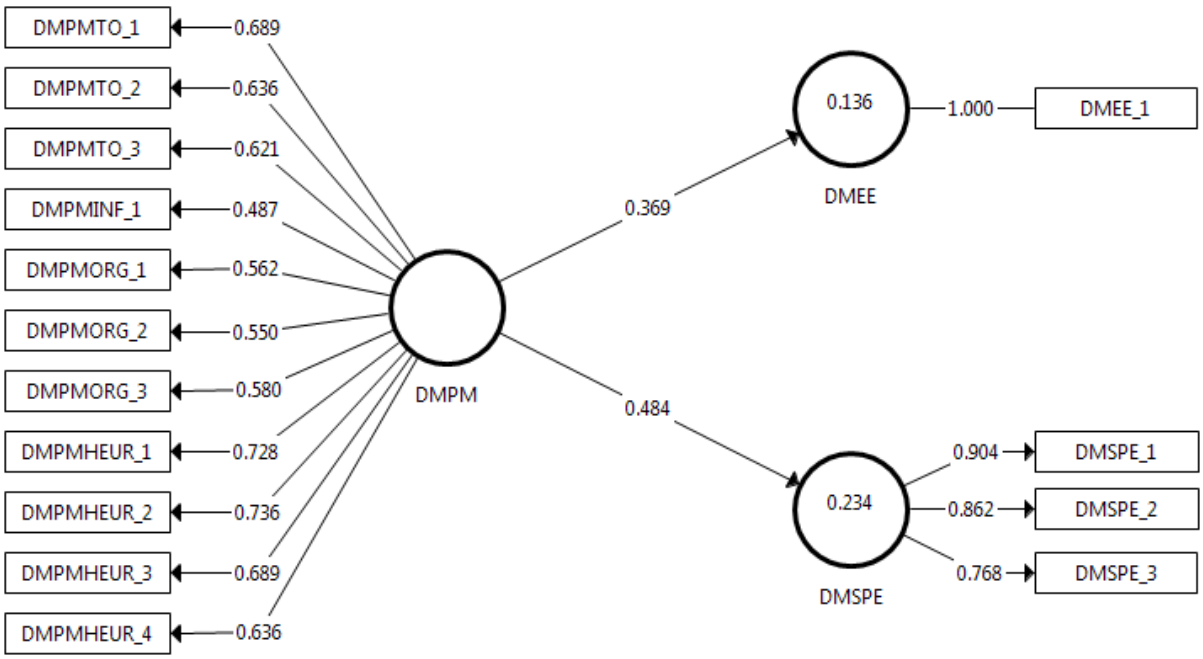

Figure 3.8: SmartPLS-SEM results: R^2-values (laboratory experiment)[393]

In the present case, the relationship between the independent variable **decision making process maturity** (DMPM) and the dependent variable ***decision making economic efficiency*** (DMEE) results in a R^2 of 0.136, meaning that in the laboratory experiment 13.6% of the variation of the ***decision making economic efficiency*** (DMEE) is explained by the **decision making process maturity** (DMPM). Moreover, the relationship between the independent variable **decision making process maturity** (DMPM) and the dependent variable ***decision making social-psychological efficiency*** (DMSPE) results in a R^2 of 0.234, suggesting that in the laboratory experiment 23.4% of the variation of the ***decision making social-psychological efficiency*** (DMSPE) is explained by the **decision making process maturity** (DMPM).

The author has decided to calculate the **decision making efficiency** variable as an amalgamated measures of the ***decision making economic efficiency*** with the ***decision making socio-***

[392] Oakshott (2012), pp. 250–251.

[393] Figure created by the author (survey data – laboratory experiment, SmartPLS output).

psychological efficiency. In the laboratory experiment, the relationship between the variable **decision making process maturity** and the amalgamated **decision making efficiency** results in a R^2 of 0.325 which means that in the laboratory experiment 32.5% of the variation of the amalgamated **decision making efficiency** is explained by the **decision making process maturity**. The results of the coefficient of determination (R^2) evaluation will be further discussed during the final test of the research hypotheses later on.

Testing the proposed hypotheses

As a next step, the author will test the research hypotheses. Based on the falsification principle of critical rationalism, it will be possible to gain scientific knowledge based on the preliminary confirmed statements and the simultaneous elimination of false statements. Thereby, the significant or non-significant results of the statistical procedures will be used as decision criteria for the tentative corroboration or rejection of the tested hypotheses.[394]

Figure 3.9 shows the testing of the proposed hypothesis in the laboratory experiment.

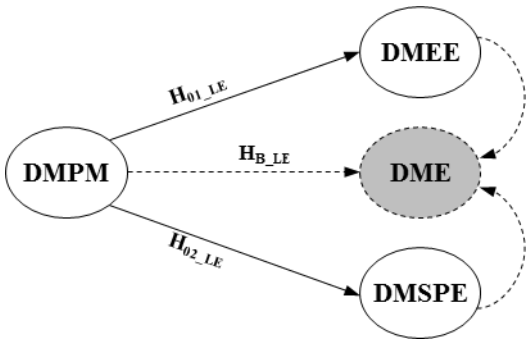

Figure 3.9: Testing the proposed hypotheses (laboratory experiment)[395]

Testing the hypothesis H_{01_LE}

As outlined before, hypothesis H_{01_LE} tested for the proposed causal relationship between the independent variable x_1, defined as the **decision making process maturity**, and the dependent variable y_1, the ***decision making economic efficiency***.

> **H_{01_LE}:** There is a significant relationship between the **decision making process maturity** and the ***decision making economic efficiency*** in the strategic supplier selection process.

[394] Bortz & Döring (2007), pp. 27–29.

[395] Figure created by the author (survey data – laboratory experiment, SmartPLS output). Abbreviations: **Decision making process maturity** (DMPM), ***decision making economic efficiency*** (DMEE), amalgamated **decision making efficiency** (DME), ***decision making socio-psychological efficiency*** (DMSPE).

The results of the structural equation modelling calculations show a significant relationship (p-value=0.013) between the **decision making process maturity** and the ***decision making economic efficiency***. H_{01_LE} is thus tentatively corroborated in the laboratory experiment, meaning that there is a significant impact of the major success factors in the decision making process, defined as the **decision making process maturity**, [396] on the cost-, time-, quality-based strategic supplier performance, defined as the ***decision making economic efficiency***.

Testing the hypothesis H_{02_LE}

Furthermore, hypothesis H_{02_LE} assumed a proposed causal relationship between the independent variable x_1, defined as the **decision making process maturity**, and the dependent variable y_2, the ***decision making socio-psychological efficiency***.

> **H_{02_LE}:** There is a significant relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency*** in the strategic supplier selection process.

The results of the structural equation modelling calculations show a highly significant relationship (p-value=0.000) between the **decision making process maturity** and the ***decision making socio-psychological efficiency***. H_{02_LE} is therefore tentatively corroborated in the laboratory experiment, meaning that there is a highly significant impact of the major success factors in decision making process, defined as the **decision making process maturity**, [397] on the ***decision making socio-psychological efficiency***, introduced as a subjective measure of the supply manager regarding their satisfaction with the strategic supplier selection process and their satisfaction with the final strategic supplier selection decision.

In summary, it can be stated that the laboratory experiment supports the relationship between the **decision making process maturity** and the ***decision making economic efficiency***. The empirical tests furthermore back the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency***.

Testing the amalgamated hypothesis H_{B_LE}

Moreover, the author has amalgamated the ***decision making economic efficiency*** with the ***decision making socio-psychological efficiency*** to a cumulative **decision making efficiency** variable. Thereby the statistical procedures result in a highly significant relationship (p-

[396] The concept of the **decision making process maturity** amalgamates the four constitutional elements of rational decision making behaviour ***DMPM-target orientation***, the ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***.

[397] See footnote 396 for the definition of the **decision making process maturity**.

value=0.000) between the **decision making process maturity** and the amalgamated **decision making efficiency**, which supports the basic hypothesis H_{B_LE} of this thesis. This means, that there is a significant impact of the major success factors in the decision making process, defined as the **decision making process maturity**, [398] on the overall decision making outcomes, defined as the **decision making efficiency**.

Finally, Table 3.9 displays the summarised hypotheses tests in the laboratory experiment.

Table 3.9: Testing of hypotheses: H_{B_LE}, H_{01_LE}, H_{02_LE} (laboratory experiment)[399]

Hypothesis	Result	
H_{B_LE} (DMPM→DME)	Confirmed (tentatively corroborated)[400]	
H_{01_LE} (DMPM→DMEE)	Confirmed (tentatively corroborated)	γ_{11}=0.369, p-value=0.013 R^2=0.136
H_{02_LE} (DMPM→DMSPE)	Confirmed (tentatively corroborated)	γ_{21}=0.484, p-value=0.000 R^2=0.234

In sum, as described above and displayed in Table 3.9, H_{B_LE}, H_{01_LE}, and H_{02_LE} are confirmed, respectively tentatively corroborated in the laboratory experiment. These results will be discussed further and explained in detail in chapter 3.6 of this thesis.

3.5. THE STRATEGIC SUPPLIER SELECTION PROCESS IN MANUFACTURING ENTERPRISES: A FIELD STUDY-BASED APPROACH

3.5.1. RESEARCH DESIGN AND RESEARCH PROCESS

For the second empirical test of the proposed hypotheses, the author decided to conduct a field study in the empirical environment of the manufacturing enterprises. This method will compensate for the potential shortcomings of the laboratory experiment in terms of external validity. The field study will provide valuable "real-economical" insights for the investigation of the strategic supplier selection process.

Therefore, the author will directly contact supply managers in manufacturing enterprises by using an ex-post-evaluation approach. The supply managers will have to randomly recall a specific strategic supplier selection process from their experience and fill out a questionnaire which will be used to evaluate the impact of the **decision making process maturity** on the

[398] The concept of the **decision making process maturity** includes the ***DMPM-target orientation***, the ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***.

[399] Table created by the author (survey data – laboratory experiment, SmartPLS output).

[400] γ_{11cum}=0.570, p-value=0.000, R^2_{cum}=0.325.

decision making efficiency variables in the strategic supplier selection process.[401] Thereby, the managers will have to describe the strategic supplier selection process which they have used to select the strategic supplier, measured by the constitutional elements of the **decision making process maturity**, the performance of the selected strategic supplier, based on cost-, time-, and quality indicators and measured by the ***decision making economic efficiency***, and their satisfaction with the strategic supplier selection process respectively their satisfaction with the final supplier selection decision which was measured by the ***decision making socio-psychological efficiency***.

Additionally, the selected **company-internal determinants**, namely the ***manager´s experience***, the ***manager´s education***, and the ***company´s reward initiatives*** will be investigated in course of the field study.

Organisation of the field study

The field study will be used to investigate the impact of the **decision making process maturity** on the **decision making efficiency** variables, in particular the ***decision making economic efficiency*** and the ***decision making socio-psychological efficiency,*** in the strategic supplier selection process in the context of the empirical environment of manufacturing enterprises in Europe.

The author will directly contacted strategic supply managers by using the following three membership directories: BVL (Bundesvereinigung Logistik Österreich), BMOE (Bundesverband Materialwirtschaft, Einkauf und Logistik Österreich), and MUL/IL (Montanuniversität Leoben/Lehrstuhl für Industrielogistik). After 14 days the non-responding supply managers will be reminded to complete the survey.[402]

Table 3.10 gives an overview of the organisations and sample sizes in the field study.

Table 3.10: Overview of the participating organisations and sample sizes (field study) [403]

Organisation	Sample sizes (number of contacted supply managers)
BVL	2,520 (63.8%)
BMOE	1,239 (31.4%)
MUL/IL	190 (4.8%)
Total	**3,949 (100 %)**

[401] See appendix 5.1 and appendix 5.2 for the standardised questionnaire.

[402] The author of this thesis has used the free open source software survey tool "Lime Survey 2.05" for the programming, the distribution, and the data collection of the questionnaire.

[403] Table created by the author (survey data – field study, SPSS output).

By combining the signed members of BVL (Bundesvereinigung Logistik Österreich) N=2,520 (63.8%), BMOE (Bundesverband Materialwirtschaft, Einkauf und Logistik Österreich) N=1,239 (31.4%), and MUL/IL (Montanuniversität Leoben/Lehrstuhl für Industrielogistik) N=190 (4.8%) the author will generate a total sample of N=3.949 supply managers.

3.5.2. OPERATIONALISATION OF VARIABLES

As a next step, the author will operationalise the variables of the conceptual framework for the field study. This will be achieved by formulating the indicators for the independent variable x_1 **decision making process maturity**, the dependent Variable y_1 ***decision making economic efficiency***, and the dependent Variable y_2 ***decision making socio-psychological efficiency***.

Additionally, the selected **company-internal determinants**, namely the ***manager´s experience***, the ***manager´s education***, and the ***company´s reward initiatives*** will be measured by using appropriate indicators.

Therefore, the following Figure 3.10 displays the operationalisation of the variables in the field study based on the notation of a standardised structural equation model as described in chapter 3.3.2 of this thesis.

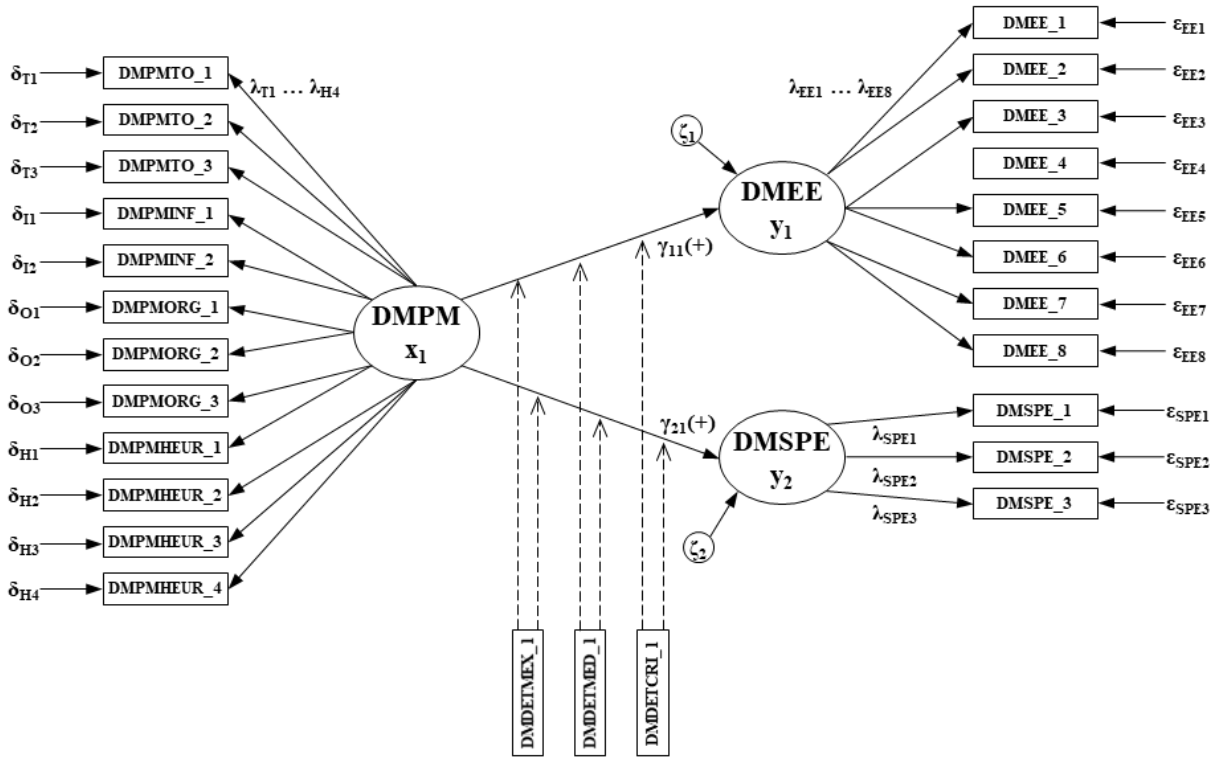

Figure 3.10: Operationalisation of the variables (field study)[404]

[404] Figure created by the author.

Similar to the laboratory experiment, the independent variable x_1 **decision making process maturity** (DMPM) describes conceptualisation of success factors in the decision making process based on the amalgamation of four constitutional elements of rational decision making behaviour. Therefore, the **decision making process maturity** (DMPM) will be measured by defining the indicators (DMPMTO_1 … DMPMHEU_4) for its constitutional elements, namely the ***DMPM-target orientation***, the ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***. Moreover, the two depended variables of the **decision making efficiency** will be measured by the indicators (DMEE_1 … DMEE_8) for the dependent variable y_1 ***decision making economic efficiency*** (DMEE) and by the indicators (DMSPE_1 … DMEE_3) for the dependent variable y_2 ***decision making socio-psychological efficiency*** (DMSPE). In addition, the three **company-internal determinants** will be measured by the three separated indicators (DMDETMEX_1) for the ***manager´s experience***, (DMDETMEd_1) for the ***manager´s education***, and (DMDETCRI_1) for the ***company´s reward initiatives***.

Operationalisation of the independent variable (x_1): The decision making process maturity[405]

The operationalisation of the **decision making process maturity** for the usage in the field study is identical with the operationalisation of the **decision making process maturity** from the usage in the laboratory experiment.[406]

Operationalisation of the dependent variable (y_1): The decision making economic efficiency[407]

The ***decision making economic efficiency*** is defined as the actual strategic supplier performance in relation to the pre-defined strategic supplier requirements in terms of cost-, quality-, and time-based measures. Therefore, the conceptualisation of the economic efficiency will include financial indicators (cost measures) and non-financial indicators (quality, time and flexibility measures). The present study follows the example of Kaufmann et al., Riedl, and Buhrmann. The ***decision making economic efficiency*** is operationalised by using the following indicators which were measured by using a 5 point Likert scale ranging from 1=very bad

[405] The theoretical framework of the **decision making process maturity** is described in chapter 1.3 of this thesis.

[406] See chapter 3.4.2 of this thesis.

[407] The theoretical framework of the ***decision making economic efficiency*** is described in chapter 1.4 of this thesis.

performance to 5=very good performance, and by comparing the actual performance with the expected performance at the begin of the supplier relationship: [408]

- DMEE_1: Evaluation of supplier performance: Development of total costs since the beginning of the supplier selection
- DMEE_2: Evaluation of supplier performance: Price stability since the beginning of the supplier selection
- DMEE_3: Evaluation of supplier perf.: Comparison of actual costs to costs at the beginning of the supplier selection
- DMEE_4: Evaluation of supplier performance: Adherence to quality standards
- DMEE_5: Evaluation of supplier performance: Frequency of quality complaints
- DMEE_6: Evaluation of supplier performance: On-time delivery performance
- DMEE_7: Evaluation of supplier performance: Reliability in terms of complete deliveries
- DMEE_8: Evaluation of supplier performance: Reliability in terms of on-time deliveries

Operationalisation of the dependent variable (y_2): The decision making socio-psychological efficiency[409]

Again, the operationalisation of the ***decision making socio-psychological efficiency*** for the usage in the field study is based on the operationalisation of the ***decision making socio-psychological efficiency*** for the usage in the laboratory experiment.[410] The author thereby refers to the studies by Neuert, Bronner, and Schröder. The ***decision making socio-psychological efficiency*** is operationalised by using the following indicators which were measured by using a 5 point Likert scale ranging from 1=completely unsatisfied/no commitment to 5=completely satisfied/full commitment: [411]

- DMSPE_1: How satisfied are you with the supplier selection decision
- DMSPE_2: How do you commit to the selected supplier
- DMSPE_3: How satisfied are you with the process of supplier selection

Operationalisation of the company-internal determinants[412]

The author will operationalise the **company-internal determinants** on three levels, in particular the ***manager´s experience***, the ***manager´s education***, and the ***company´s reward initiatives***.

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[408] Kaufmann et al. (2012b), Kaufmann et al. (2014), Riedl (2012), Buhrmann (2010).

[409] The theoretical framework of the ***decision making socio-psychological efficiency*** is described in chapter 1.4 of this thesis.

[410] Chapter 3.4.2 of this thesis.

[411] Neuert (1987), Bronner (1973), Schröder (1986).

[412] The theoretical framework for the ***company-internal determinants*** was developed in chapter 1.5 of this thesis.

For the operationalisation, the author will measure the ***manager´s experience*** by using the following four groups: 0-4 years of experience, 5-9 years of experience, 10-14 years of experience, >14 years of experience in the strategic supplier selection process. The ***manager´s education*** will be investigated by using the following four groups: Apprenticeship certificate, high school education, university education, and other supply management-oriented education. Finally, the ***company´s reward initiatives*** will be operationalised by using the following two groups: "Implemented company´s reward initiatives" and "no implemented company´s reward initiatives.

3.5.3. METHODS OF DATA COLLECTION AND QUALITY EVALUATION CRITERIA

As a next step, the author will briefly discuss the selected method of data collection, and the quality criteria for the selected research approach.

Method of data collection for the field study

As discussed, the testing of the proposed hypothesis and the application of proposed structural equation modelling approach require a high quality of the underlying research model in terms of validity and reliability.[413] Similar to the laboratory experiment, the author will use a standardised questionnaire as the selected method of data collection. Again, the questionnaire will be developed based on the state of the art guidelines for empirical research studies.[414] Moreover, the questionnaire and the preliminary research from the laboratory experiment will be reviewed and pre-tested by specialists working in the field of strategic supplier selection processes in order to ensure their applicability in the field study.

Evaluation criteria in order to assess the quality of the applied research method "field study"

In accordance with chapter 3.3.4 of this thesis, the quality evaluation criteria for empirical research studies will be discussed in the following, namely objectivity, validity, reliability, and generalisability.[415]

[413] Homburg & Baumgartner (1995b), pp. 1091–1108.

[414] In this case, the author is referring to the recommendations of Moosbrugger & Kelava (2012), Kirchhoff et al. (2010), and Porst (2011).

[415] Töpfer (2012), pp. 233–236, Bortz & Döring (2007), pp. 195–202.

The objectivity of the research method is ensured by the standardised research process guaranteeing the objective processing of the required procedures, a standardised method for the evaluation of the research results (including the evaluation of the descriptive results, the evaluation of both the measurement model and the structural model, the structural analysis, and the hypothesis testing processes) and standardised guidelines for the interpretation of the research results.[416]

As discussed in chapter 3.3.1 of this thesis, field studies offer a high level of external validity, transferability, and generalisability of the research results because of their realistic setting; but they come with the disadvantage that confounding variables may influence the results of the research process.[417]

Selecting and contacting the key informants is another important factor which may influence the validity of the research results.[418] The contact of the right information carrier will be ensured by using the following three membership directories of the BVL (Bundesvereinigung Logistik Österreich), the BMOE (Bundesverband Materialwirtschaft, Einkauf und Logistik Österreich), and the MUL/IL (Montanuniversität Leoben/Lehrstuhl für Industrielogistik) for the identification of "appropriate" key informants.

In line with the explanations in chapter 3.4.3 of this thesis, content validity can be ensured by the structured research process which is based on theoretical analyses and systematically deduced conceptual framework. The underlying indicators are objectively generated in course the operationalisation procedures. Most of the selected indicators were used in previous studies within a similar context, which further contributes to the enhancement of content validity.
The selected structural equation modelling approach will be used to calculate measures for the assessment of convergent validity (e.g., the average variance extracted (AVE)), for the assessment of the discriminant validity (e.g., the Fornell-Larcker criterion), and for the assessment of internal consistency reliability (e.g., the Cronbach´s alpha (CBA) and/or the composite reliability (CR)).

Finally, as discussed chapter 3.4.3 of this thesis, the guidelines of the selected structural equation modelling approach suggest that the minimum sample size can be calculated by taking ten times the largest number of the structural paths directed at a particular variable in the

[416] The experimental procedures are based on the recommendations of König (1972), Mittenecker (1968), and Friedrichs (1980).

[417] Bortz & Schuster (2010), p. 8.

[418] Kumar et al. (1993), pp. 1633–1635.

structural model, respectively decision tables offer insights regarding the minimum sample size in order to guarantee a flawless operation of the statistical test procedures.[419] In the present case, the proposed sample size of the field study which plans to involve more than 130 participants is much higher than the recommended threshold of 33.

Moreover, like comparable state of the art empirical research studies[420] the author will employ the non-response-bias method by Armstrong & Overton in order to evaluate the representability based on significant differences in earlier and later respondents. This approach is based on the fact that the behaviour of the non-responding sample is more similar to later respondents than to earlier respondents.[421] This test should furthermore determine the representability of the research results.

Based on the previously discussed quality criteria for the field study, the author concludes that the selected research method will provide acceptable data based on the criteria of objectivity, validity, reliability, and generalisability.

3.5.4. DESCRIPTIVE RESULTS

The author of this thesis has used the survey tool "Lime Survey 2.05" to programme the questionnaire. The survey was conducted between July 2016 (07.JUL.2016) and September 2016 (04.SEP.2016). The author has directly contacted strategic supply managers by using the following three membership directories: BVL (Bundesvereinigung Logistik Österreich), BMOE (Bundesverband Materialwirtschaft, Einkauf und Logistik Österreich), and MUL/IL (Montanuniversität Leoben/Lehrstuhl für Industrielogistik). After 14 days, the non-responding supply managers were reminded to complete the survey. The results of the survey process are summarised in Table 3.11.

Table 3.11: Overview of survey sample (field study)[422]

Organisation	Total sample selected	Questionnaires accessed	Partly completed or not valid questionnaires[423]	Completed questionnaires
BVL	2,250	133	99	34
BMOE	1,239	95	59	36
MUL/IL	190	131	62	69
Total	**3,949**	**359**	**220**	**139**
Total (%)	**100.0%**	**9.1%**	**5.6%**	**3.5%**

[419] Hair (2014), pp. 24–27.

[420] E.g. Kaufmann et al. (2014), Schenkel (2006).

[421] Armstrong & Overton (1977), pp. 396–402.

[422] Table created by the author (survey data – field study, SPSS output).

[423] Incorrect data or not completed surveys.

As described above, the author has contacted supply managers by using three membership directories. In sum, 3,949 managers (2,250 from the BVL directory, 1,239 from the BMOE directory, and 190 from the MUL/IL directory) were directly contacted. In total, 359 managers accessed the survey. 220 questionnaires were partly completed or not valid because parts of the answers could not be processed. The resulting sample contains 139 responses from strategic supply managers, corresponding to a total response rate of 3.5%. The total response rate is comparable with similar studies in the field of supply management.[424]

Overview of the industrial branches

As displayed in Figure 3.11, the sample featured in the field study consists of supply managers from a number of different branches within the manufacturing and manufacturing-related industry in Europe.

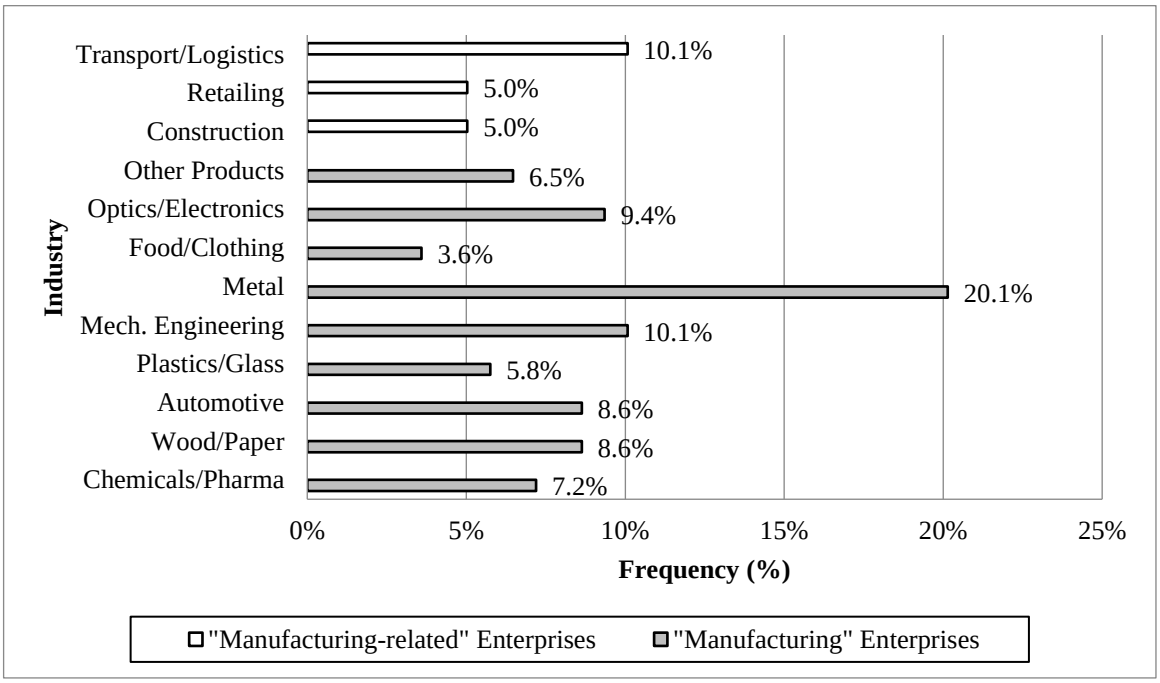

Figure 3.11: Overview of all industrial branches featured (field study)[425]

Out of the 139 participating manufacturing enterprises, 10 (7.2%) can be assigned to the branch "Chemicals/Pharma", 12 (8.6%) can be assigned to the branch "Wood/Paper", 12 (8.6%), can be assigned to the branch "Automotive", 8 (5.8%) can be assigned to the branch "Plastics/Glass", 14 (10.1%) can be assigned to the branch "Mechanical Engineering", 28 (20.1%) can be assigned to the branch "Metal", 5 (3.6%) can be assigned to the branch "Food/Clothing", 13 (9.4%) can be assigned to the branch "Optics/Electronics", and 9 (6.5%)

[424] E.g. Brandl (2013), p. 64.

[425] Figure created by the author (survey data – field study, SPSS output).

can be assigned to the other product-manufacturing branches. Moreover, out of the remaining 28 manufacturing-related enterprises, 7 (5.0%) can be assigned to the branch "Construction", 7 (5.0%) can be assigned to the branch "Retailing", and 14 (10.1%) can be assigned to the branch "Transport/Logistics".[426] Furthermore, the author has investigated potential differences in the indicator values between the manufacturing and the manufacturing-related branches. The Mann-Whitney U test shows no significant differences in all indicator values between "manufacturing" and "manufacturing-related" enterprises.[427]

Distribution of firm size (number of employees)

Figure 3.12 shows the distribution of firm sizes (according to number of employees) in the field study.

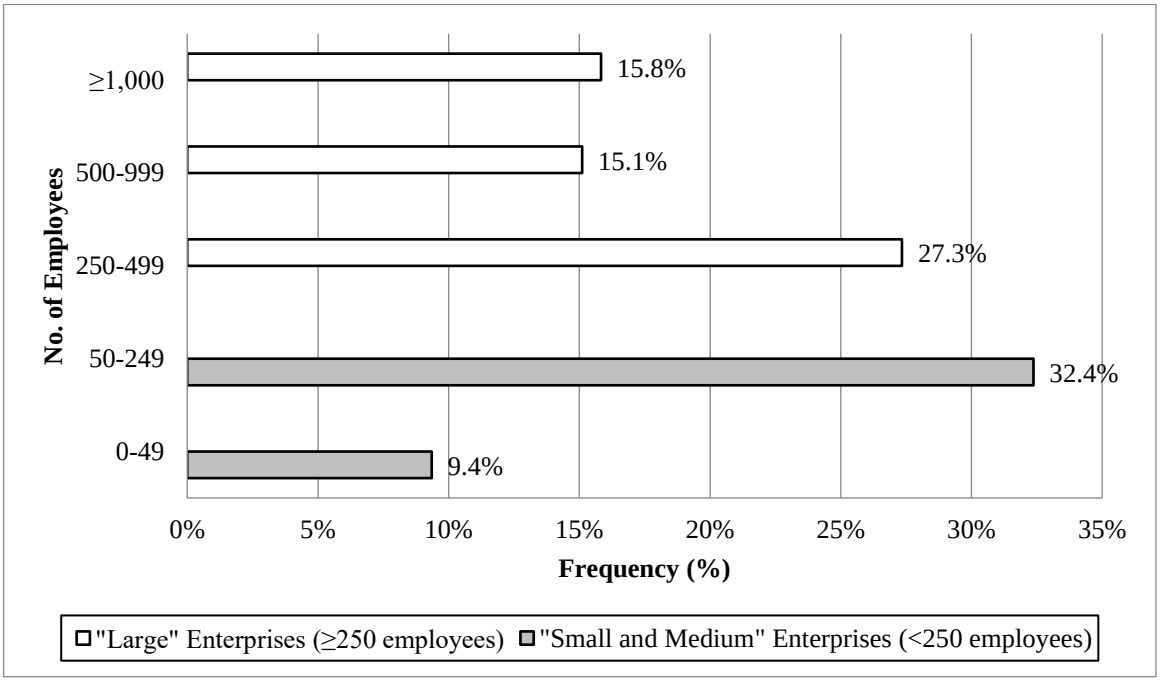

Figure 3.12: Distribution of firm sizes (field study)[428]

Figure 3.12 indicates that the majority of the participating manufacturing enterprises employ between 50 and 249 people. In general, the sample contains 13 enterprises (9.4%) with 0 to 49 employees, 45 enterprises (32.4%) with 50 to 249 employees, 38 enterprises (27.3%) with 250 to 499 employees, 21enterprises (15.1%) with 500 to 999 employees, and 22 enterprises (15.8%) with more than 1,000 employees.

[426] Grouping: "Manufacturing" (group 0, branch code=0, n=111), "manufacturing-related" enterprises (group 1, branch code=1-4, n=28).

[427] See appendix 6.2.1.

[428] Figure created by the author (survey data – field study, SPSS output).

For the further investigation of the firm size, the author will merge the above described four groups into the two groups of "small and medium" enterprises (0-249 employees) and "large" enterprises (≥250 employees).[429]

Distribution of the supply manager's experience

Figure 3.13 shows the distribution of the **company-internal determinant *manager´s experience*** in the field study.

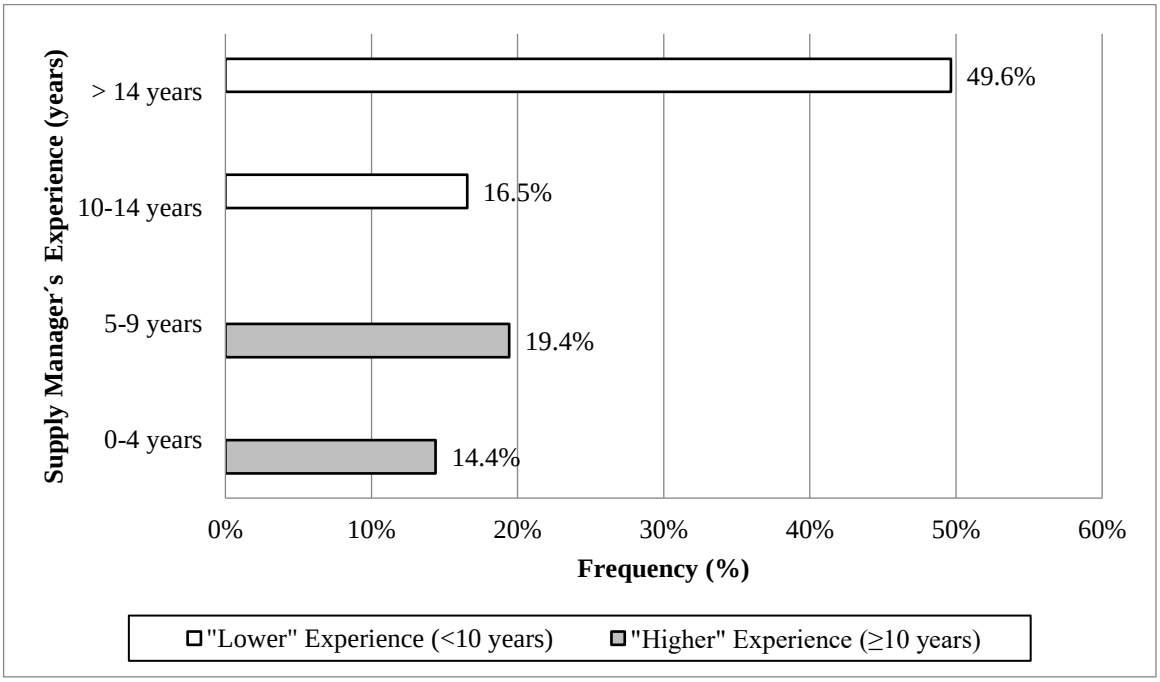

Figure 3.13: Distribution of the supply manager's experience in the field study[430]

As displayed in Figure 3.13, the majority of the participating strategic supply managers have more than 14 years of experience in supply management-related tasks. Furthermore, the sample contains 20 managers (14.4%) with 0 to 4 years of experience, 27 managers (19.4%) with 5 to 9 years of experience, 23 managers (16.5%) with 10 to 14 years of experience, and 69 managers (49.6%) with more than 14 years of experience.

For the investigation of the ***manager´s experience***, the author will merge the above described four groups into the two groups of "lower" experience (0-9 years of experience) and "higher" experience (≥10 years of experience).[431]

[429] Grouping: "Small and medium" enterprises (group 0, 0-249 employees, n=58), "large" enterprises (group 1, >249 employees, n=81).

[430] Figure created by the author (survey data – field study, SPSS output).

[431] Grouping: "Lower" manager´s experience (group 0, 0-4 years and 5-9 years, n=47), "higher" manager´s experience (group 1, 10-14 years and >14 years, n=92).

Distribution of the supply manager's education

Figure 3.14 illustrates the distribution of the **company-internal determinant** of the ***manager´s education*** in the field study.

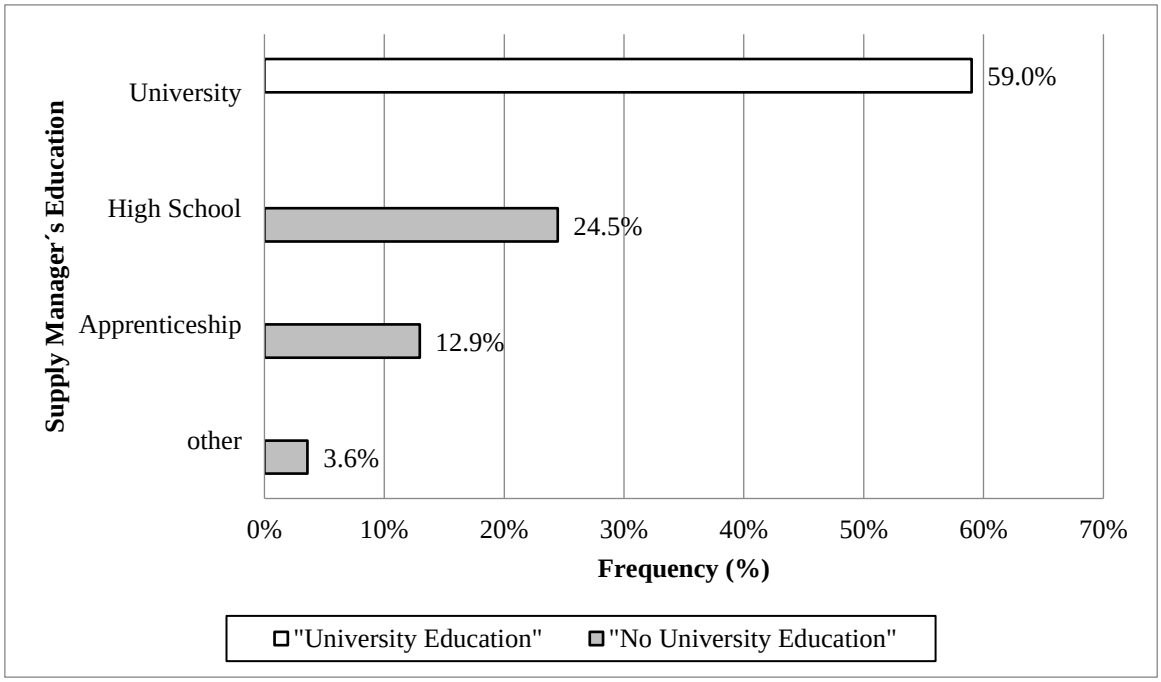

Figure 3.14: Distribution of the supply manager's education in the field study[432]

Figure 3.14 indicates that the majority of the participating strategic supply managers holt a university degree. In total, the sample contains 82 managers (59.0%) with a university education, 34 managers (24.5%) with a high school certificate, 18 managers (12.9%) with an apprenticeship certificate, and 5 managers (3.6%) with another type of education (Figure 3.14).

For the investigation of the ***manager´s education***, the author will merge the above described four groups into the two groups of "no university education" (high school certificate, apprenticeship certificate, and another type other education) and "university education" (university education).[433]

[432] Figure created by the author (survey data – field study, SPSS output).

[433] Grouping: Manager´s education "no university education" (group 0, other education, apprenticeship certificate, high school certificate, n=57), manager´s education "university education" (group 1, university education, n=82).

Distribution of the company´s reward initiatives

Table 3.12 depicts the distribution of the **company-internal determinant** of the ***company´s reward initiatives*** in the field study.

Table 3.12: Distribution of the company´s reward initiatives in the field study[434]

Company Reward Initiatives (CRI)	Frequency	Frequency (%)
Implemented CRI	93	66.9%
Not Implemented CRI	46	33.1%

Table 3.12 suggests that the majority of the participating manufacturing enterprises have implemented a performance-based reward system for their strategic supplier selection process. In detail, 93 enterprises (66.9%) claim to have implemented a performance-based reward system, while 46 enterprises (33.1%) have not implemented a performance-based reward system.

Consequently, when investigating the ***company´s reward initiatives***, the two above mentioned groups will be compared with each other.[435]

Distribution of the company´s collaborative quality and process optimisation projects

Table 3.13 displays an additional question regarding the company´s collaborative quality process optimisation activities.

Table 3.13: Distribution of the company´s collaborative quality and process optimisation projects in the field study[436]

Collaborative Quality and Process Optimisation Projects (CQaPP)	Frequency	Frequency (%)
Implemented CQaPP	115	82.7%
Not Implemented CQaPP	24	17.3%

Most of the participating enterprises (115 enterprises, 82.7%) have collaborative quality and process optimisation projects together with their strategic suppliers. The remaining 24 enterprises (17.3%) have not implemented cooperative quality and process optimisation projects at the point of inquiry.[437]

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[434] Table created by the author (survey data – field study, SPSS output).

[435] Grouping: "Implemented" company reward initiatives (group 0, yes, n=93), "not implemented" company reward initiatives (group 1, no, n=46).

[436] Table created by the author (survey data – field study, SPSS output).

[437] Grouping: "Implemented" collaborative quality and process optimisation projects (group 0, yes, n=115), "Not Implemented" collaborative quality and process optimisation projects (group 1, no, n=24).

Distribution of time elapsed since the final decision (number of months)

Figure 3.15 displays the distribution of the elapsed time since the final supplier selection decision.[438]

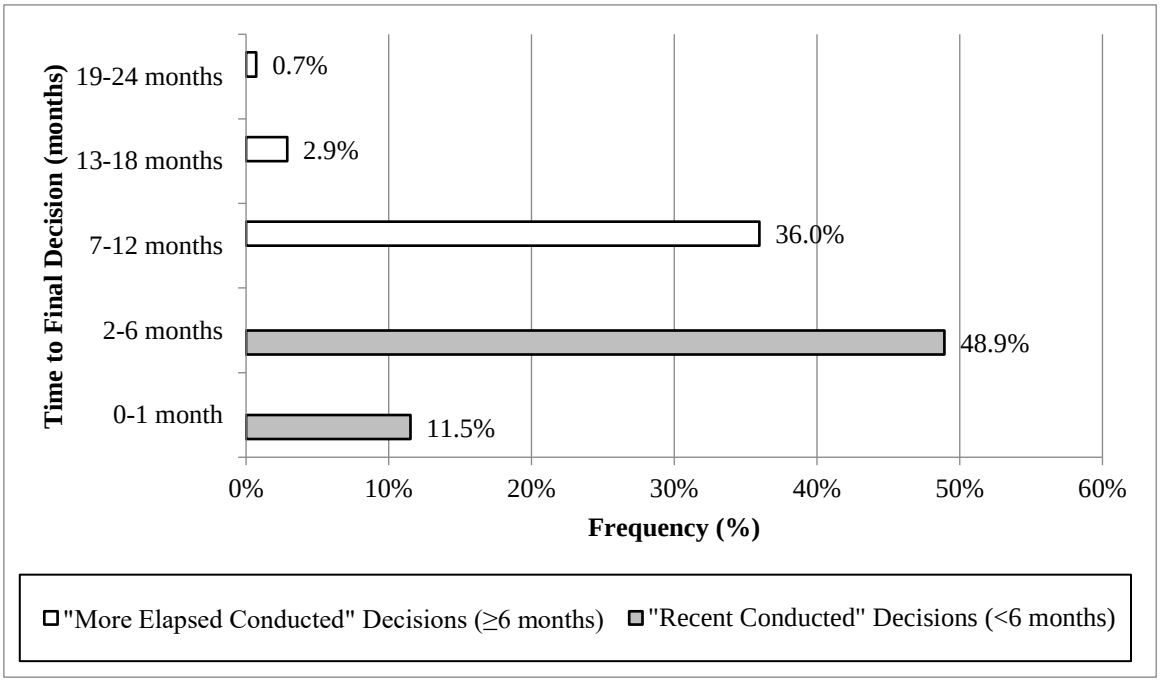

Figure 3.15: Distribution of time elapsed since the final decision (field study)[439]

The sample contains 16 strategic supply selection processes which were conducted within a timeframe from 0 to 1 month (11.5%) before completing the survey, 68 strategic supply selection processes which were conducted within a timeframe of 2 to 6 months (48.9%) before completing the survey, 50 strategic supply selection processes which were conducted within a timeframe from 7 to 12 months (36.0%) before completing the survey, and 1 strategic supply selection process which was conducted within a timeframe of 19 to 24 months (0.7%) before completing the survey.

Furthermore, the results provide the following descriptive data regarding the distribution of the time passed since the final supplier selection decision in the field study: Mean 5.647, median 5.000, minimum value: 0.000, maximum value: 24.000, standard deviation: 4.012. For further investigation, the author will merge the above described groups into the two groups of "recent conducted" (<6 months) and "more elapsed conducted" (≥6 months) strategic supplier selection process.[440]

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[438] Measured timeframe=Date of the final supplier selection decision – survey response date.

[439] Figure created by the author (survey data – field study, SPSS output).

[440] Grouping: "Recent conducted" (group 0, t<6 months, n=84), "more elapse conducted" (group 1, t≥6 months, n=55) strategic supplier selection processes.

Distribution of survey response time

Figure 3.16 displays the distribution of the survey response time.[441]

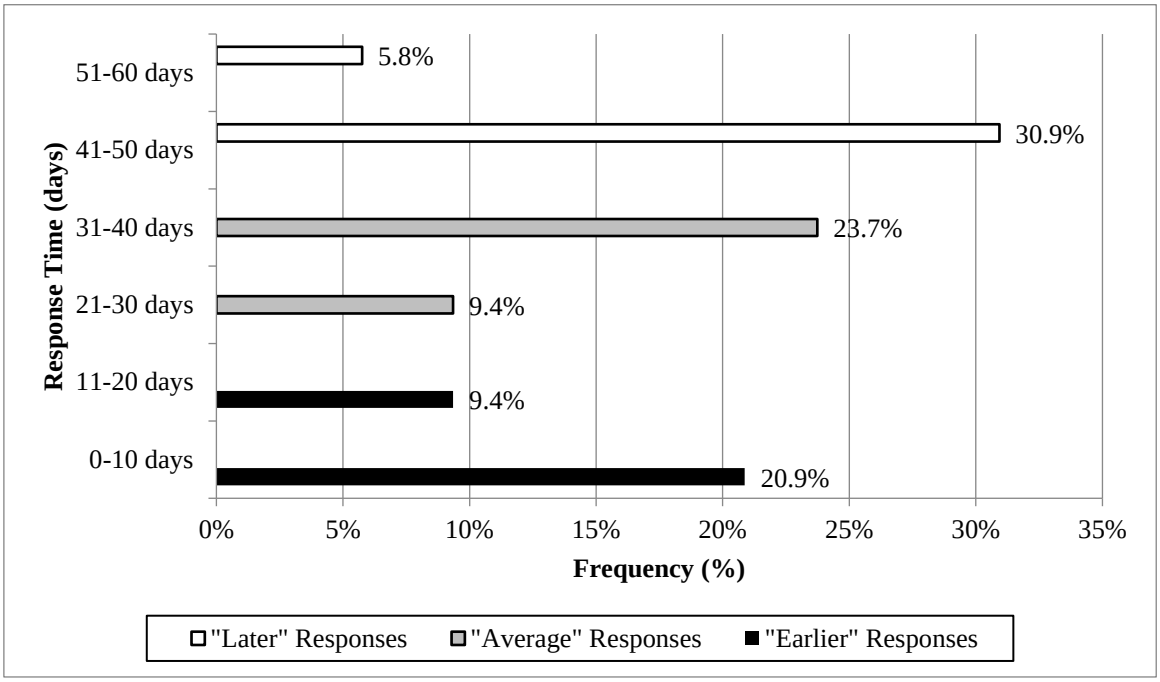

Figure 3.16: Distribution of survey response time (field study)[442]

29 participants responded in a timeframe of 0 to 10 days (20.9%), 13 participants responded in the timeframe of 11 to 20 days (9.4%), 13 participants responded in the timeframe of 21 to 30 days (9.4%), 33 participants responded in the timeframe of 31 to 40 days (23.7%), 43 participants responded in the timeframe of 41 to 50 days (30.9%), and 8 participants responded in the timeframe of 51 to 60 days (5.8%).

Furthermore, the results provide the following descriptive data regarding the distribution of the survey response time: Mean 29.856, median 36.000, minimum value: 0.000, maximum value: 57.000, standard deviation: 16.587.

For further investigation, the author will merge the above described groups to the three groups of "earlier" (0-20 days), "average" (21-40 days), and "later" (41-60 days) responses.[443]

[441] Measured response time=Survey starting time – survey response time.

[442] Figure created by the author (survey data – field study, SPSS output).

[443] Grouping: "Earlier" (group 0, t=0-20 days, n=42), "average" (group 1, t=21-40 days, n=46), and "later" (group 2, t=41-60 days, n=51) received survey responses.

Summarised mean values of all indicators

Table 3.14 summarises the mean values of all indicators in the field study.

Table 3.14: Mean values of all indicators (field study)[444]

DMPM				DME (DMEE, DMSPE)			
Indicator	***Missing***	***Min***	***Max***	***Indicator***	***Missing***	***Min***	***Max***
DMPMTO_1	0.000	1.000	5.000	DMEE_1	0.000	1.000	5.000
DMPMTO_2	0.000	1.000	5.000	DMEE_2	0.000	1.000	5.000
DMPMTO_3	0.000	1.000	5.000	DMEE_3	0.000	1.000	5.000
DMPMINF_1	0.000	1.000	5.000	DMEE_4	0.000	1.000	5.000
DMPMORG_1	0.000	1.000	5.000	DMEE_5	0.000	1.000	5.000
DMPMORG_2	0.000	1.000	5.000	DMEE_6	0.000	1.000	5.000
DMPMORG_3	0.000	1.000	5.000	DMEE_7	0.000	1.000	5.000
DMPMHEUR_1	0.000	1.000	5.000	DMEE_8	0.000	1.000	5.000
DMPMHEUR_2	0.000	1.000	5.000	DMSPE_1	0.000	1.000	5.000
DMPMHEUR_3	0.000	1.000	5.000	DMSPE_2	0.000	1.000	5.000
DMPMHEUR_4	0.000	1.000	5.000	DMSPE_3	0.000	1.000	5.000

No indicator values were missing (missing values: 0) which provides a perfect foundation for the structural equation modelling procedures. Most of the indicators (variables: DMPM, DMEE, DMSPE) deviate from 1-5 on the 5-point Likert scales. This means that the empirical data provides the entire range from less to more mature respectively from less to more efficient strategic supplier selection processes for the forth following analyses.

In addition, (normal) distribution tests of all indicator values were performed. A Kolmogorov-Smirnov test and a Shapiro-Wilk test were used to evaluate the (normal) distribution of all indicator values (variables: DMPM, DMEE, DMSPE). Results showed significant differences in all indicator values between (empirical) data and not normally distributed data.[445] All indicators are not normally distributed.

Furthermore, the author tested for the non-response-bias as suggested by Armstrong & Overton[446] which evaluates the representability based on significant differences in earlier and later responses. The conducted non-parametric Kruskal-Wallis test showed no significant differences in all indicator values between “earlier”, “average”, and “later” received survey responses. This can be seen as another indication for the representability respectively the external validity of the research results in the field study.[447]

[444] Table created by the author (survey data – field study, SPSS output).

[445] See appendix 6.2.2.

[446] Armstrong & Overton (1977), Schenkel (2006).

[447] See appendix 6.2.3.

Moreover, the method of "ex-post-evaluation" in the ***decision making economic efficiency*** and the ***decision making socio-psychological efficiency*** requires the evaluation of significant differences in all indicator values (variables: DMPM, DMEE, DMSPE) between "earlier", "average", and "later" received survey responses. The so-called recalling information bias[448] was to be evaluated by using a non-parametric Mann-Whitney U test. The results show no significant differences in all indicator values between "recent conducted" and "more elapsed" strategic supplier selection processes.[449]

3.5.5. MODEL EVALUATION FINDINGS

Furthermore, the "quality" of the research model from the field study will have to be evaluated. This evaluation will be divided into three steps: The evaluation of the measurement model, the evaluation of the structural model, and the additional model evaluation analyses.

Evaluation of the measurement model (field study)

The in step 1.1 of the evaluation process computed Cronbach´s alpha (CBA) values were 0.898 for the **decision making process maturity**, 0.914 for the ***decision making economic efficiency***, and 0.856 for the ***decision making socio-psychological efficiency***. All of them are above the recommend value of 0.600 respectively 0.700 [450] and, thus, ensure internal consistency reliability.

Step 1.2 further measures the composite reliability (CR) as a second measure for the internal consistency reliability. The computed values come out at 0.915 for the **decision making process maturity**, 0.930 for the ***decision making economic efficiency***, and 0.910 for the ***decision making socio-psychological efficiency***. All of the computed values are above the recommend limit of 0.700[451] which further confirms the internal consistency reliability.

In step 1.3 of the evaluation procedure, the indicator reliability was computed. Table 3.15 displays the indicator loadings. According to literature, the recommended values for the indictor loadings should not be below 0.400.[452] If the indicator reliability is between 0.400 to 0.700, it should only be optimised if the deletion of an indicator leads to an increase of both the composite reliability and the average variance extracted. Ideally, the indicator reliability should

[448] See Srinivasan & Ratchford (1991), Kaufmann et al. (2012b).

[449] See appendix 6.2.4.

[450] Heath & Jean (1997), p. 81., Hair et al. (2014), p. 123.

[451] Hair (2014), p. 122. For further information see Fornell & Larcker (1981b) and Peter (1979).

[452] Krasnova et al. (2008), p. 7. For further information see Homburg & Baumgartner (1995a).

be above 0.700.[453] Due to their bad indicator reliability in the laboratory experiment and because of comparability reasons, the DMPMINF_2 indicator of the **decision making process maturity** was not included in the evaluation of the field study. However, all of the indicators investigated showed values above the recommended threshold in the field study and, therefore, they can be considered as reliable measures.

Table 3.15: Indicators loadings (field study)[454]

DMPM		**DMEE, DMSPE**	
Indicator	***Loadings***	***Indicator***	***Loadings***
DMPMTO_1	0.763	DMEE_1	0.769
DMPMTO_2	0.826	DMEE_2	0.807
DMPMTO_3	0.757	DMEE_3	0.732
DMPMINF_1	0.594	DMEE_4	0.769
DMPMORG_1	0.605	DMEE_5	0.814
DMPMORG_2	0.590	DMEE_6	0.795
DMPMORG_3	0.639	DMEE_7	0.848
DMPMHEUR_1	0.732	DMEE_8	0.780
DMPMHEUR_2	0.790	DMSPE_1	0.895
DMPMHEUR_3	0.711	DMSPE_2	0.880
DMPMHEUR_4	0.715	DMSPE_3	0.858

Step 1.4 calculates the average variance extracted (AVE). In this case, the AVE values are 0.499 for the **decision making process maturity**, 0.624 for the ***decision making economic efficiency***, and 0.771 for the ***decision making socio-psychological efficiency***. All values are above the minimum criteria of 0.400,[455] and furthermore above the more conservatively defined value of 0.500[456] which ensures the convergent validity of the research model.

Step 1.5 evaluates the cross loadings. Table 3.16 shows the cross loadings from the field study. Literature suggests that an indicator's outer loading on the associated variable should be greater than any of its cross loadings.[457] This is the chase for all of the tested indicators. The computed results thus confirm the discriminant validity of the research model.

[453] Hair (2014), p. 122.

[454] Table created by the author (survey data – field study, SmartPLS output).

[455] Bagozzi & Youjae (1988), pp. 375–381.

[456] Hair et al. (2014), p. 619, Hair (2014), p. 122.

[457] Hair (2014), 115–122.

Table 3.16: Discriminant validity I: Cross loadings (field study)[458]

	DMPM - DMEE		DMPM - DMSPE	
Indicator	***Outer Loadings***	***Cross Loadings***	***Outer Loadings***	***Cross Loadings***
DMPMTO_1	0.763	0.363	0.763	0.421
DMPMTO_2	0.826	0.381	0.826	0.372
DMPMTO_3	0.757	0.399	0.757	0.407
DMPMINF_1	0.594	0.242	0.594	0.278
DMPMORG_1	0.605	0.299	0.605	0.297
DMPMORG_2	0.590	0.301	0.590	0.313
DMPMORG_3	0.639	0.370	0.639	0.406
DMPMHEUR_1	0.732	0.386	0.732	0.432
DMPMHEUR_2	0.790	0.415	0.790	0.454
DMPMHEUR_3	0.711	0.328	0.711	0.439
DMPMHEUR_4	0.715	0.382	0.715	0.428

Moreover, step 1.6 of the model assessment procedure calculates the Fornell-Larcker criterion as another measure of discriminant validity. The results of this calculation are given in Table 3.17.

Table 3.17: Discriminant validity II: Fornell-Larcker criterion (field study)[459]

DMPM - DMEE		DMPM - DMSPE	
$\sqrt{AVE}$	***Lat. Var. Corr.***	$\sqrt{AVE}$	***Lat. Var. Corr.***
0.706	0.504	0.706	0.555

According to literature, the square root of each construct's average variance extracted (AVE) values should be greater than its highest correlation with any other construct. [460] This holds true for all of the computed values, therefore further confirming the discriminant validity of the research model.

In step 1.7, the Heterotrait-Monotrait Ratio (HTMT) is generated as a third measure for the model´s discriminant validity. The calculations result in the following values: DMPM→DMEE: HTMT=0.548, DMSPE→DMEE: HTMT=0.827, DMSPE→DMPM: HTMT=0.600. All values are above the recommended value of 0.850,[461] with this third value confirming the discriminant validity of the underlying research model.

[458] Table created by the author (survey data – field study, SmartPLS output).

[459] Table created by the author (survey data – laboratory experiment, SmartPLS output).

[460] Hair (2014), pp. 115–122.

[461] Hair (2014), pp. 129–132.

The last step of the measurement model evaluation procedure, step 1.8, calculates the indicator significance. According to Table 3.18 all indicator values are significant and therefore the recommended p-value of 0.050.[462]

Table 3.18: Indicator significance (field study)[463]

DMPM			DMEE, DMSPE		
Indicator	***T-values***	***p-values***	***Indicator***	***T-values***	***p-values***
DMPMTO_1	13.007	0.000	DMEE_1	14.787	0.000
DMPMTO_2	20.661	0.000	DMEE_2	16.247	0.000
DMPMTO_3	10.880	0.000	DMEE_3	9.731	0.000
DMPMINF_1	6.209	0.000	DMEE_4	14.453	0.000
DMPMORG_1	6.075	0.000	DMEE_5	16.901	0.000
DMPMORG_2	8.590	0.000	DMEE_6	17.474	0.000
DMPMORG_3	6.617	0.000	DMEE_7	20.286	0.000
DMPMHEUR_1	10.642	0.000	DMEE_8	14.428	0.000
DMPMHEUR_2	22.591	0.000	DMSPE_1	20.572	0.000
DMPMHEUR_3	12.116	0.000	DMSPE_2	17.780	0.000
DMPMHEUR_4	12.739	0.000	DMSPE_3	29.628	0.000

Evaluation of the structural model (field study)

Step 2.1 computes the significance of the path coefficients. The results of this calculation are displayed in Table 3.19.

Table 3.19: Significance of the path coefficients (field study)[464]

Path coefficient	T-values	p-values
DMPM → DMEE	5.758	0.000
DMPM → DMSPE	6.967	0.000

The results show a highly significant path coefficient for the **decision making process maturity** on the ***decision making economic efficiency*** and a highly significant path coefficient for the **decision making process maturity** on the ***decision making socio-psychological***

[462] Gefen & Straub (2005), p. 93.

[463] Table created by the author (survey data – laboratory experiment, SmartPLS output).

[464] Table created by the author (survey data – laboratory experiment, SmartPLS output).

efficiency. This means that the proposed cause-effect relationships are confirmed in the structural model of the field study.[465]

Step 2.2 evaluates the size of the path coefficients. The resulting values (0.504 for DMPM→DMEE respectively 0.555 for DMPM→DMSPE) are positive and therefore in line with the proposed relationships.[466]

The in step 2.3 calculated R^2-values show positive and moderate values. [467] In detail, the results are: R^2-value for the ***decision making economic efficiency***=0.254, R^2-value for the ***decision making social-psychological efficiency***=0.308.

The effect size (f^2) is calculated in step 2.4 of the structural model evaluation procedure. According to literature,[468] the relationship between the **decision making process maturity** and the ***decision making economic efficiency*** shows a medium, almost large effect (f^2=0.340) and the relationship between the **decision making process maturity** and the ***decision making social-psychological efficiency*** reveals a large effect (f^2=0.306).

The last step (2.5) of the structural model evaluation procedure calculates the predictive relevance (Q^2). The results of this calculation are displayed in Table 3.20.

Table 3.20: Computed Q^2-values (field study)[469]

Construct cross-validated redundancy				**Construct cross-validated communality**			
Indicator	***SSO***	***SSE***	***Q^2(=1-SSE/SSO)***	***Indicator***	***SSO***	***SSE***	***Q^2(=1-SSE/SSO)***
DMPM	1,529.000	1,529.000	---	DMPM	1,529.000	933.013	0.390
DMEE	1,112.000	957.992	0.138	DMEE	1,112.000	547.485	0.508
DMSPE	417.000	332.165	0.203	DMSPE	417.000	205.337	0.508

All computed Q^2 levels are above the recommended threshold of 0.000.[470] The predictive relevance of the research model is thus ensured.

[465] Bortz & Schuster (2010), pp. 106–107. See chapter 3.5 of this thesis.

[466] See chapter 3.5 of this thesis.

[467] Hair (2014), p. 208.

[468] Hair (2014), p. 201-208. For further information see Cohen (1988).

[469] Table created by the author (survey data – field study, SmartPLS output).

[470] Hair (2014), pp. 202–209. For further information see Stone (1974) and Geisser (1975).

Additional model evaluation analyses (field study)

Step 3.1 calculates the collinearity statistics (VIF) in order to assess discriminant validity. All resulting values are higher than the recommend minimum value of 0.200 and lower than the recommended maximum value of 5.000[471] which again confirms the discriminant validity of the research model. [472]

Moreover, step 3.2 calculates the standardised root mean squared residual (SRMR) for the composite model. In this case, the SRMR value is 0.069 which, according to literature recommendations,[473] can be considered as a good model fit.

3.5.6. STRUCTURAL ANALYSES AND HYPOTHESES TESTING

The positive results of the model evaluation procedure, which were used in order to verify the validity and reliability of the research model, allow for a further test of the proposed cause-effect relationships by using the empirical data from the field study.[474]

Before the postulated hypotheses will be discussed, the results of the structural analysis of the research model will be briefly elaborated on, which will be divided into the evaluation of p-values and the evaluation of R^2-values.

Evaluation of p-values

Again, the p-value is defined as the probability of observing a sample value as extreme as, or more extreme than, the actual value observed, given that the null-hypothesis holds true. This also represents the probability of a type I error[475] that must be assumed if the null hypothesis is rejected. The p-value is compared to the significance level (α), and on this basis the hypothesis is either rejected or confirmed (respectively tentatively corroborated).[476]

According to literature, the recommended significance levels (α) are:[477]

- p-value ≤ 0.05 respectively 5% statistically significant
- p-value ≤ 0.01 respectively 1% statistically highly significant

The following Figure 3.17 displays the calculated p-values for the field study.

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[471] See Table A.6.3.2-1 Computed VIF values (field study) in the appendix 6.3.2 of this thesis.

[472] Hair (2014), p. 208. For further information see Kock & Lynn (2012).

[473] Hair (2014), p. 208. For further information see Hu & Bentler (1999).

[474] Jahn (2007), p. 30.

[475] A type I error defines the probability of incorrectly rejecting the null hypothesis, which in most cases means that a difference respectively a correlation exists, when it actually does not. Hair et al. (2014), p. 3.

[476] Cooper & Schindler (2014), pp. 438–440.

[477] Bortz & Döring (2007), pp. 495–496, Bortz & Schuster (2010), pp. 100–101, Töpfer (2012), p. 307.

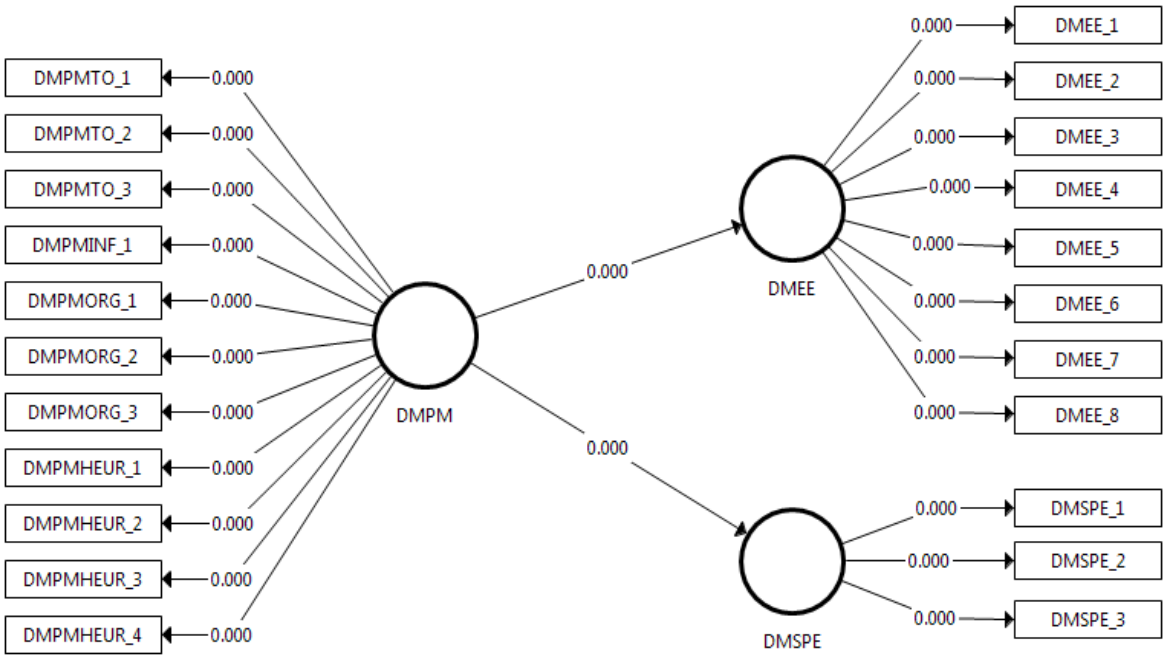

Figure 3.17: SmartPLS-SEM results: p-values (field study)[478]

As displayed in Figure 3.17, all indicators of the independent variable **decision making process maturity** (DMPM), the dependent variable ***decision making economic efficiency*** (DMEE), and the dependent variable ***decision making socio-psychological efficiency*** (DMSPE) consistently show highly significant relationships (p-value≤0.01), suggesting that all indicators highly significantly influence their associated latent variables in this research model. Moreover, the author will analyse the significance of the path coefficients. In the field study, both path coefficients of the structural model show highly significant relationships between the independent and the dependent variables of the research model. In detail, the empirical results insinuate that the independent variable **decision making process maturity** (DMPM) has a statistically highly significant impact (p-value=0.000) on the dependent variable ***decision making economic efficiency*** (DMEE). The independent variable **decision making process maturity** (DMPM) has a statistically highly significant impact (p-value=0.000) on the dependent variable ***decision making socio-psychological efficiency*** (DMSPE).

Furthermore, the author has decided to calculate the **decision making efficiency** variable as the amalgamated measure of the ***decision making economic efficiency*** with the decision making ***socio-psychological efficiency***. In the field study, **decision making process maturity** has a statistically highly significant impact (p-value=0.000) on the amalgamated **decision making**

[478] Figure created by the author (survey data – field study, SmartPLS output).

efficiency variable. The results of the p-value evaluation will be further discussed during the final test of the research hypotheses later on.

Evaluation of R^2-values

As outlined, the coefficient of determination (R^2) measures the proportion of the variation in the dependent variable as explained by the variation in the independent variable which can be calculated by computing the square root of the product moment correlation coefficient.[479]

Figure 3.18 displays the calculated R^2-values for the field study.

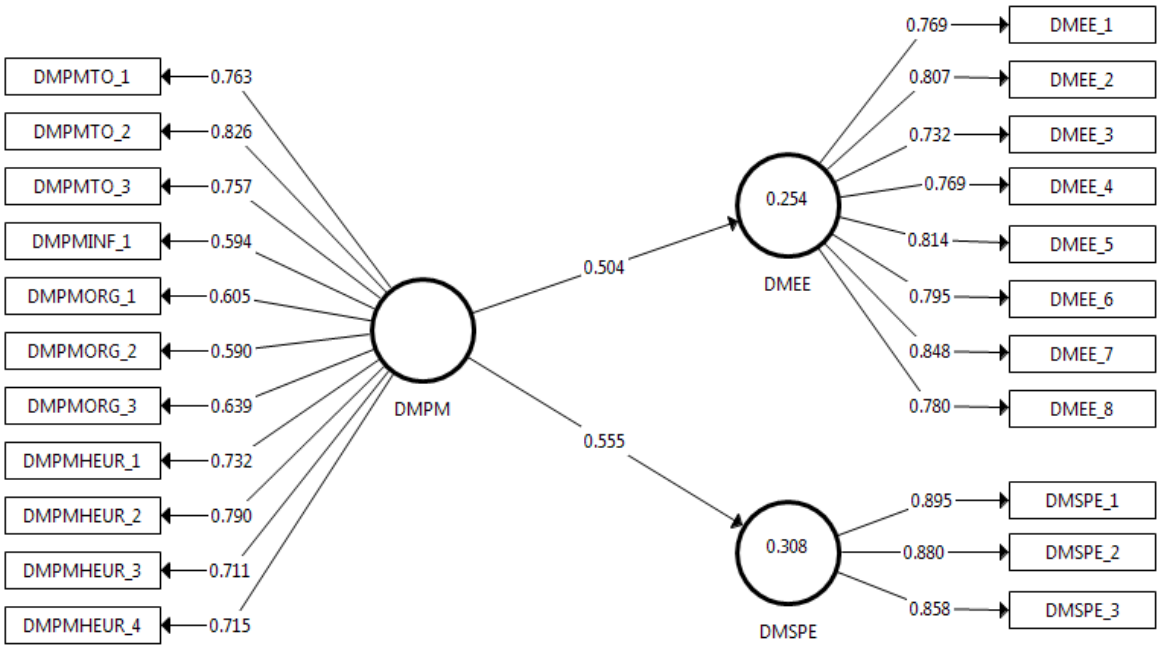

Figure 3.18: SmartPLS-SEM results: R^2-values (field study)[480]

In the present case, the relationship between the independent variable **decision making process maturity** (DMPM) and the dependent variable ***decision making economic efficiency*** (DMEE) results in a R^2 of 0.254, meaning that in the field study 25.4% of the variation of the ***decision making economic efficiency*** (DMEE) is explained by the **decision making process maturity** (DMPM). Moreover, the relationship between the independent variable **decision making process maturity** (DMPM) and the dependent variable ***decision making social-psychological efficiency*** (DMSPE) results in a R^2 of 0.308, implying that in the field study 30.8% of the variation of the ***decision making social-psychological efficiency*** (DMSPE) is explained by the **decision making process maturity** (DMPM).

[479] Oakshott (2012), pp. 250–251.

[480] Figure created by the author (survey data – field study, SmartPLS output).

The author has decided to calculate the **decision making efficiency** variable as the amalgamated measure of the ***decision making economic efficiency*** with the ***decision making socio-psychological efficiency***. In the field study, the relationship between the variable **decision making process maturity** and the amalgamated **decision making efficiency** results in a R^2 of 0.309, meaning that 30.9% of the variation of the amalgamated **decision making efficiency** is explained by the **decision making process maturity**. The results of the coefficient of determination´s (R^2) evaluation will be further discussed during the final test of the research hypotheses later on.

Testing the proposed hypotheses

Again, the author will test the research hypotheses.

Figure 3.19 shows the testing of the proposed hypothesis in the field study. Based on the falsification principle of critical rationalism, scientific knowledge will be primarily gained based on the preliminary confirmed statements and the simultaneously elimination of false statements. Thereby, the significant or non-significant results of the statistical procedures will be used as decision criteria for the tentative corroboration or the rejection of the tested hypotheses.[481]

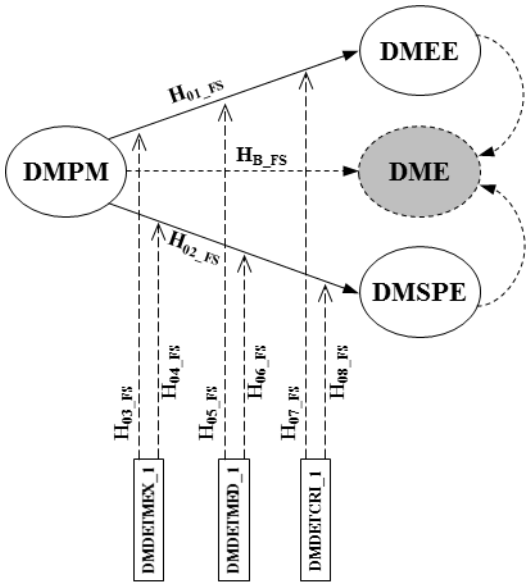

Figure 3.19: Testing of proposed hypotheses (field study)[482]

[481] Bortz & Döring (2007), pp. 27–29.

[482] Figure created by the author (survey data – laboratory experiment, SmartPLS output). . Abbreviations: **Decision making process maturity** (DMPM), ***decision making economic efficiency*** (DMEE), amalgamated **decision making efficiency** (DME), ***decision making socio-psychological efficiency*** (DMSPE), ***manager´s experience*** (DMDETMEX_1), ***manager´s education*** (DMDETMED_1), ***company´s reward initiatives*** (DMDETCRI_1).

Testing the hypothesis H_{01_FS}

As outlined before, hypothesis H_{01_FS} will test the proposed causal relationship between the independent variable x_1, defined as the **decision making process maturity** and the dependent variable y_1, the decision ***making economic efficiency***.

> **H_{01_FS}:** There is a significant relationship between the **decision making process maturity** and the ***decision making economic efficiency*** in the strategic supplier selection process.

The results of the structural equation modelling calculations show a highly significant relationship (p-value=0.000) between the **decision making process maturity** and the ***decision making economic efficiency***. Hence, H_{01_FS} is tentatively corroborated in the field study, meaning that there is a significant impact of the major success factors in the decision making process, defined as the **decision making process maturity**, [483] on the cost-, time-, quality-based strategic supplier performance, defined as the ***decision making economic efficiency***.

Testing the hypothesis H_{02_FS}

Furthermore, hypothesis H_{02_FS} will test the proposed causal relationship between the independent variable x_1, defined as the **decision making process maturity** and the dependent variable y_2, the ***decision making socio-psychological efficiency***.

> **H_{02_FS}:** There is a significant relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency*** in the strategic supplier selection process.

The results of the structural equation modelling calculations show a highly significant relationship (p-value=0.000) between the **decision making process maturity** and the ***decision making socio-psychological efficiency***. H_{02_FS} is thus tentatively corroborated in the field study, meaning that there is a significant impact of the major success factors in the decision making process, defined as the **decision making process maturity**, [484] on the ***decision making socio-psychological efficiency***, introduced as a subjective measure of the supply manager regarding their satisfaction with the strategic supplier selection process and their satisfaction with the final strategic supplier selection decision.

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[483] The concept of the **decision making process maturity** amalgamates the four constitutional elements of rational decision making behaviour ***DMPM-target orientation***, the ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***.

[484] See footnote 483 for the definition of the **decision making process maturity**.

To sum up, it can be stated that the field study supports the relationship between the **decision making process maturity** and the ***decision making economic efficiency***. The empirical tests furthermore underline the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency***.

Testing the hypothesis H_{B_FS}

Moreover, the author has amalgamated the ***decision making economic efficiency*** with the ***decision making socio-psychological efficiency*** to a cumulative **decision making efficiency** variable. Thereby the statistical procedures result in a highly significant relationship (p-value=0.000) between the **decision making process maturity** and the amalgamated **decision making efficiency**, supporting the basic hypothesis H_{B_FS} of this thesis. This means, that there is a significant impact of the major success factors in decision making process, defined as the **decision making process maturity**,[485] on the overall decision making outcomes, defined as the **decision making efficiency**.

Finally, Table 3.21 displays the summarised hypotheses tests in the field study.

Table 3.21: Testing of hypotheses: H_{B_FS}, H_{01_FS}, H_{02_FS} (field study)[486]

Hypothesis	Result	
H_{B_FS} (DMPM→DME)	Confirmed (tentatively corroborated)[487]	
H_{01_FS} (DMPM→DMEE)	Confirmed (tentatively corroborated)	γ_{11}=0.504, p-value=0.000 R^2=0.254
H_{02_FS} (DMPM→DMSPE)	Confirmed (tentatively corroborated)	γ_{21}=0.555, p-value=0.000 R^2=0.308

In sum, as described above and displayed in Table 3.21, H_{B_FS}, H_{01_FS}, and H_{02_FS} are confirmed, respectively tentatively corroborated in the field study. These results will be discussed further and explained in detail in chapter 3.6 of this thesis.

Further testing of the proposed hypotheses

In order to test the three **company-internal determinants**, namely the ***manager´s experience***, the ***manager´s education***, and ***company´s reward initiatives***, the author will conduct a multitude of group comparison test. Therefore, the author has decided to apply two different approaches to tests the proposed research hypotheses.

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[485] The concept of the **decision making process maturity** amalgamates the four constitutional elements of rational decision making behaviour ***DMPM-target orientation***, the ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***.

[486] Table created by the author (survey data – field study, SmartPLS output).

[487] γ_{11cum}=.556, p-value=0.000, R^2_{cum}=0.309.

The selected state of the art structural modelling software SmartPLS allows for the application of the multi group analysis (MGA) toolset which basically includes a set of parametric and non-parametric methods for group analysis tests.[488] Thereby, the multi group analysis (MGA), as a non-parametric test, treats test-groups as categorical moderator variables which affect the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable.[489] This approach enables the researcher to test statistically significant differences in the identical model between different groups, namely between different subsamples. In summary, this approach allows the researcher to test whether differences between group-specific path coefficients are statistically significant. Therefore, this approach compares each bootstrap estimate of one group with all other bootstrap estimates of the same parameter in the other group.[490] The author will additionally compute the more "conservatively" used non-parametric Mann-Whitney U test[491] and the non-parametric Kruskal-Wallis test[492] in order to determine significant differences in the **decision making process maturity**, the ***decision making economic efficiency***, and the ***decision making socio-psychological efficiency*** variable values between the three **company-internal determinant** test groups.

Hence, the author will test proposed effects of the ***manager´s experience***, the ***manager´s education***, and the ***company´s reward initiatives*** by evaluating hypotheses H_{03_FS} – H_{08_FS}in the field study.

Testing the hypothesis H_{03_FS} and H_{04_FS}: The manager´s experience

Hypothesis H_{03_FS} will test the proposed effect of the ***manager´s experience*** on the causal relationship between **decision making process maturity** and the ***decision making economic efficiency***.

> **H_{03_FS}:** There is a significant effect of the ***manager´s experience*** on the relationship between the **decision making process maturity** and the ***decision making economic efficiency*** in the strategic supplier selection process.

The results of the multi group analysis tests show no significant impact of the ***manager´s experience*** (p-value=0.266) on the relationship between the **decision making process**

[488] Hair (2014), pp. 293–295.

[489] Sarstedt et al. (2011), p. 198 referring to Baron & Kenny (1986).

[490] Hair (2014), p. 42-294.

[491] Swift & Piff (2010), pp. 576–580.

[492] Bortz & Schuster (2010), p. 214.

maturity and the ***decision making economic efficiency***. In consequence, H_{03_FS} is rejected in field study. These results are supported the Mann-Whitney U test as well. The test results show no significant differences in the variable values (DMPM, DMEE) between the "lower" experience and "higher" experience test groups.[493]

Hypothesis H_{04_FS} will test the proposed effect of the ***manager´s experience*** on the causal relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency***.

> **H_{04_FS}:** There is a significant effect of the ***manager´s experience*** relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency*** in the strategic supplier selection process.

The results of the multi group analysis tests show no significant impact of the ***manager´s experience*** (p-value=0.356) on the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency***. H_{04_FS} is therefore rejected in field study. These results are supported by the Mann-Whitney U test as well. The test results showed no significant differences in the variable values (DMPM, DMSPE) between the "lower experience" and the "higher experience" test groups.[494]

Consequently, Table 3.22 displays the summarised hypotheses tests H_{03_FS} and H_{04_FS} in the field study.

Table 3.22: Testing of hypotheses: H_{03_FS}, H_{04_FS} (field study)[495]

Hypothesis	Result	
H_{03_FS} (DMDETMEX)	Rejected	PLS-MGA (p-value=0.266)
H_{04_FS} (DMDETMEX)	Rejected	PLS-MGA (p-value=0.356)

All in all, it can be stated that the ***manager´s experience*** has no effect on the relationship between the major success factors in decision making process, defined as the **decision making process maturity,** [496] and the cost-, time-, quality-based supplier performance, defined as the ***decision making economic efficiency***. The empirical tests furthermore do not confirm the assumption that the ***manager´s experience*** has a significant effect on the relationship between

[493] See appendix 6.2.5.1.

[494] See appendix 6.2.5.1.

[495] Table created by the author (survey data – field study, SmartPLS output).

[496] The concept of the **decision making process maturity** amalgamates the four constitutional elements of rational decision making behaviour ***DMPM-target orientation***, the ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***.

the major success factors in the decision making process, defined as the **decision making process maturity,**[497] and the ***decision making socio-psychological efficiency***, introduced as a subjective measure of the supply manager regarding their satisfaction with the strategic supplier selection process and their satisfaction with the final supplier selection decision.

Testing the hypothesis H_{05_FS} and H_{06_FS}: The manager´s education

Hypothesis H_{05_FS} will test the proposed effect of the ***manager´s education*** on the causal relationship between the **decision making process maturity** and ***the decision making economic efficiency***.

> **H_{05_FS}:** There is a significant effect of the ***manager´s education*** on the relationship between the **decision making process maturity** and the ***decision making economic efficiency*** in the strategic supplier selection process.

The results of the multi group analysis tests show no significant impact of the ***manager´s education*** (p-value=0.794) on the relationship between the **decision making process maturity** and the ***decision making economic efficiency***. H_{05_FS} is hence rejected in the field study. These results are supported by the Mann-Whitney U test, too. The test results show no significant differences in the variable values (DMPM, DMEE) between the "no university education" and "university education" test groups.[498]

Hypothesis H_{06_FS} will test the proposed effect of the ***manager´s education*** on the causal relationship between the **decision making process maturity** and ***the decision making socio-psychological efficiency***.

> **H_{06_FS}:** There is a significant effect of the ***manager´s education*** on the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency*** in the strategic supplier selection process.

The results of the multi group analysis tests show no significant impact of the ***manager´s education*** (p-value=0.390) on the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency***. Consequently, H_{06_FS} is rejected in field study. These results are supported by the Mann-Whitney U test as well. The test results show no significant differences in the variable values (DMPM, DMSPE) between the "no

[497] The concept of the **decision making process maturity** amalgamates the four constitutional elements of rational decision making behaviour ***DMPM-target orientation***, the ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***.

[498] See appendix 6.2.5.2.

university education" and "university education" test groups.[499] Consequently, Table 3.23 displays the summarised hypotheses tests H_{05_FS} and H_{06_FS} in the field study.

Table 3.23: Testing of hypotheses: H_{05_FS}, H_{06_FS} (field study)[500]

Hypothesis	Result	
H_{05_FS} (DMDETMED)	Rejected	PLS-MGA (p-value=0.794)
H_{06_FS} (DMDETMED)	Rejected	PLS-MGA (p-value=0.390)

In summary, it can be noted that the ***manager´s education*** has no effect on the relationship between the major success factors in the decision making process, defined as the **decision making process maturity,** [501] and the cost-, time-, quality-based supplier performance, defined as the ***decision making economic efficiency***. The empirical tests furthermore reject the notion that the ***manager´s education*** has a significant effect on the relationship between the major success factors in the decision making process, defined as the **decision making process maturity,** [502] and the ***decision making socio-psychological efficiency***, introduced as a subjective measure of the supply manager regarding their satisfaction with the strategic supplier selection process and their satisfaction with the final supplier selection decision.

Testing the hypothesis H_{07_FS} and H_{08_FS}: The company´s reward initiatives

Hypothesis H_{07_FS} will test the proposed effect of the ***company´s reward initiatives*** on the causal relationship between the **decision making process maturity** and the ***decision making economic efficiency***.

> **H_{07_FS}:** There is a significant effect of the ***company´s reward initiatives*** on the relationship between the **decision making process maturity** and the ***decision making economic efficiency*** in the strategic supplier selection process.

The results of the multi group analysis test show no significant impact of the ***company´s reward initiatives*** (p-value=0.227) on the relationship between the **decision making process maturity** and the ***decision making economic efficiency***. H_{07_FS} is rejected in the field study. These results are also supported by the Mann-Whitney U test. The test results show no significant differences

[499] See appendix 6.2.5.2.

[500] Table created by the author created by the author (survey data – field study, SmartPLS output).

[501] The concept of the **decision making process maturity** amalgamates the four constitutional elements of rational decision making behaviour ***DMPM-target orientation***, the ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***.

[502] See footnote 501 for the definition of the **decision making process maturity**.

in the variable values (DMPM, DMEE) between the "implemented reward initiatives" and "not implemented reward initiatives" test groups.[503]

Hypothesis H_{08_FS} will test the proposed effect of the ***company´s reward initiatives*** on the causal relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency***.

> **H_{08_FS}:** There is a significant effect of the ***company´s reward initiatives*** on the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency*** in the strategic supplier selection process.

The results of the multi group analysis test show no significant impact of the ***company´s reward initiatives*** (p-value=0.238) on the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency***. H_{08_FS} is rejected in the field study. Furthermore, these results are supported by a Mann-Whitney U test as well. The test results show no significant differences in the variable values (DMPM, DMSPE) between the "implemented reward initiatives" and "not implemented reward initiatives" test groups. However, the Mann-Whitney U test has further indicated a significant difference (p-value=0.036) in the ***decision making economic efficiency*** variable values between the "implemented reward initiatives" and "not implemented reward initiatives" test groups.[504]

Consequently, Table 3.24 displays the summarised hypotheses tests H_{07_FS} and H_{8_FS} in the field study.

Table 3.24: Testing of hypotheses: H_{07_FS}, H_{08_FS} (field study)[505]

Hypothesis	Result	
H_{07_FS} (DMDETCRI)	Rejected	PLS-MGA (p-value=0.227)
H_{08_FS} (DMDETCRI)	Rejected	PLS-MGA (p-value=0.238)

In sum, it can be stated that the ***company´s reward initiatives*** variable has no effect on the relationship between the major success factors in the decision making process, defined as the **decision making process maturity,** [506] and the cost-, time-, quality-based supplier performance, defined as the ***decision making economic efficiency***. The empirical tests

[503] See appendix 6.2.5.3.

[504] See appendix 6.2.5.3.

[505] Table created by the author created by the author (survey data – field study, SmartPLS output).

[506] The concept of the **decision making process maturity** amalgamates the four constitutional elements of rational decision making behaviour ***DMPM-target orientation***, the ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***.

furthermore reject the hypothesis that the ***company´s reward initiatives*** has a significant bearing on the relationship between the major success factors in the decision making process, defined as the **decision making process maturity,** [507] and the ***decision making socio-psychological efficiency***, introduced as a subjective measure of the supply manager regarding their satisfaction with the strategic supplier selection process and their satisfaction with the final supplier selection decision.

3.6. DISCUSSION OF RESEARCH RESULTS AND DERIVATION OF MANAGERIAL IMPLICATIONS

Based on the previously pointed-out research gap, which was identified after an intensive literature review and 7 explorative semi-structured interviews, this thesis investigates the impact of the major success factors in the decision making process, defined as the independent variable **decision making process maturity**, on the decision making outcomes, defined as the two dependent variables of the **decision making efficiency**, by focusing on the strategic supplier selection process in manufacturing enterprises.

For this purpose, the author has analysed the theoretical foundation and the fundamental organisational theories of decision making with a special focus on the descriptive decision making theory and on the concept of the situational theories.

The three structured content analyses of previous research-subject-related studies resulted in 73 identified studies dealing with the constitutional elements of the **decision making process maturity**, 67 relevant studies addressing **decision making efficiency** measures, and 16 relevant studies for the **company-internal determinants**. In sum, the three structured content analyses produced a total of 156 research-relevant studies respectively 141 direct and 109 indirect research-relevant indicators in the timeframe from 1970 to 2016.

For the empirical evaluation, the author selected a triangulated approach which included a laboratory experiment with 117 participants, a pre-evaluation respectively a pre-test of the intermediate research results and the questionnaire from the laboratory experiment by 23 specialists working in the field of strategic supplier selection processes, and a field study with 3,949 strategic supply managers, resulting in 139 valid responses from manufacturing enterprises in Europe. These research results generated a multitude of valuable implications which will be discussed in the next paragraphs.

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[507] The concept of the **decision making process maturity** amalgamates the four constitutional elements of rational decision making behaviour ***DMPM-target orientation***, the ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***.

In a first step, the author will reflect on the research results based on the theoretical framework of this thesis. After reviewing research-subject-related organisational theories (e.g., production theory, decision making theories, new institutional economics, etc.), the author has decided to focus on the descriptive decision making theory and on the concept of the situational theories for the synopsis of the theoretical framework. Thereby, the author postulates that, similar to production processes, decision making processes in businesses management can be improved by using controlled interactions in the course of the process sequence.[508] By referring to the research approach by Neuert, who proclaims that human behaviour seems to show more or less consistent patterns of decision making rationality,[509] the author has deduced the major success factors in the decision making process which was defined as the concept of the **decision making process maturity**. Based on the "Brim-Glass-Lavin-Goodman stage process of decision making" model,[510] Wild´s "generalised theory of planning",[511] and Neuert´s "degrees of rational planning behaviour",[512] the author turned to the descriptive decision making theory for the development of the four constitutional elements of rational decision making behaviour which ultimately form the amalgamated concept of the **decision making process maturity**. Therefore, the constitutional elements were defined as the ***DMPM-target orientation***, ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***.[513]

The author further used the descriptive decision making theory[514] for the conceptualisation of holistic measures determining the outcomes of the decision making process by focusing on the strategic supplier selection process. By referring to Gzuk´s concept of target-output relation,[515] the construct of the ***decision making economic efficiency*** was specified in order to capture the cost, quality, and time-dimensions of the strategic supplier performance. The descriptive decision making theory clearly stresses the importance of socio-psychological aspects (e.g., motivation, commitment, trust) in the course of decision making processes. For this purpose, the author has developed the construct of the ***decision making socio-psychological efficiency***.[516] Both depended variables, namely the ***decision making economic efficiency*** and

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[508] See Schulz (1977), pp. 1–4 and chapter 1.2 of this thesis.

[509] Neuert (1987), pp. 81–84.

[510] Witte (1988a), p. 203.

[511] Wild (1982), pp. 28–31.

[512] Neuert (1987), pp. 39–46.

[513] See chapter 1.3 of this thesis.

[514] See chapter 1.4 of this thesis.

[515] Gzuk (1975), p. 57.

[516] See chapter 1.4 of this thesis.

the ***decision making socio-psychological efficiency*** are part of the (overall) **decision making efficiency** variables complex.

The concept of the situational theories was used for the development of the theoretical framework for the **company-internal determinants**. Thereby the author has decided to focus on the three determinants of the ***manager´s experience***, the ***manager´s education***, and the ***company´s reward initiatives***. The determinant ***manager´s experience*** was used to evaluate the effects of specific on-job experience, the determinant ***manager´s education*** was used to measure the effects of the specific education, and the determinant ***company´s reward initiatives*** was used to investigate the effects of performance-based incentives and/or bonus systems in the strategic supplier selection process.[517]

Based on the theoretical framework, the author has developed this thesis´ conceptual framework by conducting an analytical literature review based on existing research models. For this reason, the author has executed three structured content analyses for the identification of the state of the art in research-subject-related areas of management research (e.g., strategic management, marketing, logistics and supply chain management, etc.).

The first structured content analysis resulted in 73 research-subject-relevant studies, mainly questionnaire-based field studies, for the conceptualisation of the **decision making process maturity**. The majority of the identified studies showed a significant (positive) relationship between various characteristics of the four constitutional elements of the **decision making process maturity** and the **decision making efficiency**. Most of the identified unidimensional studies were based on information-oriented (***DMPM-information orientation***) respectively on heuristics-oriented process measures (***DMPM-heuristics application***). In information supply-focused studies, predominately laboratory investigations, decision makers had never used all theoretical available information.[518] Interestingly, there was neither a significant relationship nor even a positive linear trend, between information supply and activities and the efficiency of the decision making processes,[519] meaning that an "isolated" search for additional information does not contribute to enhanced decision making outcomes.

As part of the ***DMPM-heuristics application*** measure, various studies demonstrate that the use of decision making heuristics (e.g., the usage and the weighting of evaluation criteria) will

[517] See chapter 1.5 of this thesis.

[518] Bronner (1973).

[519] Witte (1972d).

contribute to an increased **decision making efficiency**.[520] Additional studies have investigated the impact of organisational activities on decision making processes results. Enhanced organisational activities increase the process transparency and therefore the overall-efficiency of the decision making.[521] This can be achieved by the clarification of process frameworks as well as the personal and temporal assignment of tasks.[522] It should be further remarked that the "over-organisation" of decision making processes may decrease the **decision making efficiency**.[523] In fact, very few studies have investigated the first constitutional element ***DMPM-target orientation*** in decision making processes. Researchers are thus advised to pay more attention to target-oriented aspects in the strategic supplier selection process, because specific decision making targets are not given by themselves and therefore require a specific target building process.[524] The investigated ***DMPM-target orientation***-related studies constantly show a significant relationship between target-oriented behaviour and efficiency-related measures.[525]

Only a handful of multidimensional studies, which included more than one characteristics of the four constitutional elements of the **decision making process maturity,** were identified in course of the structured content analyses. Similar to the findings from the unidimensional studies, these models (e.g., the procedural rationality [526] and the decision comprehensiveness[527]) mainly include information-based (***DMPM-information orientation***) and/or heuristics-based (***DMPM-heuristics application***) measures and therefore still lack a broader view. However, the multidimensional models also tend to support the relationship between rational process behaviour (e.g., the procedural rationality)[528] and various decision making outcomes (e.g., organisational performance,[529] supply chain performance,[530] as well as financial and non-financial performance[531]).

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[520] Buhrmann (2010), Riedl (2012).

[521] Joost (1975).

[522] Schenkel (2006).

[523] Joost (1975).

[524] Hauschildt (1977).

[525] E.g. Conant & White (1999), Dyson & Foster (1982), Kenis (1979), Schenkel (2006).

[526] Dean & Sharfman (1993), Dean & Sharfman (1996).

[527] Fredrickson (1984).

[528] Dean & Sharfman (1993), Dean & Sharfman (1996).

[529] Elbanna & Child (2007).

[530] Acharya (2012).

[531] Kaufmann et al. (2012b).

The author has identified 67 research-subject-relevant studies for the conceptualisation of the **decision making efficiency** measures. As a result, the identified studies were clustered into four different decision making levels which could be used to measure the effects of the actual strategic supplier performance. These levels were systematically clustered into the supply chain level, the company level, the department or product performance level, and the level of the individual decision making process. Similar to most decision making behaviour-oriented studies,[532] the author has used the level of the individual decision (maker) because this approach allows for the most precise investigation of cause-effect relationships in the strategic supplier selection process.

The third part of the structured content analyses revealed 16 research-relevant studies for the conceptualisation of the **company-internal determinants**, which were divided into the ***manager´s experience***, the ***manager´s education***, and the ***company´s reward initiatives***. The ***manager´s experience*** was expected to influence the decision making process behaviour,[533] but various studies (e.g., Neuert)[534] are unable to confirm any significant relationship between higher experience and higher decision making outcomes. Moreover, the majority of the identified studies showed a positive effect of training and/or education, which in the present case is defined as the ***manager´s education***, and various decision making performance measures.[535]

In addition, empirical studies (e.g., Davis & Mentzer)[536] often reject the proposed performance-enhancing effects of monetary incentives which, in the present case, were measured by the ***company´s reward initiatives***.

For the empirical part, the author decided to apply a triangulated approach which combined the advantages of a laboratory experiment with the advantages of the field study. By using this approach, the author received valuable information from both the laboratory experiment (high level of internal validity and control) and the field study (high level of external validity and realism).[537]

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[532] E.g. Bronner (1973), Hering (1986).

[533] E.g. Buhrmann (2010), Riedl (2012).

[534] Neuert (1987).

[535] E.g. Mentzer & Cox (1984), Ahire et al. (1996).

[536] Davis & Mentzer (2007).

[537] See chapter 3.3.1 of this thesis.

At this point, the author again refers to the recent findings by Deck & Smith who recommended the future application of laboratory experiments in management research.[538]

Hereinafter, the author will briefly summarise the research results from the two empirical studies. Therefore, Table 3.25 displays the summarised research results respectively the summarised testing of the hypotheses H_B, H_{01}, and H_{02} in the laboratory experiment and in the field study.

Table 3.25: Summarised testing of hypotheses: H_B, H_{01}, H_{02} (laboratory experiment and field study)[539]

Hypothesis	Results: Laboratory experiment		Results: Field study	
H_B (DMPM→DME)	Confirmed (tentatively corroborated)[540]		Confirmed (tentatively corroborated)[541]	
H_{01} (DMPM→DMEE)	Confirmed (tentatively corroborated)	γ_{11}=0.369 p-value=0.013 R^2=0.136	Confirmed (tentatively corroborated)	γ_{11}=0.504 p-value=0.000 R^2=0.254
H_{02} (DMPM→DMSPE)	Confirmed (tentatively corroborated)	γ_{21}=0.484 p-value=0.000 R^2=0.234	Confirmed (tentatively corroborated)	γ_{21}=0.555 p-value=0.000 R^2=0.308

The results of the laboratory experiment show a significant impact of the **decision making process maturity** on the ***decision making economic efficiency*** (γ_{11}=0.369, p-value=0.013, R^2=0.136) in the strategic supplier selection process. Moreover, the **decision making process maturity** has a highly significant impact on the ***decision making socio-psychological efficiency*** (γ_{21}=0.484, p-value=0.000, R^2=0.234). This means that in the laboratory experiment, the identified major success factors in decision making processes (defined as the four constitutional elements of the **decision making process maturity**) have a significant impact on both, ***the decision making economic efficiency*** (defined as the strategic supplier performance) and on the ***decision making social-psychological efficiency*** (defined as the satisfaction with the strategic supplier selection process as well as the final strategic supplier selection decision).

Overall the lab results further indicate a highly significant (positive) impact of the **decision making process maturity** on the amalgamated **decision making efficiency** (γ_{11cum}=0.570, p-value=0.000, R^2_{cum}=0.325). In sum, H_B, H_{01}, and HB_{02} could be tentatively corroborated in the laboratory experiment.

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[538] Deck & Smith (2013). Professor Vernon L. Smith was awarded the Nobel Memorial Prize in Economic Sciences in 2002.

[539] Table created by the author (survey data – laboratory experiment & field study, SmartPLS & SPSS output).

[540] Calculation results for H_B in the laboratory experiment: γ_{11cum}=0.570, p-value=0.000, R^2_{cum}=0.325.

[541] Calculation results for H_B in the field study: γ_{11cum}=0.556, p-value=0.000, R^2_{cum}=0.309.

The results of the field have also revealed a highly significant impact of the **decision making process maturity** on the ***decision making economic efficiency*** (γ_{11}=0.504, p-value=0.000, R^2=0.254) and a highly significant impact of the **decision making process maturity** on the ***decision making socio-psychological efficiency*** (γ_{21}=0.555, p-value=0.000, R^2=0.308) in the strategic supplier selection process. Overall the field results further indicate a (positive) highly significant impact of the **decision making process maturity** on the amalgamated **decision making efficiency** variable (γ_{11cum}=0.556, p-value=0.000, R^2_{cum}=0.309). H_B, H_{01}, and HB_{02} could be tentatively corroborated in the field study.

In summary, both empirical studies have produced very similar results. H_B, H_{01}, and HB_{02} could be tentatively corroborated in the laboratory experiment and in the in the field study. Moreover, the research results are in line with similar studies in research-subject-related disciplines (e.g., strategic management[542] and marketing management[543]) and have produced results similar to studies which have used multidimensional models (e.g., procedural rationality[544] and (decision) comprehensiveness[545]).

Based on the overall proposition that, similar to production processes, decision making processes can be improved by using controlled interactions in the course of the process sequence[546] the empirical results revealed that the amalgamated concept of the **decision making process maturity** affects both, the ***decision making economic efficiency*** and the ***decision making socio-psychological efficiency*** in the strategic supplier selection process. This means that controlled interactions, which are based on the four constitutional elements of the **decision making process maturity** will have a significant (positive) impact on the overall-strategic supplier performance, which was measured by the ***decision making economic efficiency***, and on socio-psychological aspects, e.g., the satisfaction with the supplier selection process respectively with the final strategic supplier selection decision, which were measured by the ***decision making socio-psychological efficiency***.

Again, based on the research analyses, the four constitutional elements of the **decision making process maturity** can be used to increase the outcomes of the strategic supplier selection process in manufacturing enterprises. The constitutional elements of the **decision making process maturity** include the degree of precision of the target system and the continuous usage of the target system in the course of the strategic supplier selection process and during the final

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[542] E.g. Neuert (1987).

[543] E.g. Schenkel (2006).

[544] E.g. Dean & Sharfman (1993), Acharya (2012), Kaufmann et al. (2012b).

[545] E.g. Fredrickson (1984), Atuahene-Gima & Li (2004).

[546] See Schulz (1977), pp. 1–4 for similar considerations.

strategic supplier selection decision (***DMPM-target orientation***), the intensity of search activities for decision-relevant information (***DMPM-information orientation***), the maturity level of systematically organised activities (***DMPM-organisation***), and the heuristics application in the strategic supplier selection process (***DMPM-heuristics application***).[547]

Moreover, the field study revealed the following research results for three **company-internal determinants** of the ***manager´s experience***, the ***manager´s education,*** and the determinant ***company´s reward initiatives***.

Table 3.26 displays the summarised research results respectively the summarised testing of the hypotheses H_{03_FS}, H_{04_FS}, H_{05_FS}, $H_{06\_FS,}$ H_{07_FS}, and H_{08_FS} in the field study.

Table 3.26: Summarised testing of hypotheses: H_{03_FS}, H_{04_FS}, H_{05_FS}, $H_{06\_FS,}$ H_{07_FS}, H_{08_FS} (field study)[548]

Hypothesis	Results: Field study	
H_{03_FS} (DMDETMEX)	Rejected	PLS-MGA (p-value=0.266)
H_{04_FS} (DMDETMEX)	Rejected	PLS-MGA (p-value=0.356)
H_{05_FS} (DMDETMED)	Rejected	PLS-MGA (p-value=0.794)
H_{06_FS} (DMDETMED)	Rejected	PLS-MGA (p-value=0.390)
H_{07_FS} (DMDETCRI)	Rejected	PLS-MGA (p-value=0.227)
H_{08_FS} (DMDETCRI)	Rejected	PLS-MGA (p-value=0.238)

The research results showed no significant impact of the ***manager´s experience*** on the relationship between the **decision making process maturity** and the ***decision making economic efficiency*** (p-value=0.266) respectively on the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency*** (p-value=0.356). In sum, H_{03} and H_{04} were rejected in the field study. These results were further supported by a Mann-Whitney U test which revealed no significant differences in the **decision making process maturity**, the ***decision making economic efficiency***, and the ***decision making socio-psychological efficiency*** variables between the "lower experience" and the "higher experience" test groups.

These results are similar to previous studies in the field of strategic management.[549] Surprisingly, it seems that the manager´s working experience does influence the rational

[547] See chapter 1.3 for the theoretical definition of the constitutional elements of the **decision making process maturity**.

[548] Table created by the author created by the author (survey data – field study, SmartPLS output).

[549] E.g. Neuert (1987), Winklhofer & Diamantopoulos (2003).

decision making behaviour, measured by the **decision making process maturity**, respectively the **decision making efficiency** of the strategic supplier selection process.

Furthermore, research results showed no significant impact of the ***manager´s education*** on the relationship between the **decision making process maturity** and the ***decision making economic efficiency*** (p-value=0.794) respectively on the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency*** (p-value=0.390). In sum, H_{05} and H_{06} were rejected in the field study. These results were further supported by a Mann-Whitney U test which showed no significant differences in the **decision making process maturity**, the ***decision making economic efficiency***, and the ***decision making socio-psychological efficiency*** between the "no university education" and the "university education" test groups.

In contrast to the some of the identified studies,[550] the educational level by itself does not significantly influence the rational decision making behaviour, measured by the **decision making process maturity**, respectively the **decision making efficiency** in the strategic supplier selection process. However, according to related studies, [551] specific training initiatives and problem-based instructions could be used to increase the degree of rational decision making behaviour in the strategic supplier selection process.

Finally, research results did not bring to light any significant impact of the ***company´s reward initiatives*** on the relationship between the **decision making process maturity** and the ***decision making economic efficiency*** (p-value=0.227) respectively on the relationship between the **decision making process maturity** and the ***decision making socio-psychological efficiency*** (p-value=0.238). To sum up, H_{07} and H_{08} were rejected in the field study. These results were supported by an additional Mann-Whitney U test which showed no significant differences in the **decision making process maturity** and the ***decision making socio-psychological efficiency*** variables between the "implemented reward initiatives" and "not implemented reward initiatives" test groups. However, the Mann-Whitney U test suggested significant differences in the ***decision making economic efficiency*** variable (p-value=0.036) between the "implemented reward initiatives" and "not implemented reward initiatives" test groups.

In contrast to some of the identified studies,[552] the ***company´s reward initiatives*** did not influence the supply manager´s process behaviour.

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[550] E.g. Goll & Rasheed (2005), Park & Krishnan (2001).

[551] E.g. Neuert (1987), Mentzer & Cox (1984).

[552] E.g. Buhrmann (2010), Riedl (2012), Riedl et al. (2013).

However, the significant difference in the supplier performance, which was measured by the ***decision making economic efficiency***, could be explained by the fact that a higher overall-strategic supplier performance will result in a higher bonus for the supply manager. This fosters an extrinsic-motivation-based, performance-oriented strategic supplier selection process, but does not have any effect on the socio-psychological satisfaction of the supply manager.

CONCLUSIONS

The results of the theoretical and analytical findings combined with the empirical research results lead to the following conclusions:

1. In general, it can be stated that the success of business decision making processes, measured by the **decision making efficiency**, is significantly dependent on the fulfilment of rational decision making behaviour elements which were defined by the for constitutional elements of the **decision making process maturity**, namely the ***DMPM-target orientation***, the ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***.
2. The **decision making efficiency** cannot only be identified via economic measures (i.e. costs, profitability, revenues, etc.) but also has to take into account socio-psychological elements, as i.e. subjective satisfaction with the decision making process and the decision making outcomes, motivation of the decision makers, commitment of the decision makers to the decision making tasks, etc.
3. The empirical research emphasises the generally equal relevance of the four constitutional elements of the **decision making process maturity**, namely the ***DMPM-target orientation***, the ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***. This means, that successful decision making processes require the fulfilment of all those success factors, by pointing out that they cannot be mutually "traded in" by each other, because that would deteriorate the **decision making efficiency**.
4. In sum, the basic hypothesis, claiming that the **decision making process maturity** has a significant impact on the **decision making efficiency** in the strategic supplier selection process in manufacturing enterprises has been generally substantiated.
5. The robustness of the research model and the empirical findings can be definitely stated because they were confirmed by a laboratory experiment, by specialists working in the field of strategic supplier selection processes, and by a field study.
6. In addition, there is no significant impact of the **company-internal determinants** ***manager´s experience***, ***manager´s education***, ***company´s reward initiatives*** on the relationship between the **decision making process maturity** and the **decision making efficiency** in the strategic supplier selection process in manufacturing enterprises.
7. There is a significant positive impact of specific training procedures and/or problem-based instruction concerning the success factors in the decision making process (targets,

information, organisation, heuristics), on the decision making outcomes. This means that task-related training and instruction contribute to better decision making outcomes.

8. The **company-internal determinant *company´s reward initiatives*** does not directly influence the relationship between the **decision making process maturity** and the **decision making efficiency** variables in the strategic supplier selection process in manufacturing enterprises. In this case, additional empirical results show a significant difference in the ***decision making economic efficiency*** between enterprises with and enterprises without reward systems, meaning that performance-based and extrinsic-motivation-oriented company reward systems do have an impact on the supplier performance (***decision making economic efficiency***). Nevertheless, the results show no effect on the process- and results-based satisfaction of the supply managers, which was measured by the ***decision making socio-psychological efficiency***.

RECOMMENDATIONS

Based on the results of this scientific study, the author derived the following recommendations:

Recommendations for supply managers, buyers and purchasers, and professionals working in the fields of logistics, supply chain management, and supply management in manufacturing enterprises

1. Management has to design and implement a structured strategic supplier selection process in order to increase the decision making outcomes based on the developed concept of the **decision making process maturity**.[553]
2. For comprehensive improvement of decision making processes in general and of the strategic supplier selection process in particular management and decision making in businesses has to be focused on the outlined above four constitutional elements of **decision making process maturity**. This holistic approach can significantly contribute to elevated decision making outcomes. It is important to recognise that an isolated focus on a single constitutional element (e.g., ***DMPM-information orientation***) will only be partially helpful. Basically, all the four variables (***DMPM-target orientation***, ***DMPM-information orientation***, ***DMPM-organisation***, and ***DMPM-heuristics application***) have to be sustainably taken into account and applied.
3. Management has to consider the fact that motivational elements (e.g., satisfaction, commitment, trust) play an important role in the strategic supplier selection process. The supply manager´s motivation plays an important role in the course of the strategic supplier selection process (e.g., especially in the development of the target system and during the information search respectively information processing activities). Thereby, the **decision making process maturity** has a highly significant impact on the previously outlined ***decision making socio-psychological efficiency*** variable.
4. Supply managers tend to significantly overestimate their abilities to search for decision-relevant information. Therefore, management has to develop computer-based and/or manual strategic supplier selection support systems (e.g. handbooks, checklists, guide booklets), based on the research findings, for company decision makers.
5. While the education of supply managers is important, more specific trainings and management workshops have to be conducted in order to improve rational decision making behaviour in the strategic supplier selection process.

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[553] The concept of the **decision making process maturity** amalgamates the four constitutional elements of rational decision making behaviour ***DMPM-target orientation***, the ***DMPM-information orientation***, the ***DMPM-organisation***, and the ***DMPM-heuristics application***.

6. Performance-based reward systems will lead to a higher extrinsic motivation, fostering the supply managers to improve the supplier performance. However, these systems will not affect the supply manager´s process- and decision-based satisfaction. There is a future need for more holistic reward systems.
7. Management has to introduce and conduct regular and continuous strategic supplier selection training processes for relevant supply managers, concerning the phases, planning, instruments, heuristics and personal and temporal organisation of the strategic supplier selection process in manufacturing enterprises, based on the empirical findings concerning the relationship between the **decision making process maturity** and the **decision making efficiency** variables in the strategic supplier selection process.

Recommendations for scientists and research scholars

1. Science has to continue to develop the descriptive decision making theory in general respectively in the specific field of the strategic supplier selection process.
2. The theoretical foundation of the strategic supplier selection process should be further improved by transferring insights from research-subject-related disciplines to the field of research. In the end, this should contribute to a more comprehensive theory of supply management, logistics management, and supply chain management.
3. Science should further investigate the impact of company-internal and company-external determinants on the relationship between the **decision making process maturity** and the **decision making efficiency** variables.
4. Furthermore, future management research should investigate non-linear cause-effect relationships in decision making (e.g., the relationship between ***information quality*** and **decision making efficiency**).
5. Research should further analyse situational, contextual, and personal variables which can influence the rational decision making behaviour in the strategic supplier selection process. Thereby, the investigation of cultural variables and group decision making approaches might play in important role in future decision making research.
6. Finally, the author recommends an increased application of laboratory experiments in the field of logistics management, supply chain management, and supply management. This significantly underrated research method is able to deliver valuable insights for descriptive decision making research by giving the researcher the opportunity to design a specific framework which eliminates possible cofounding variables.

Recommendations for universities, academic training, and education

1. Universities have to create more awareness for the strategic supplier selection process respectively for strategic planning and decision making processes in general by developing more accurate lectures, curricula, and applied research projects.
2. Universities have to provide opportunities to learn and develop problem-based behaviour in managerial planning and decision making processes. This can be achieved by the enhanced usage of business simulations, case studies, projects, etc.
3. Universities have to foster the importance of structured decision making approaches in the strategic supplier selection process, focusing on the developed constitutional elements of the **decision making process maturity**, and increase the awareness of situational, contextual, and personal variables in the strategic supplier selection process.

Recommendations for economic development agencies

1. Provide supply managers with opportunities (e.g., functional platforms) to exchange their best practice experience for the improvement of their strategic supplier selection process.
2. Implement specific supply management training initiatives and decision support tools, especially in small- and medium-sized manufacturing enterprises.

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WORDS OF GRATITUDE

"Feeling gratitude and not expressing it is like wrapping a present and not giving it."

William Arthur Ward

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APPENDICES

Appendix 1: Systematic literature analyses

Appendix 1 contains an overview of research-relevant studies and is divided into: Table A1.1-1: Concepts (and measures) of **decision making process maturity**, Table A1.2-1: Concepts (and measures) of **decision making efficiency**, including the ***decision making economic efficiency*** measures and the ***decision making socio-psychological efficiency*** measures, and Table A1.3-1: Concepts (and measures) of **company-internal determinants**, including the three **company-internal determinants** ***manager´s experience***, ***manager´s education***, and ***company´s reward initiatives***.

Appendix 1.1: Concepts and measures of the decision making process maturity

Table A1.1-1[1] summarises the concepts and measures of the **decision making process maturity**.

Table A1.1-1: Concepts and measures of the decision making process maturity[2]

No.	Author	Research relevant investigated variable(s)	Sample	R. methods	Research Results
1	Acharya (2012)	Procedural rationality (extensively looked for information, analyse relevant information, quantitative analytic techniques, process influence on group decision, effective focusing on crucial information and ignoring irrelevant information) Five item scale by Dean & Sharfman (1993)	n=53	LABEX	No effect of information availability by itself and procedural rationality by itself on the total costs in the supply chain. The interaction of information availability and procedural rationality influence the overall supply chain performance. The procedural rationality in the retailer position has the most influence on the supply chain performance.
2	Atuahene-Gima & Li (2004)	Strategic decision comprehensiveness (development of alternatives, considering different criteria, examined multiple explanations for problems, conducted multiple examinations, search extensively for possible alternative courses of action) Five item scale by Miller et al. (1998)	n=373	FIELD_PDA	Significant impact of strategic decision comprehensiveness on new product performance. The relationship between strategic decision comprehensiveness and new product performance is negatively moderated by technology uncertainty and positively moderated by demand uncertainty
3	Bourgeois & Eisenhardt (1988)	Rational decision making process (analyse industry, competitor analysis, firm´s strength and weaknesses, target market, develop strategy)	n=24 (4)	FIELD_PDA	Strategic decision making is more difficult in a high velocity environment. Rational analyses improve the initial quality of the decision and result in a high performance. Plan carefully and analytically, but move more quickly and boldly.
4	Bronner et al. (1972)	Information demand activities (amount of "new" requests for information, amount of "repeated" requests for information)	n=144	LABEX	Participants never use all (theoretically) available information. No significant differences in information demand between groups which are encouraged to request additional information and groups which are not. Significant differences in information demand between groups which received an additional information request sheet in order to demand additional information and groups which did not.
5	Bronner (1973)	Information demand activities (amount of requests, accuracy of requests, intensity of cognitive processing of information)	n=96	LABEX	Significant differences in information demand between decisions with time limits and decisions without time limits. Time pressure leads to a reduction of information demand. No significant differences in the accuracy of requests and the intensity of cognitive processing of information between decisions with time limits and decisions without time limits.
6	Bronner & Wossidlo (1988)	Information demand activities (amount of requests, accuracy of requests, intensity of cognitive processing of information)	n=144	LABEX	Significant differences in information demand between decisions with time limits and decisions without time limits. Time pressure leads to a reduction of information demand. No significant differences in the accuracy of requests and the intensity of cognitive processing of information between decisions with time limits and decisions without time limits.

[1] Abbreviations: No.=order number, R. methods=research methods (LABEX=laboratory experiment, FIELD_PDA=field study/primary data analysis, FIELD_SDA=field study/secondary data analysis, CONCEPT=conceptual study).

[2] Table created by the author (structured content analysis).

No.	Author	Research relevant investigated variable(s)	Sample	R. methods	Research Results
7	Buhrmann (2010)	Decision task decomposition (split the decision task, determine a set of relevant criteria, specifications before search, prioritised criteria, weighting of criteria, structured information for evaluation)	n=337	FIELD_PDA	Significant relationship between decision task decomposition and non-financial decision effectiveness. Significant relationship between decision task decomposition and financial decision effectiveness.
8	Claycomb et al. (2000)	Strategic marketing formalisation (formal written documents: marketing strategic plan, marketing mission statement, distribution of strategic plan, distribution of mission statement)	n=200	FIELD_PDA	Significant correlation between strategic marketing formalisation and performance, organisational configuration, structure, and consumer driven exchange. The better the strategic marketing formalisation, the better the market performance and the financial performance.
9	Conant & White (1999)	Marketing program planning (23 item scale, e.g., clarity of targets; resulting in 4 factors: formal planning, strategic clarity, extent of segmentation, rapid market response)	n=77	FIELD_PDA	Significant impact of strategic clarity on market knowledge, marketing program effectiveness, and financial performance. Market knowledge and marketing program effectiveness are significantly related to financial performance.
10	Cramme (2005)	Information demand activities (personal sources, impersonal sources)	n=1900	FIELD_PDA	Significant correlation between information demand activities by using personal sources (customers; suppliers, partners, distributors; customer-oriented employees; supplier- and customer-contacts) and the decision making efficiency. No significant correlation between information demand activities by using impersonal sources (market and industry data) and the decision making efficiency.
11	Dean & Sharfman (1993)	Procedural rationality (extensively look for information, analyse relevant information, quantitative analytic techniques, process influence on group decision, effective focusing on crucial information and ignoring irrelevant information) Five item scale by Dean & Sharfman (1993)	n=57	FIELD_PDA	The environment (competitive threat), the organisation (external control), and the strategic issue (uncertainty) jointly effect the level of procedural rationality. Uncertainty is quite strongly related to procedural rationality. Lack of relationship between decision importance and procedural rationality.
12	Dean & Sharfman (1996)	Procedural rationality (extensively look for information, analyse relevant information, quantitative analytic techniques, process influence on group decision, effective focusing on crucial information and ignoring irrelevant information) Five item scale by Dean & Sharfman (1993)	n=52	FIELD_PDA	Decision making processes (procedural rationality) are related to decision making success (success related to objectives) Managers who collect information and use analytical techniques are more effective than those who do not. Furthermore, environmental instability and quality of decision implementation play an important role in influencing the decision effectiveness.
13	Dyson & Foster (1982)	Effectiveness (12 items, e.g., richness of formulation, adequate data, iteration in process, control measures)	n=10	FIELD_PDA	Conceptual framework for effectiveness (12 items) and participation (3 items) in the planning process. Changes in the participation level will cause a change in the effectiveness level.
14	Elbanna (2006)	Procedural rationality (extensively look for information, analyse relevant information, quantitative analytic techniques, process influence on group decision, effective focusing on crucial information and ignoring irrelevant information) Five item scale by Dean & Sharfman (1993)	n=0	CONCEPT	Analytical review of strategic decision making process models. Focus on procedural rationality.
15	Elbanna & Child (2007)	Procedural rationality (extensively look for information, analyse relevant information, quantitative analytic techniques, effective focusing on crucial information and ignoring irrelevant information) Five item scale by Dean & Sharfman (1996)	n=169	FIELD_PDA	Rationality has an impact on the organisational performance. Rationality is shaped by decision-, firm-, and environmental characteristics.
16	Fredrickson & Mitchell (1984)	Comprehensiveness (70 measures, primary responsibility, breadth of participation, willingness to go outside for information, primary method used, amount of expenditures, range of techniques)	n=109	FIELD_PDA	The strategic decision making process based on rational models (comprehensiveness) is not appropriate for some environments. Negative relationship between comprehensiveness and performance in unstable environments.
17	Fredrickson (1983)	Comprehensiveness (48 measures, based on the four steps: situation diagnosis, alternative generation, alterative evaluation, decision integration)	n=27+38	FIELD_PDA	Significant (negative) relationship between comprehensiveness and return on assets as well as growth in sales in unstable environment. No significant relationship between comprehensiveness and sales.
18	Fredrickson (1984)	Comprehensiveness (48 measures, based on the four steps: situation diagnosis, alternative generation, alterative evaluation, decision integration)	n=38	FIELD_PDA	Significant (positive) relationship between comprehensiveness and performance (average after-tax return on assets*, %change in gross sales*) in stable environment. * … during the last 5 years

No.	Author	Research relevant investigated variable(s)	Sample	R. methods	Research Results
19	Fredrickson (1986)	Comprehensiveness (70 measures, primary responsibility, breadth of participation, willingness to go outside for information, primary method used, amount of expenditures, range of techniques)	n=0	CONCEPT	Critical strategic decision process characteristics: Process initiation, role of goals, means/ends relationship, explanation of strategic action, comprehensiveness in decision making, comprehensiveness in integrating decisions.
20	Fredrickson & Iaquinto (1989)	Comprehensiveness in decision making (43 measures, based on the four steps: situation diagnosis, alternative generation, alterative evaluation, decision integration)	n=45	FIELD_PDA	Changes in organisational size, executive-team tenure, and level of team continuity are associated with changes in comprehensiveness. Relationships between comprehensiveness and performance has lasted for years after the initial studies. Significant across-industry differences in comprehensiveness.
21	Fugate et al. (2009)	Improved knowledge management activities (LO knowledge generation, LO knowledge dissemination, LO knowledge shared interpretation, LO knowledge responsiveness)	n=336	FIELD_PDA	In logistics operations, knowledge management processes show a strong positive relationship between this knowledge and operational and organisational performance.
22	Geißler (1986)	Causes of failure decisions (constitutional, procedural, and personnel problems in decision making processes)	n=50	FIELD_PDA	Constitutional problems in decision making processes (e.g., missing information, barriers of information flow). Procedural problems in decision making processes (e.g., missing definition of process steps). Personnel problems in decision making processes (e.g., competences).
23	Goll & Rasheed (1997)	Rational decision making (systematic search, strategic importance, application of techniques, explanation of proposed changes, participative consensus seeking, open communication)	n=159	FIELD_PDA	Market dynamism shows a negative significant relationship on the performance/return on assets (model 1). Environmental munificence has a moderating effect on the relationship between rational decision making and performance/return on assets as well as return on sales (model 2). Significant relationship between rational decision making and performance/return on assets as well as return on sales in high munificence environments. Significant relationship between rational decision making and performance/return on assets as well as return on sales in high munificence and high dynamism environments.
24	Goll & Rasheed (2005)	Rational decision making (systematic search, strategic importance, application of techniques, explanation of proposed changes, participative consensus seeking, open communication)	n=159	FIELD_PDA	Top management demographic characteristics (tenure, education level) influence rational decision making. Interaction between environmental munificence and rational decision making lead to a signification increase in the variance of the performance (return on assets, return on sales). Environmental munificence moderates the relationship between rational decision making and performance.
25	Greenley & Bayus (1993)	Marketing planning decision making (decision making methods, confidence in using methods, type of information, participation in decision making, potential for improvement)	n=106	FIELD_PDA	Significant differences between decision making practices in US und UK. Few companies use decision making methods on a regular base und have little confidence in using them. Internal information is used predominantly. Gathering of information requires significant resource allocation.
26	Grieshop (2010)	Quality of the formal information exchange Quality of the informal information exchange	n=1057	FIELD_PDA	Signification correlation between the quality of the formal information exchange and the quality of the cooperation between controlling and external accounting. Signification correlation between the quality of the informal information exchange and the quality of the cooperation between controlling and external accounting.
27	Grover & Segars (2005)	Strategic information system planning (comprehensiveness, formalization, focus, flow, participation, consistency)	n=253	FIELD_PDA	Different (maturity) stages can be found in strategic planning processes. Every firm follows a certain pattern in each of the stages. Firms with more experience in strategic information system planning processes and in a more mature stage have better outcomes. Firms in a more mature stage experience more uncertainty and a higher level of diffusion.

No.	Author	Research relevant investigated variable(s)	Sample	R. methods	Research Results
28	Grün et al. (1972)	Information demand activities (request, invite, define competences, define work tasks, define dates)	n=233	FIELD_SDA	Descriptive evaluation of information demand activities. Highly significant differences in information demand activities regarding the type of information (economic, organisational, technical information).
29	Hamel (1974)	Target building process, target variations in course of the target building process	n=118 (76)	FIELD_SDA	Decision targets require a target building process (clear and repeated definition of the decision target, time consuming activities in the process). Further investigation regarding the variation of decision targets in the course of the decision making process (target objects, target characteristics, target functions).
30	Hansen (2009)	Exchange of information with suppliers	n=295	FIELD_PDA	The exchange of information with suppliers significantly increases the receptive and the investigative vigilance of supply management.
31	Hauschildt (1977)	Content of targets (target objective, target characteristics, target formulation, target function), target building process	n=61	FIELD_SDA	Decision targets are not given by themselves and not identical with the targets of the enterprise. Decision targets require organisation, and therefore they need a target building process. Further investigation on the structure of decision targets, the target building process and the relationship between target building and decision making activities.
32	Hauschildt (1988)	Target building process, target content	n=148	FIELD_SDA	A higher degree of decision complexity causes a higher amount of activities in the target building process.
33	Hough & White (2003)	Strategic-decision-making rationality (availability and pervasiveness)	n=400 (54)	LABEX	Results indicate that environmental dynamism may moderate the relationship between decision making and decision quality on an individual level by using a laboratory experiment. The form of the above-mentioned relationship differs from firm-level research.
34	Hsu et al. (2008)	Information sharing capability (information system integration, decision system integration, business process integration)	n=596	FIELD_PDA	Positive relationship between information sharing capability, buyer-supplier relationships and performance. Information system integration, decision system integration, and business process integration are positively related to the buyer-supplier relationship (supply chain architecture, relationship architecture. Relationship architecture is positively related to market performance and positively affects financial performance.
35	John & Martin (1984)	Organisational structure (centralisation: locus of authority, participation; formalisation; structural differentiation: diversity, specialisation, dispersion)	n=46	FIELD_PDA	Overall, the organisational structure influences the credibility and the utilisation of the marketing plan. Significant positive effect of formalisation, significant negative effect of centralisation, and insignificant effect of structural differentiation (specialisation, dispersion) on plan utilisation. The additional LISREL model shows a significant positive impact of the formalisation variable, a significant negative impact of the centralisation variable, a positive but statistically insignificant impact of the specialisation variable, and a significantly positive impact of the spatial dispersion variable on credibility.
36	Joost (1975)	Organization (content, time, task assignment, others (control, place) of the decision making process	n=233	FIELD_SDA	Organisational activities are distributed over the whole duration of the decision making process. Analyses of existence, analyses of causes, and analyses of effects regarding the organisation in decision making processes. Organisation in decision making processes leads to a higher transparency (mostly in larger enterprises). A higher degree of organisation leads to a higher efficiency. Too much organisation can decrease the efficiency.

No.	Author	Research relevant investigated variable(s)	Sample	R. methods	Research Results
37	Kaufmann et al. (2012b)	Procedural rationality (mostly analytical, extensive search for information, quantitative analyses, focus on information, analysing relevant information)	n=300	FIELD_PDA	Significant positive impact of procedural rationality on the financial performance. Significant positive impact of procedural rationality on the non-financial performance. Comparison of effects of procedural rationality between German and Chinese samples. Benefits of procedural rationality across different levels of dynamism and stability of environments.
38	Kaufmann et al. (2014)	Procedural rationality (mostly analytical, extensive search for information, quantitative analyses, analysing relevant information)	n=54	FIELD_PDA	Rational processes (procedural rationality) in sourcing teams enhance cost performance. Experience-based intuition in sourcing teams enhances cost and quality/delivery/innovativeness performance.
39	Kenis (1979)	Budgetary goal characteristics (participation, goal clarity, feedback, evaluation, goal difficulty)	n=169	FIELD_PDA	Budgetary participation and budgetary goal clarity tend to have a significant positive effect on job-related and budget-related attitudes of managers. Budgetary goal clarity has a positive significant influence on the budgetary performance and on the cost efficiency of the managers.
40	Klein & Yadav (1989)	Number of dominant alternatives in decision making processes (context factors, perceptions of context, strategy)	n=74	FIELD_PDA	The number of dominant alternatives significantly improves the choice accuracy (objective and subjective measures) and reduces the choice effort (time consumption).
41	Langley (1989)	Use of formal analyses (information, communication, direction and control, symbolic purposes)	n=3	FIELD_PDA	In organisational decision making, different structural configurations generate different patterns regarding the usage of formal analyses. Formal analyses and social interaction must be viewed as being closely intertwined rather than mutually incompatible. The usage of formal analyses acts as a glue within the social interactive processing of generating organisational commitment and ensuring action.
42	Li et al. (2012)	Collaborative knowledge management practices (c.k. generation, c.k. storage, barrier free access, c.k. dissemination, c.k. application)	n=411	FIELD_PDA	Significant positive relationship between knowledge management practices on supply chain knowledge quality. Positive significant relationship between knowledge management practices on supply chain integration.
43	Mantel et al. (2006)	Strategic vulnerability (number of suppliers, cost implications, information sufficiency) Information source formality	n=603	FIELD_PDA	Strategic vulnerability is significantly positively related to the number of qualified suppliers, cost implications, and to perceived information sufficiency. There is an additional two-way interaction between costs and information sufficiency. The likelihood to outsource when there is a high degree of core competences and low strategic vulnerability is stronger when the information comes from an information source rather than a formal source.
44	Miller (2008)	Decisional comprehensiveness (situation diagnosis, alternative generation, alterative evaluation) Based on Fredrickson & Mitchell (1984)	n=85	FIELD_PDA	Comprehensiveness and performance are connected through an U-shaped function in non-turbulent environments. Comprehensiveness is positive for performance under conditions of unpredictable change. Organisations need to move at least to a moderate level of comprehensiveness before experiencing any benefit.
45	(Molloy & Schwenk (1995)	Information technology usage (storage, processing, communication)	n=4	FIELD_PDA	The use of IT does improve the efficiency and the effectiveness of decision making processes. The effect of IT on performance is found to be positively related to the level of IT use with problem decisions having a higher level of use and performance than crises decisions.

No.	Author	Research relevant investigated variable(s)	Sample	R. methods	Research Results
46	Moon et al. (2003)	Reference process for sales forecasting (organisation, information, technical issues, the forecaster and users, costs and benefits)	n=0	CONCEPT	Development of a methodology for conducting a sales forecasting audit which will help companies to understand the status of their sales forecasting process and identify ways to improve these processes. Three phases of analysis: "as-is" to understand the companies´ forecasting process, "should-be" to present the vision of a world-class forecasting process, and "way-forward" roadmap to change the current forecasting processes in order to achieve a world-class level.
47	Neuert (1987)	Degree of planning behaviour (Target orientation, organization, information, decision making cognition, control)	n=83	LABEX	Significant impact of the degree of planning behaviour on the formal efficiency (forecasting accuracy). Significant impact of the degree of planning behaviour on the material efficiency (financial performance). Significant impact of the degree of planning behaviour on the personal efficiency (personal satisfaction).
48	Nooraie (2008)	Decisional comprehensiveness (situation diagnosis, alternative generation, alterative evaluation) Based on Fredrickson & Mitchell (1984)	n=135	FIELD_PDA	The decision magnitude of impact is significantly associated with the level of rationality in the decision making process. Furthermore, the data indicates that the extent of rationality in the decision making process mediates the relationship between the decision magnitude of impact and the quality of the decision making process output.
49	Onsi (1973)	Behavioural variables affecting budgetary slack (14 factors, 7 second order factors)	n=107 (7)	FIELD_PDA	Factor analysis of behavioural variables affecting budgetary slack: slack dynamics, divisional budgetary system theory "x", reaction to budgetary pressure, evaluation of system heavily budget-oriented, slack and budget attainment, slack deduction and response, and budget communication and its need.
50	Papke-Shields et al. (2006)	Strategic manufacturing planning processes characteristics (rational characteristics: flow, formality; comprehensiveness; focus; horizon; adaptive characteristics: intensity, participation)	n=202 (45)	FIELD_PDA	Consistent patterns of strategic manufacturing planning exist which are related to planning success and ultimately to business performance. The degree of "rationality" and the degree of "adaptability" are identified as important measures. "Best practice" would be a rational adaptive approach. Management should use a more rational adaptive approach which can lead to business success.
51	Pfohl (1977)	Structure and organisation of the decision making process, decision making heuristics	n=0	CONCEPT	Theoretical conceptualisation of the structure, the organisation and available heuristics of decision making processes.
52	Piercy & Morgan (1990)	Determinants of the effectiveness of the marketing planning process (analytical, behavioural, organisational)	n=144	FIELD_PDA	The correlation between behavioural planning problems and the measures of organisational context is mostly significant and negative. Behavioural planning problems are the greatest when the company has little appreciation of customer needs and different market segment requirements, and when the company lacks effectiveness in developing and implementing marketing strategies. Some significant correlations between organisational supportiveness and credibility as well as the utilisation of the marketing plan.
53	Premkumar & King (1992)	Quality of the planning process (extend of analyses in external, internal, and technological environment and external standards of good planning practices)	n=249	FIELD_PDA	The quality of the planning process is significantly better for firms in the strategy/turnaround group when compared to the support/factory group. The quality of the planning process is significantly better for firms that foresee a significant role of information systems in the future.
54	Premkumar & King (1994)	Quality of the strategic planning process (18 items: e.g., integration of various levels, evaluation of multiple alternatives, analyses of resource constraints)	n=249	FIELD_PDA	Canonical correlation reveals that the variables associated with the quality of the planning dimensions are resources, quality of facilitation mechanisms, the future impact of information systems, the quality of implementation mechanisms, and the quality of strategic business planning. The research highlights the need for a multidimensional conceptualisation of the planning system’s success and develops first evaluation measures.

No.	Author	Research relevant investigated variable(s)	Sample	R. methods	Research Results
55	Priem et al. (1995)	Rationality in strategic decision making processes (planning, scanning, analysis) By Miller (1987)	n=101	FIELD_PDA	Process rationality is positively related to firm size. Positive rationality-performance relationship for firms facing dynamic environments. No rationality-performance relationship for firms facing stable environments.
56	Pulendran & Speed (1996)	Quality of the marketing planning (process formality, process rationality, and process comprehensiveness)	n=0	CONCEPT	Conceptual framework for marketing planning practices by focusing on different planning styles (synoptic, incremental, and interpretative) and different configurational aspects (process, purpose, and players). Further description of process formality, process rationality, and process comprehensiveness.
57	Pulendran et al. (2003)	Quality of the marketing planning (process formality, process rationality, and process comprehensiveness, interaction in planning) Based on Fredrickson & Mitchell (1984) and Dean & Sharfman (1993)	n=89	FIELD_PDA	Significant positive relationship between marketing planning quality and marketing orientation. Significant positive relationship between marketing orientation and business performance. Significant positive relationship between marketing planning quality and business performance. A higher quality of the marketing plan can lead to performance benefits, but as an antecedent to marketing orientation rather than having a (direct) impact on business performance.
58	Ramanujam et al. (1986)	Key-dimensions of a planning system (design elements: system capability, use of techniques, attention to internal facets, attention to external facets, functional coverage; organisational context of planning: resources provided for planning, resistance to planning)	n=207	FIELD_PDA	The most important key-dimensions regarding the planning effectiveness are system capability, a system´s orientation toward creativity and control, resources provided for planning, and functional coverage.
59	Riedl (2012)	Decision task decomposing (determined relevant decision criteria, specifications before the search, prioritised relevant evaluation criteria, assigned weights to the evaluation criteria, structured supplier information)	n=461	FIELD_PDA	Significant impact of the decision process decomposing on the residual uncertainty. Significant impact of the residual uncertainty on the supplier´s strategic capabilities. Significant impact of the residual uncertainty on the financial performance.
60	Riedl et al. (2013)	Procedural rationality (extensive search for information, quantitative analyses, analysing relevant information)	n=457	FIELD_PDA	Procedural rationality has a significant impact on the reduction of residual uncertainty in the Chinese and in the U.S. sample. Residual uncertainty has a significant negative impact on the supplier decision performance (financial and non-financial performance) in the Chinese and in the U.S. sample.
61	Sabherwal & King (1995)	Strategic information system planning process (formalization, decision making process)	n=81	FIELD_PDA	Development of five alternative ways of information system application planning processes (planned, provincial, incremental, fluid, and political). The process should be considered as universally applicable. Anyone of the five developed processes may be used, depending on the specific circumstances.
62	Schenkel (2006)	Quality of the planning process (formal quality, quality of the information base, quality of interaction, efficiency of the process)	n=392	FIELD_PDA	The quality of the planning process has a significant impact on the quality of the market-based planning. Furthermore, the quality of the market-based plan and the application of the market-based plan have a significant impact on the quality of the market-based planning.
63	Segars & Grover (1998)	Key success factors of the effectiveness of an strategic information system process (planning alignment, planning analysis, planning cooperation, planning capabilities)	n=253	FIELD_PDA	Development of four constructs which influence the planning success. Planning objectives associated with aligning IS strategies, understanding processes, procedures, and technologies, and gaining the cooperation of various management and end-user groups provide a useful framework for structuring the desired outcomes of the strategic information system planning.
64	Simons et al. (1999)	Decisional comprehensiveness (situation diagnosis, alternative generation, alterative evaluation) Based on Fredrickson & Mitchell (1984)	n=57	FIELD_PDA	Decision comprehensiveness partly moderates the relationship between team diversity variables and financial performance.

No.	Author	Research relevant investigated variable(s)	Sample	R. methods	Research Results
65	Venkatraman & Ramanujam (1987)	Key capabilities of a planning system (development of 12 indicators)	n=202	FIELD_PDA	Based on 202 planning practices, the authors develop twelve indicators for the key capabilities of a planning system. (Anticipate surprises and crises, adapt unanticipated changes, identify new business opportunities, identify key problem areas, foster managerial motivation, enhance generation of new ideas, communicate top management´s expectation, foster management control, foster organisational learning, communicate line managers' concerns, integrate diverse functions and operations, enhance innovation).
66	Weihe (1976)	Target orientation	n=0	CONCEPT	Theoretical conceptualisation of the target orientation in decision making processes.
67	Wild (1982)	Quality of the planning process	n=0	CONCEPT	Theoretical conceptualisation of the quality variables in managerial planning processes.
68	Witte (1972a)	Information behaviour (information activities)	n=233	FIELD_SDA	No significant relationship between information activities and the efficiency of decision making processes. Not even a positive (linear) trend between information activities and the efficiency of decision making processes can be found by analysing the data from the field study.
69	Witte (1972c)	Information behaviour (information supply)	n=233	FIELD_SDA	No significant relationship between the amount of information supply activities and the efficiency of decision making processes. No linear relationship. Tendencies to a concave relationship. The highest efficiency is achieved by the lowest information supply activities.
70	Witte (1972b)	Information behaviour (information demand)	n=233	FIELD_SDA	No significant relationship between information demand activities and the efficiency of decision making processes. Low information demand activities cause lower efficiencies respectively high information demand activities cause higher efficiencies.
71	Witte (1972d)	Information behaviour (information demand, incomplete information)	n=144	LABEX	No significant relationship between the "spoken" invitation to request additional information and information demand. Significant relationship between the "written" invitation to request additional information and information demand. More precise information requests in the course of the simulation (learning effects).
72	Witte (1988a)	Formal structure of decision making processes	n=233	FIELD_SDA	Decision making processes are multi-temporal, multi-personal, and multi-operational. The "unrestricted" 5-phase-theorem of decision making processes is falsified in favour of complex, innovative, multi-personal decision making processes.
73	Witte (1988b)	Information behaviour (information supply, information demand)	n=233	FIELD_SDA	No significant relationship between information demand and the efficiency of decision making processes. No significant relationship between information supply and the efficiency of decision making processes (tendencies relations can be observed).

Appendix 1.2: Concepts and measures of the decision making efficiency

Table A1.2-1[3] summarises the concepts and measures of the **decision making efficiency** including the ***decision making economic efficiency*** measures and the ***decision making socio-psychological measures***.

Table A1.2-1: Concepts and measures of the decision making efficiency[4]

No.	Author	Independent variable(s)	Research relevant investigated variable(s)	Sample	R. methods
1	Agus & Shukri Hajinoor (2012)	Lean production in SCM	Product quality performance (prod. conformance, prod. performance, prod. reliability, prod. durability) Business performance (profit, market share, return on sales, return on asset)	n=200	FIELD_PDA
2	Aranya (1990)	Budget instrumentality Budget participation	Budgetary performance (sales figures, gross profit, franchisees' incomes, store wages, net income, inventory) Job satisfaction ("how much is there-approach")	n=100	FIELD_PDA
3	Arh et al. (2012)	Technology-enhanced organisational learning	Financial performance (return on assets, return on equity, added value per employee) Non-financial performance (fluctuation of employees, customer loyalty, costumer complaints, stability of relationships with suppliers)	n=356	FIELD_PDA
4	Birou et al. (2011)	Applied logistics knowledge	Financial performance (average return on investment*, average profit*, profit growth*) * … over the past three years	n=222	FIELD_PDA
5	Bronner (1973)	Time pressure	Personal efficiency (satisfaction) Temporal efficiency (decision time) Economic efficiency (economic output)	n=112	LABEX
6	Brouër (2014)	---	Acceptance of the achieved solution (14 items regarding the acceptance of the problem solution) Self-evaluation scale (7 items regarding the quality of the problem solution)	n=41	LABEX
7	Buhrmann (2010)	Challenging of supplier alternatives, perspective shifting initiatives, decision task decomposing	Non-financial decision effectiveness (total cost relative to expectations, actual relative to expectations, price stability, meeting target costs) Financial decision effectiveness (compliance with specifications, quality complaint rate, time from order to delivery, on-time delivery, completion of delivery)	n=337	FIELD_PDA
8	Cao & Zhang (2011)	Supply Chain Collaboration Collaborative Advantage	Firm performance (growth of sales, return on investment, growth in return on investment, profit margin on sales)	n=211	FIELD_PDA
9	Čater & Čater (2009)	(In)tangible resources (cost-leadership-based, differentiation-based competitive advantages)	Company performance (return on assets)	n=182	FIELD_PDA
10	Chen & Paulraj (2004)	Supply network structure Buyer-supplier relationships Logistics integration	Supplier operational performance (volume flexibility, scheduling flexibility, on-time delivery, delivery reliability/consistency, quality, costs) Buyer operational performance (volume flexibility, delivery speed, delivery reliability/dependability, cost, rapid confirmation of customer orders, rapid handling of customer complaints, customer satisfaction) Buyer financial performance (return on invest, profits as a percent of sales, firm´s net income before tax, present value of the firm)	n=221	FIELD_PDA

[3] Abbreviations: No.=order number, R. methods=research methods (LABEX=laboratory experiment, FIELD_PDA=field study/primary data analysis, FIELD_SDA=field study/secondary data analysis, CONCEPT=conceptual study).

[4] Table created by the author (structured content analysis).

No.	Author	Independent variable(s)	Research relevant investigated variable(s)	Sample	R. methods
11	Chen et al. (2007)	Marketing/logistics collaborative activities Firm-wide cross-functional integration	Firm performance (customer satisfaction, overall competitive position, sales, net profit margin, return on assets)	n=125	FIELD_PDA
12	Chong & Chong (2002)	Budget participation Budget goal commitment Job-relevant information	Job performance (nine-item self-rating scale)	n=79	FIELD_PDA
13	Cramme (2005)	Information search activities, information sharing activities, information exchange activities	Decision efficiency (rated efficiency-based on information behaviour)	n=1900	FIELD_PDA
14	Danese & Kalchschmidt (2011)	Forecasting process	Operational performance (cost, delivery)	n=343	FIELD_PDA
15	Grabatin (1981)	---	Economic efficiency of decision making processes	n=0	CONCEPT
16	Green et al. (2008)	Logistics performance Supply chain management strategy	Marketing performance (average return on investment*, average profit*, profit growth*, average return on sales*) Financial performance (average market share growth*, average sales volume growth*, average sales growth ($)*) * … over the past three years	n=142	FIELD_PDA
17	Green et al. (2012)	Marketing strategy alignment Supply chain performance	Marketing performance (average return on investment*, average profit*, profit growth*, average return on sales*) Financial performance (average market share growth*, average sales volume growth*, average sales growth ($)*) * … over the past three years	n=117	FIELD_PDA
18	Grün (1973)	Amount of processes, target effectiveness, decision time, quality of feedback, similarity of decisions	Target efficiency (technical performance of the selected solution) Process efficiency (efficiency of the decision making process) Decision efficiency (combination of target efficiency and process efficiency measures)	n=233	FIELD_SDA
19	Grün et al. (1988)	Amount of processes, target effectiveness, decision time, quality of feedback, similarity of decisions	Decision efficiency (degree of ideal target achievement)	n=70	FIELD_SDA
20	Gul et al. (1995)	Budgetary participation	Managerial performance (seven-point, eight-dimensional self-evaluation questionnaire)	n=54	FIELD_PDA
21	Gzuk (1975)	---	Efficiency in decision making processes (economic indicators, socio-psychological indicators)	n=233	FIELD_SDA
22	Gzuk (1988)	---	Efficiency in decision making processes (economic indicators, socio-psychological indicators)	n=0	CONCEPT
23	Hauschildt (1983)	---	Efficiency (satisfaction)	n=83	FIELD_PDA
24	Hering (1986)	Decision maker-oriented variables Problem-oriented variables	Decision efficiency (economic output and time) Personal efficiency (satisfaction with results) Perceived psychological stress Perceived information overload Communication behaviour	n=142	LABEX
25	Hoffmann et al. (2013)	Supply risk management Uncertainty	Supply risk management performance (better than competitors, satisfied, *minimize the frequency of risks occurring, *minimize the magnitude in the effect of occurring supply risks) * … in recent years	n=207	FIELD_PDA
26	Hsu et al. (2008)	Information sharing capability Buyer-supplier relationship	Financial performance (market share, return on assets, average selling price) (Market) Overall performance (overall product quality, overall competitive position, overall customer service levels)	n=596	FIELD_PDA
27	Joost (1975)	---	Effectiveness (rationality, consideration of relevant facts, transparency, scope of problem situations solved) Process efficiency (input/output criteria from effectiveness) Decision efficiency (safety, purpose, timing, satisfaction)	n=233	FIELD_SDA

No.	Author	Independent variable(s)	Research relevant investigated variable(s)	Sample	R. methods
28	Juga et al. (2010)	3PL service quality	Satisfaction (satisfaction) Loyalty (*continue relationships, *outsource more activities, likely recommend to business partner) * … with high probability	n=235	FIELD_PDA
29	Kaufmann & Carter (2006)	Uncertainty Shadow of the future Social Bonding	Non-financial performance (delivers always on time, delivers always the right amount of items, delivers the item according to the specifications)	n=335	FIELD_PDA
30	Kaufmann et al. (2012a)	Supplier selection accountability, supplier selection incentives, knowledge of item Supplier selection task decomposing, taking the supplier´s process perspective, interactional challenging of supplier selection	Financial decision effectiveness (total costs relative to expectations at the beginning o.t.t., actual costs relative to costs agreed at the time of the supplier selection, price stability since the beginning o.t.t., meeting target costs (actual costs of the purchase item compared with target costs)	n=306	FIELD_PDA
31	Kaufmann et al. (2012b)	Procedural rationality	Financial performance (total costs relative to expectations at the beginning o.t.t., actual costs relative to costs agreed upon at the time of the supplier selection, price stability since the beginning o.t.t., meeting target costs (actual costs of the purchase item compared with target costs, cost reduction initiatives of the supplier) Non-financial performance (compliance to specifications*, quality complaint rate*, time from order to delivery*, on-time delivery*, completeness of delivery*) * ... relative to your requirements	n=300	FIELD_PDA
32	Kaufmann et al. (2014)	Purchase item dynamism Purchase item complexity Procedural rationality Decision Decomposing Experience-based processing Automatic processing	Cost performance (low costs of ownership for the purchase item, low purchase item price) Quality/delivery/innovativeness performance (high purchase item quality, on-time delivery of purchase item, high innovativeness of supplier)	n=54	FIELD_PDA
33	Kenis (1979)	Internal environment variables Budgetary participation	Performance (budgetary performance/budget goals, cost efficiency, job performance)	n=169	FIELD_PDA
34	Lee et al. (2011)	Supply chain innovation Supply chain cooperation Supply chain efficiency QM practice	Organisational performance (*care quality is better, *competitive position is superior, *service level is higher) * … compared to similar size hospitals	n=243	FIELD_PDA
35	Merschmann & Thonemann (2011)	Supply chain flexibility	Firm performance (return on sales, sales growth)	n=85	FIELD_PDA
36	Nakano (2009)	Collaborative forecasting and planning with main supplier Internal forecasting and planning Collaborative forecasting and planning with main customer	Logistics and production performance (logistics costs, manufacturing costs, final product inventory level, order fill rate, delivery speed, delivery times)	n=65	FIELD_PDA
37	Nayak et al. (2011)	Supplier management (fin_con, sud_change, cost_less, dedi_supplier, trust_supp)	Focus_core (focus on critical areas where expertise is required) Resp_time (response time to buyer) Rev_growth (overall financial growth)	n=209	FIELD_PDA
38	Neuert (1987)	Degree of planning behaviour	Formal efficiency (forecasting accuracy) Material efficiency (financial performance) Personal efficiency (personal satisfaction)	n=83	LABEX

No.	Author	Independent variable(s)	Research relevant investigated variable(s)	Sample	R. methods
39	Noordewier et al. (1990)	---	Supplier flexibility (flexible in responding to requests, adjusting inventories, handling changes well, providing emergency deliveries) Supplier assistances (calls in advance, help during emergencies, recommends stock substitutes, helps in value analyses etc., advises on potential problems) Expectation of continuity (long time relationship, essentially "evergreen" relationship, renewal of relationship is virtually automatic) % on-time delivery record (%) % acceptable items (%) Relative price paid compared to market price(%)	n=140	FIELD_PDA
40	Ogulin et al. (2012)	IT and process capability connectivity Regulation and rules capability connectivity Relationship alignment Market-related informally networked supply chain Supply-related informally networked supply chain	Internal efficiency (reducing supply chain costs, increasing productivity, reducing response times, standardising supply chain services) Market effectiveness (increasing access to relevant supply chain knowledge, heightened focus on core business, accelerating supply chain response times)	n=231	FIELD_PDA
41	Overstreet et al. (2013)	Transformational leadership Organisational innovativeness	Operational performance (service quality, costs of service, claims ratio, on-time delivery, safety) Financial performance (average return on investments*, average profit*, profit growth*, average return on sales*, average operating ratio*) * … over the last three years	n=158	FIELD_PDA
42	Pagell & Sheu (2001)	Uncertainty created by buyer Number of suppliers per input Supplier selection criteria Percentage outsourced	Buyer performance (% orders delivered after promised delivery date) Supplier performance (% orders delivered after promised delivery date)	n=290	FIELD_PDA
43	Piercy & Morgan (1990)	Customer philosophy Marketing organisation effectiveness Marketing information effectiveness Strategic orientation Marketing plan credibility and utilisation (Behavioural marketing planning process problems)	Market plan credibility and utilisation (realistic and practical, accurate and based on good information, good basis for building market strategies, critical marketing elements are included, assumptions are realistic, key to effective management is to find ways around the requirements of the marketing plan, marketing plan should directly guide actions and be the basis for making decisions)	n=144	FIELD_SDA
44	Ralston et al. (2013)	Logistics salience Logistics innovativeness Logistics service differentiation	Logistics performance (lowest costs possible, reduce time between order and delivery, meet quoted or anticipated delivery dates, ability to provide desired quantities, extent to which perceived logistics performance matches customer expectations)	n=136	FIELD_SDA
45	Riedl (2012)	Decision process decomposition Residual uncertainty	Financial performance (total costs relative to expectations at the beginning o.t.t., actual costs relative to the costs agreed upon at the time of the supplier selection, price stability since the beginning o.t.t., meeting target costs (actual costs of the purchase item compared to target costs) Supplier´s strategic capabilities (technical cap., innovation cap., management cap., service cap., financial strength)	n=461	FIELD_PDA
46	Riedl et al. (2013)	Organisational, situational, personal characteristics Procedural rationality Residual uncertainty	Non-financial performance (quality complaint rate*, time from order to delivery*, on-time delivery*) * ... relative to your requirements Financial performance (total costs relative to expectations at the beginning o.t.t., actual costs relative to the costs agreed upon at the time of the supplier selection, price stability since the beginning o.t.t., meeting target costs (actual costs of the purchase item compared with target costs)	n=461	FIELD_PDA
47	Robb et al. (2008)	Supply chain operations practice Operations dimension importance Operations dimension performance	Market performance (sales growth, profitability performance, market share performance)	n=72	FIELD_PDA
48	Ruamsook et al. (2009)	---	Logistics performance (14 operational indicators)	n=114	FIELD_PDA

No.	Author	Independent variable(s)	Research relevant investigated variable(s)	Sample	R. methods
49	Sanders (2008)	IT use for exploitation IT use for exploration Operational coordination Strategic coordination	Operational benefits (cost efficiency from higher sales volumes, improvement to current processes/creation of new processes, improved profitability) Strategic benefits (learning about customers/markets for new products, creation of new products/products enhancements, development new business opportunities)	n=241	FIELD_PDA
50	Gil Saura et al. (2008)	Personal quality, information quality, and order quality Timeliness	Satisfaction (delighted with overall distribution service relationship, with more suppliers like this one) Loyalty (consider this supplier as a first choice, if all attributes are similar we will always buy from this supplier)	n=194	FIELD_PDA
51	Schenkel (2006)	Quality of the market-based plan, application of the market-based plan	Market success (customer satisfaction, retaining existing customers, acieration of new customers, ensuring the planned market share) Company-internal efficiency (cost reduction initiatives, efficient use of resources, cost awareness, optimisation of internal processes and decisions)	n=392	FIELD_PDA
52	Schröder (1986)	Performance-orientation	Personal efficiency (satisfaction)	n=131	LABEX
53	Sezhiyan & Nambirajan (2011)	Supply effort management Functions of supplier selection criteria Logistics capabilities Supply chain management strategy	Firm performance (13 items)	n=358	FIELD_PDA
54	Shang & Marlow (2005)	Information-based capability Benchmarking capability Flexibility capability	Logistics performance (meet delivery dates and quantities, provide desired quantities, respond to the needs of key customers, notify customers in advance of delivery delays or product shortages, accommodate new product introductions) Financial performance (profit, return on assets, return on investment)	n=198	FIELD_PDA
55	Spillan et al. (2013)	Process strategy Market strategy Information strategy Logistics coordination effectiveness Customer service effectiveness	Company/division competitiveness (responds quickly and effectively to changing customer or supplier needs*, responds quickly and effectively to changing competitor strategies*, develops and markets new products quickly and effectively*, strong/weak competitor in most markets) * ... compared to our competitors	n=50	FIELD_PDA
56	Vickery et al. (2003)	Integrative information technologies Supply chain integration Customer Service	Financial performance (pre-tax return on sales, return on investments, return on sales)	n=57	FIELD_PDA
57	Wentzel (2002)	Budgetary participation Fairness perceptions Goal commitment	Managerial performance (8 items based on managerial tasks) Budgetary performance (meeting budgetary sets)	n=74	FIELD_PDA
58	Whitten et al. (2012)	Triple-A supply chain Supply chain performance	Financial performance (average return on investments, average profit, profit growth, average return on sales) Marketing performance (average market share growth, average sales volume growth, average sales ($) growth)	n=132	FIELD_PDA
59	Wild (1982)	---	Efficiency of the planning process	n=0	CONCEPT
60	Wisner (2003)	Supplier management strategy Customer relationship strategy Supply chain management strategy	Firm performance (market share*, return on assets*, average selling price relative to competitors*, overall product quality*, overall competitive position*, overall customer service levels*) * … compared to competitors	n=556	FIELD_PDA
61	Witte (1972a)	Information behaviour (information activities)	Decision efficiency (degree of innovativeness of the final solution - defined by experts)	n=233	FIELD_SDA
62	Witte (1972c)	Information behaviour (information supply)	Decision efficiency (degree of innovativeness of the final solution - defined by experts)	n=233	FIELD_SDA
63	Witte (1972b)	Information behaviour (information demand)	Decision efficiency (degree of innovativeness of the final solution - defined by experts)	n=233	FIELD_SDA
64	Witte (1988b)	Information behaviour (information supply, information demand)	Decision efficiency (degree of innovativeness of the final solution - defined by experts)	n=233	FIELD_SDA
65	Wu & Weng (2010)	---	Capabilities (technological, price response, management, financial, quality management, delivery, flexible capability)	n=247	FIELD_PDA

No.	Author	Independent variable(s)	Research relevant investigated variable(s)	Sample	R. methods
66	Yang & Su (2009)	Operational ERP benefits Tactical ERP benefits Strategic ERP benefits	Internal business process perspective (enhanced manufacturing lead time and yield rate, increased truck cube utilisation, improved responsiveness to urgent orders, improved new product time to market, shares operational information internally) External business process perspective (collaborates in planning and forecasting with suppliers, ERP system reflects enterprise-wide integrated processes, ERP system has increased delivery flexibility, ERP system has enhanced purchase order fill rate, ERP system has reduced ordering and invoice complexity) Customer service perspective (increased customer response time and percentage of resolving customer´s first call, increased product quality and customer´s product return rate, ERP system has enhanced the time between receipt and delivery, ERP system has reduced ordering and invoice complexity) Cost management perspective (better control capability regarding total logistics costs landed, increased total revenue and sales growth, better planning regarding total costs, costs per unit produced, inventory caring costs, delivery costs) Synthesis (SCM performance is not impacted by the ERP system, it is necessary to adopt the ERP system to enhance the firm performance, ability to provide operational managers with sufficient and timely information)	n=262	FIELD_PDA
67	Zhang et al. (2005)	Physical supply flexibility Purchasing flexibility Physical distribution Demand management	Customer satisfaction (keep doing business with us, satisfied with price and function, perceived money´s worth when purchasing the product, satisfied with quality, good reputation, customers are loyal)	n=273	FIELD_PDA

Appendix 1.3: Concepts and measures of the company-internal determinants

Table A1.3-1[5] summarises the concepts and measures of the **company-internal determinants**, including the three **company-internal determinants** ***manager´s experience***, ***manager´s education***, and ***company´s reward initiatives***.

Table A1.3-1: Concepts and measures of the company-internal determinants[6]

No.	Author	Dependent variable(s)	Research relevant investigated variable(s)	Sample	R. methods	Research results
1	Ahire et al. (1996)	TQM implementation constructs	Employee training (availability of resources for training, frequency of training and retraining, no. of employee levels participating in the same training session, no. of employees trained in basic quality concepts, satisfaction of employees with overall training)	n=371	FIELD_PDA	High correlations of employee training with all other TQM quality constructs With a proper customer focus motivated and trained employees will contribute to quality initiatives and to the consistent use of quality information.
2	Beersma et al. (2003)	Cooperation, competition, team performance	Reward structure (cooperative reward structure, competitive reward structure)	n=300	LABEX	Teams with cooperative reward structure have more cooperative orientation. Teams with competitive reward structure have more competitive orientation.

[5] Abbreviations: No.=order number, R. methods=research methods (LABEX=laboratory experiment, FIELD_PDA=field study/primary data analysis, FIELD_SDA=field study/secondary data analysis, CONCEPT=conceptual study).

[6] Table created by the author (structured content analysis).

No.	Author	Dependent variable(s)	Research relevant investigated variable(s)	Sample	R. methods	Research results
3	Buhrmann (2010)	Challenging of supplier alternatives, perspective shifting intensity, decision task decomposition, non-financial performance, financial decision effectiveness	Supplier selection incentives (higher bonus, promotion opportunities, job security, higher salary, financial reward) Supplier selection knowledge (lots of experience, substantial knowledge, familiarity, expert for purchasing this item, knew a lot about this item)	n=337	FIELD_PDA	Significant relationship between supplier selection incentives and challenging of supplier alternatives/perspective shifting intensity. Significant relationship between supplier selection knowledge and challenging of supplier alternatives/perspective shifting intensity/decision task decomposition. Significant relationship between challenging of supplier alternatives/perspective shifting intensity/decision task decomposition and non-financial effectiveness. Significant relationship between challenging of supplier alternatives/decision task decomposition and financial decision effectiveness.
4	Davis & Mentzer (2007)	Sales forecasting capability Performance outcomes	Reward alignment (structure of compensation, bonuses and recognition)	n=516	FIELD_PDA	There is no incentive to strive for forecasting accuracy - quite the opposite. Bump in sales (to achieve bonuses) followed by a sharp drop in the first month of the subsequent quarter.
5	Eroglu & Knemeyer (2010)	Judgmental adjustments of statistical forecasts	Compensation-seeking (extrinsic motivation for financial or tangible rewards)	n=112	FIELD_PDA	Female forecasters that are motivated by financial rewards perform better in judgmental adjustments, whereas male forecasters that are motivated by financial rewards performed worse.
6	Goll & Rasheed (2005)	Firm Performance	Top management´s age, tenure Education level	n=159	FIELD_PDA	No significant relation between age and decision making rationality. Significant relation between tenure/educational level and decision making rationality.
7	Kaufmann et al. (2014)	Costs Quality/Delivery/ Innovativeness	Experience-based processing (intuition: rely on experience, similar situations in the past, decisions based on experience, similar selections and decisions)	n=54	FIELD_PDA	Experience-based intuition has a positive effect on supplier costs and quality/delivery/innovativeness performance in sourcing teams.
8	Kaynak & Hartley (2008)	Employee relations Quality data and reporting, etc.	Training (statistical training, trade training, quality-related training)	n=424	FIELD_PDA	Training is directly related to employee relations. The relationship between training and quality data and reporting/customer focus is not significant.
9	Mentzer & Cox (1984)	Achieved forecasting accuracy	Formal training of personnel (courses and seminars)	n=160	FIELD_PDA	Significant positive relationship between formal training and increased forecasting accuracy. Formal training has the largest coefficient affecting forecasting accuracy (among other factors, e.g., level at which forecast is prepared).
10	Neuert (1987)	Degrees of planning behaviour, formal efficiency, material efficiency, personal efficiency	Experience (managers vs. students) Training (instructions vs. no instructions)	n=83	LABEX	Significant differences in the degrees of planning behaviour between "instructions" and "no instructions" groups. Significant differences in target orientation/information/control between "instructions" and "no instructions" groups. No significant differences in organisation/cognition between "instructions" and "no instructions" groups. No significant differences in the problem solving times between managers and students. No significant differences in the planning-effort-/planning-outcome-ratio between managers and students. Significant correlation between the amount of planning periods conducted and the planning-effort-/planning-outcome-ratio.
11	Onsi (1973)	Budgetary slack	Incentives related to budget	n=107	FIELD_PDA	Incentives related to budget are defined as one factor of "evaluation system heavily budget-oriented". This factor indicates the dimensions of an evaluation system that heavily weights budget achievement and its consequences on manager´s attitudes toward developing standards and budgets.
12	Park & Krishnan (2001)	Supplier selection practices	Executive´s age Executive´s education Executive´s work experience	n=78	FIELD_PDA	Executive´s age, executive´s education, and executive´s work experience are all found to be statistically significant moderators of the relationship between objective criteria and the selection of suppliers. The application of SCM practices is also a function of executives' personal characteristics.

No.	Author	Dependent variable(s)	Research relevant investigated variable(s)	Sample	R. methods	Research results
13	Riedl (2012)	Residual uncertainty, suppliers' strategic capabilities, financial supplier performance	Incentives (higher bonus, promotion opportunities, job security) Purchase familiarity (lots of experience, expert, knew a lot about this item) Work experience (years of working)	n=461	FIELD_PDA	Incentives have a significant impact on the decision process decomposition (USA, CHN sample). Purchase familiarity has a significant impact on the decision process decomposition (only CHN sample). Work experience has a significant impact on the decision process decomposition (only CHN sample). Decision process decomposition has a significant impact on residual uncertainty which significantly affects the supplier´s strategic capabilities/financial supplier performance.
14	Riedl et al. (2013)	Procedural rationality, residual uncertainty, supplier decision performance	Incentives (higher bonus, promotion opportunities, job security) Purchase familiarity (lots of experience, expert, knew a lot about this item) Work experience (years of working)	n=461	FIELD_PDA	Decision makers that anticipate rewards for strong decision performance are more likely to use procedural rationality. Significant positive relationship between product familiarity and procedural rationality, but only in the Chinese sample, not in the U.S. sample. Significant positive relationship between work experience and procedural rationality, but only in the Chinese sample, not in the U.S. sample.
15	Taylor (1975)	PDS Scores (amount of information, information processing rate, etc.)	Age Experience in personnel decisions Years of management experience	n=79	LABEX	Significant correlation between age and amount of information/information rating accuracy/decision time/decision confidence (-)/decision flexibility. Significant correlation between experience in personal decisions and information rating accuracy. Significant correlation between years of management and information rating accuracy/decision time/decision confidence (-)/decision flexibility.
16	Winklhofer & Diamanto-poulos (2003)	Export sales forecasting resources Export sales forecasting commitment	Export experience (firm´s experience in export processes)	n=180	FIELD_PDA	No significant impact of the export experience on the export sales forecasting resources. Significant impact of the export experience on the export sales forecasting commitment.

Appendix 2: List of explorative semi-structured interviews with specialists working in the field of strategic supplier selection processes

Appendix 2 contains a list of specialists working in the field of strategic supplier selection processes which were used to evaluate the "practical problems" and the "practical importance" of the strategic supplier selection process in manufacturing enterprises. The following Table A.2-1 shows the list of the explorative semi-structured interviews with specialists working in the field of strategic supplier selection processes conducted between June 2014 and July 2014.

Table A.2-1: List of explorative semi-structured interviews[7]

No.	Name (Initials)	Education	Function	Type of organization
1	AF	Master	Manager Production & Forecasting	Manufacturing Enterprise
2	JO	Master	SCM Manager, Head of Purchasing	Manufacturing Enterprise
3	CE	Ph.D.	Professor, Consultant	University of Applied Sciences
4	RH	Master	SCM Manager, Head of Purchasing	Manufacturing Enterprise
5	MS	Ph.D.	In-house Consultant Logistics, SM, SCM	Manufacturing Enterprise
6	ML	Ph.D.	SCM Manager, Head of Organisation	Manufacturing Enterprise
7	WS	Ph.D.	In-house Consultant Production	Manufacturing Enterprise

The specialist were randomly selected by using the ex-ante selection approach.[8] In course of the selection of specialist, the researcher will have to specify criteria which define a person as a specialist. Thereby, the author defines a specialist by having clear and accessible knowledge in a specific field. The specialists´ knowledge is based on confident statements resp. should not be based on unspecific assumptions. Moreover, the specialist is responsible for the design, the implementation, and/or the control of a specific problem solution and has exclusive access to crucial information.[9] Literature further suggests that the specialist sample should include a mixture of different groups of experts in order to include diverse points of view.[10]

[7] Table created by the author.

[8] Mayer (2002), p. 38.

[9] Mayer (2002), p. 40, Bogner et al. (2005), pp. 113–116.

[10] Mayer (2002), p. 41.

Appendix 3: Laboratory experiment[11]

Appendix 3 contains the problem definition, the problem tasks, the information request sheet, the German and the summarised English version of the questionnaire, and the expert solution for the indicator DMEE_1 which were all used in the laboratory experiment.

Appendix 3.1: Problem definition, tasks, and information request sheet (German)

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Fallbeispiel Lieferantenwahl

Startzeit: _____

Endzeit: _____

Ausgangssituation

Sie sind bei der **Firma Printer GmbH,** Hauptstraße 10, 36039 Fulda, Deutschland im **Einkaufsteam** beschäftigt. Das Produkt mit den höchsten Verkaufszahlen ist derzeit der **Drucker Samsung – HL 2250**. Dieses Modell hat sich aufgrund seiner sehr guten Druckqualität, hoher Druckgeschwindigkeit und seiner geräuscharmen Betriebsweise zu einem echten Verkaufsschlager entwickelt.

Die Kunden sind jedoch über den hohen Preis der originalen Samsung Tintenpatronen verärgert und äußern verstärkt den Kaufwunsch nach **kompatiblen Tintenpatronen** für dieses Druckermodell. Auf diese Weise können einerseits die Druckkosten verringert und andererseits trägt dies auch zum Umweltschutz bei. Einige Stammkunden drohen sogar abzuspringen, da sie für das entsprechende Zubehör jedes Mal in eine größere Stadt fahren müssen und es sich daher anbietet, anderes Computerzubehör dort zu kaufen.

Was sind kompatible Tintenpatronen?

Es handelt sich hierbei um neue Patronen, die preiswerter von anderen Herstellern als den Originalherstellern wie Samsung, HP, Epson, etc. angeboten werden. Nur an der Aufschrift können diese Patronen von den Originalen unterschieden werden, sie sind aber bis zu 50% billiger.

[11] The experimental task is based on the case study Institut für Ökonomische Bildung gemeinnützige GmbH (IÖB).

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Arbeitsauftrag

Als Mitarbeiter im Einkaufsteam sind Sie, wie oben beschrieben, bestrebt einen **neuen Lieferanten** für kompatible Tintenpatronen zu finden. Nach ausführlicher Suche liegen Ihnen schlussendlich **4 Angebote von potentiellen Lieferanten** (für jeweils 100 Stück Patronen) vor.

Auf Nachfrage stehen Ihnen gegebenenfalls weitere Informationen zu den einzelnen Lieferanten und deren Leistungsfähigkeit zur Verfügung, die Sie schriftlich per Informationsnachfragebogen abrufen können. Pro abgerufener, zusätzlicher Information wird Ihnen ein durchschnittlicher Zeitmalus von +10% auf Ihre Entscheidungszeit berechnet, sodass Sie bei vollständiger Informationsnachfrage die doppelte Entscheidungszeit verrechnet bekommen.

Bitte analysieren Sie gründlich die vorliegende Entscheidungssituation und erarbeiten Sie einen nachvollziehbaren Lösungsvorschlag für dieses Entscheidungsproblem nach dem folgenden Schema:

1. Bringen Sie bitte die 4 vorliegenden Angebote in die von Ihnen **favorisierte Reihenfolge** und **begründen** Sie diese von Ihnen vorgenommene Reihung ausführlich. Die detaillierte Begründung bzw. die Nachvollziehbarkeit Ihrer Lösung ist Teil der Bewertung) → **Ergebnisblatt 1**,
2. Dokumentieren Sie dazu bitte nachvollziehbar und detailliert Ihren **Entscheidungsprozess** in Prosaform, legen Sie dazu bitte Ihre Kalkulationen und Notizen bei und beantworten Sie bitte die Detailfragen zum Prozess → **Ergebnisblatt 2**,
3. Beantworten Sie bitte den beigefügten Fragebogen → **Fragebogen**.

Die besten Ergebnisse werden prämiert!

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Angebot 1: INK Paradies

Ink Paradies, Inkstraße 100, 24125 Domstadt

INK Paradies

Firma Printer GmbH
Hauptstraße 10
36039 Fulda

Ihr Zeichen, Ihre Nachricht vom	Unser Zeichen,	Name, Durchwahl	Datum
F. Ink Paradies, 04.05.2015	IP_01	Fr. Schneider, -318	07.05.2015

Angebot

Sehr geehrte Damen und Herren,

wir bedanken uns recht herzlich für das Vertrauen, welches Sie uns mit Ihrer Anfrage entgegenbringen und möchten Ihnen folgendes Angebot unterbreiten:

Druckkopf schwarz – remanufactured 42 ml.
ersetzt die Originaltintenpatrone für Samsung – HL 2250 **Preis: 23,05 €**

Bei Abnahme von 100 Stück gewähren wir Ihnen einen Mengenrabatt von 20%. Für die Verpackung und den Versand berechnen wir bei dieser Stückzahl eine Pauschale von 5,80 €.
Die Lieferung kann sofort nach Eingang der Bestellung erfolgen.

Über einen Auftrag von Ihnen würden wir uns sehr freuen.

Mit freundlichen Grüßen,

INK Paradies
i.A. Fr. Schneider

INK Paradies
info@ink-paradies.de
www.ink-paradies.de

Volksbank Domstadt
IBAN: 1220000000236531
BIC: GENDODEDE

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Angebot 2: Das Tintenfass

Das Tintenfass, Tintenstraße 100, 33211 Brick

Das Tintenfass

Firma Printer GmbH
Hauptstraße 10
36039 Fulda

Ihr Zeichen, Ihre Nachricht vom	Unser Zeichen,	Name, Durchwahl	Datum
F. Das Tintenfass, 04.05.2015	DTF_01	Herr Maler, -320	07.05.2015

Angebot

Sehr geehrte Damen und Herren,

für Ihre Anfrage bedanken wir uns sehr. Wir bieten Ihnen anhand unseres aktuellen Kataloges und der zurzeit gültigen Preislisten Folgendes an:

Samsung – HL 2250	
Refilled Head, schwarz	**Preis: 22,27 €**

Der Preis versteht sich einschließlich der Verpackungskosten.
Zahlbar innerhalb von 10 Tagen unter Abzug von 2% Skonto.

Für den Versand berechnen wir Ihnen bei einer Bestellmenge von 100 Stück pauschal 7,90 €.

Wir freuen uns auf Ihre Bestellung.

Mit freundlichen Grüßen,

Das Tintenfass
i.A. Herr Maler

Das Tintenfass
info@dastintenfass.de
www.dastintenfass.de

Volksbank Brick
IBAN: 1220000000236589
BIC: GENDODEDA

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Angebot 3: TP Discounter

TP Discounter, TPDstraße 100, 2260 Deggensfeld

TP Discounter

Firma Printer GmbH
Hauptstraße 10
36039 Fulda

Ihr Zeichen, Ihre Nachricht vom	Unser Zeichen,	Name, Durchwahl	Datum
F. TP Discounter, 04.05.2015	TPD_01	Fr. Müller, -399	07.05.2015

Angebot

Sehr geehrte Damen und Herren,

wir danken für Ihr Interesse an unseren Produkten. Nachfolgend möchten wir Ihnen gerne folgendes Angebot unterbreiten:

Artikel-Nr. R780581
Samsung Refilled Print Cartridge, schwarz **Preis: 23,93 €**

Die Rechnung ist zahlbar netto innerhalb von 30 Tagen oder binnen 10 Tagen unter Abzug von 3% Skonto.
Bei einer Liefermenge von 100 Stück gewähren wir Ihnen einen Mengenrabatt von 10%.
Die Lieferung erfolgt frei Haus 10 Tage nach Auftragseingang.

Über einen Auftrag von Ihnen würden wir uns sehr freuen.

Mit freundlichen Grüßen,

TP Discounter
i.A. Fr. Müller

TP Discounter
info@tpdiscounter.de
www.tpdiscounter.de

Volksbank Deggensfeld
IBAN: 122000000026577
BIC: GENDODEDC

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Angebot 4: PRINT4YOU

PRINT4YOU, Printstraße 100, 22856 Tingeln

PRINT4YOU

Firma Printer GmbH
Hauptstraße 10
36039 Fulda

Ihr Zeichen, Ihre Nachricht vom	Unser Zeichen,	Name, Durchwahl	Datum
F.PRINT4YOU, 04.05.2015	PFY_01	Fr. Berger, -314	07.05.2015

Angebot

Sehr geehrte Damen und Herren,

vielen Dank für Ihr Interesse.
Ich kann Ihnen das folgende Produkt aus unserem Portfolio anbieten:

Samsung – HL 2250
Kompatible Patronen, Nachgefüllt **Preis: 22,80 €**

Wir gewähren Ihnen 3% Skonto binnen 10 Tagen und einen Mengenrabatt von 2,5 %. Für Verpackung und Versand berechnen wir pauschal 9,40 €.

Ich würde mich über eine endgültige Bestellung sehr freuen!

Mit freundlichen Grüßen,

PRINT4YOU
i.A. Fr. Berger

PRINT4YOU
info@print4you.de
www. print4you.de

Volksbank Tingeln
IBAN: 1220000000254821
BIC: GENDODEDF

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Informationsnachfragebogen

Hiermit fordere ich zusätzliche Informationen zu den Lieferanten ein (bitte ankreuzen!):

Rechtsform des Unternehmens	
Struktur des Eigenkapitals	
Lieferzeit	
Anzahl der Geschäftsführer	
Anzahl der Niederlassungen	
Termintreue	
Reklamationen/Ausschuss	
Altersdurchschnitt der Mitarbeiter	
Produktqualität	
Durchschn. Dienstjahre der Mitarbeiter	

Appendix 3.2: Problem definition, problem tasks, and information request sheet (summarised English version)

Case study: Strategic supplier selection process

Start time: _____ End time: _____

Initial situation

You are a member of the Printer GmbH, Hauptstraße 10, 36039 Fulda, Germany and a manager in the supply management team. Currently, the printer "Samsung-HL2250" is the product with the highest sales, due to its high quality, fast printing performance, and silent operation mode.

However, customers are starting to complain about the high price of the ink cartridges. Moreover, they tend to request cheaper third-party ink cartridges. These third-party products will lower the printing costs and further contribute to environmental production because they mainly contain recycled materials. Due to the higher price of the original ink cartridges, some customers also switch to another company.

What are third-party ink cartridges?

Third-party ink cartridges are new and cheaper than the ones from the original manufactures (e.g., Samsung, HP, and Epson), and offered by alternate producers. The only difference is the label. Third-party ink cartridges are almost 30% cheaper.

Assignment

As a manager of the supply management team you will have to select a new supplier for the third-party ink cartridges. After an extensive market research process, the following four suppliers have delivered their quotations (order quantity: 100 pieces).

On request, additional supplier information can be delivered by using the information request sheet. The request of additional information will cause a 10% charge on your total decision time, meaning that the requests of all available information will double your decision time.

Please analyse the problem situation carefully and develop a transparent solution by following these steps: Rank the four suppliers with regard to your final supplier selection decision, clearly justify your ranking, as this will be an important part of your solution, record your decision making process in detail and add all calculations and notes to this protocol, and complete the attached questionnaire.

Attachments

Attachment 1: *Quotations: Supplier 1(INK Paradies), supplier 2 (Das Tintenfass), supplier 3 (TP Discounter), and supplier 4 (Print4You)*

Table A.3.2-1 displays the summarised quotations (supplier 1- supplier 4)

Table A.3.2-1: Summarised quotations: Supplier 1-4[12]

	Supplier			
Type of costs	***S1: INK Paradies***	***S2: Das Tintenfass***	***S3: TP Discounter***	***S4: PRINT4YOU***
Order quantity	100 Units	100 Units	100 Units	100 Units
Product price	23.05 €/Unit	22.27 €/Unit	23.93 €/Unit	22.80 €/Unit
Discount 1 ("*Rabatt*") in %	20.00%	0.00%	10.00%	2.50%
Discount 2 ("*Skonto*") in %	0.00%	2.00%	3.00%	3.00%
Packaging and shipping costs	5.80 €	7.90 €	0.00 €	9.40 €

Attachment 2: *Information request sheet (additional information available on request)*

The following additional information could be requested by using the information request sheet:

- Legal form of the enterprise
- Equity ratio
- Delivery time
- No. of managing directors
- No. of subsidiaries
- Reliability on delivery dates
- Complaint rate
- Average age of employees
- Product quality
- Average years of service (employees)

[12] Table created by the author (Quotations S1-S4 - laboratory experiment).

Appendix 3.3: Questionnaire (German)

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Ergebnisblatt: Resultate

Resultierende Reihenfolge

Reihenfolgenummer	Lieferantenname
1 (bester Lieferant)	
2	
3	
4 (schlechtester Lief.)	

Transparente Begründung zur Reihung

Beschreiben Sie bitte ausführlich und detailliert, wie Sie zur Reihenfolge der Lieferanten gekommen sind. Führen Sie bitte die Gründe an, warum die Lieferanten so gereiht worden sind.

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Fragebogen

Allgemeine Angaben zur Person

Geburtsjahr: _____

Geschlecht: | M | W |

Matrikel-Nr.: _____ (ausschließlich für die Prämierung)

Angaben zum Entscheidungsprozess

Denken Sie nun bitte an den Entscheidungsprozess während des Fallbeispiels und beantworten Sie bitte die nachfolgenden Fragen. Inwieweit treffen Ihrer Meinung nach die folgenden Aussagen zu?

1. Ich habe eindeutig festgelegt, welche Anforderungen der „ideale“ Lieferant zu erfüllen hat.

trifft überhaupt nicht zu | 1 | 2 | 3 | 4 | 5 | trifft voll zu

2. Im Zuge des Entscheidungsprozesses wurde das Erreichen aller vorab festgelegten Anforderungen genauestens überprüft.

trifft überhaupt nicht zu | 1 | 2 | 3 | 4 | 5 | trifft voll zu

3. Inwieweit hat im Zuge des Entscheidungsprozesses das Berücksichtigen der vorab festgelegten Anforderungen zur endgültigen Entscheidungsfindung beitragen?

trifft überhaupt nicht zu | 1 | 2 | 3 | 4 | 5 | trifft voll zu

4. In welchem Ausmaß haben Sie während des Entscheidungsprozesses umfassend nach relevanten Informationen gesucht?

in nur sehr schwachen Ausmaß | 1 | 2 | 3 | 4 | 5 | in sehr starken Ausmaß

5. Inwieweit haben Sie sich bei der Informationssuche letztendlich auf relevante Informationen fokussiert?

in nur sehr schwachen Ausmaß | 1 | 2 | 3 | 4 | 5 | in sehr starken Ausmaß

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6. Inwieweit haben Sie vorab einen klaren Ablauf zur Lösung des Entscheidungsproblems festgelegt? (d.h. abgegrenzte Prozessschritte die nach und nach durchlaufen werden)

in nur sehr schwachen Ausmaß | 1 | 2 | 3 | 4 | 5 | in sehr starken Ausmaß

7. Inwieweit haben Sie Ihren Entscheidungsprozess straff durchorganisiert?

in nur sehr schwachen Ausmaß | 1 | 2 | 3 | 4 | 5 | in sehr starken Ausmaß

8. Inwieweit sind Sie in Ihren Entscheidungsprozess pragmatisch (=sachlich orientiert, Fakten-orientiert) vorgegangen?

in nur sehr schwachen Ausmaß | 1 | 2 | 3 | 4 | 5 | in sehr starken Ausmaß

9. Inwieweit haben Sie für die endgültige Entscheidung klar definierte Bewertungskriterien festgelegt? (d.h. eindeutig messbare Kriterien wie z.B. Qualität, Lieferzeit, Kosten)

in nur sehr schwachen Ausmaß | 1 | 2 | 3 | 4 | 5 | in sehr starken Ausmaß

10. In welchem Ausmaß haben Sie alle 4 Lieferanten entsprechend der vordefinierten Bewertungskriterien beurteilt?

in nur sehr schwachen Ausmaß | 1 | 2 | 3 | 4 | 5 | in sehr starken Ausmaß

11. In welchem Ausmaß waren Ihnen alle Konsequenzen einer alternativen Wahl klar? (d.h. Vor- und Nachteile aller 4 vollständig beurteilten Lieferanten)

in nur sehr schwachen Ausmaß | 1 | 2 | 3 | 4 | 5 | in sehr starken Ausmaß

12. In welchem Ausmaß wurden alle Unterschiede zwischen den einzelnen, möglichen 4 Lieferanten klar herausgearbeitet?

in nur sehr schwachen Ausmaß | 1 | 2 | 3 | 4 | 5 | in sehr starken Ausmaß

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Angaben zur Lösung des Fallbeispiels

13. Wie zufrieden sind Sie letztendlich mit der getroffenen Entscheidung?

sehr unzufrieden | 1 | 2 | 3 | 4 | 5 | sehr zufrieden

14. Inwieweit sind Sie glücklich mit der getroffene Entscheidung?

überhaupt nicht glücklich | 1 | 2 | 3 | 4 | 5 | sehr glücklich

15. Wie zufrieden waren Sie dem generellen Ablauf des Entscheidungsprozesses?

in nur sehr schwachen Ausmaß | 1 | 2 | 3 | 4 | 5 | in sehr starken Ausmaß

Appendix 3.4: Questionnaire (summarised English version)

Questionnaire: Strategic supplier selection process

Part I: Results

1. Resulted supplier ranking (supplier 1 – supplier 4)
2. Precise justification for the final supplier ranking

Part II: Questionnaire

1. Year of birth
2. Gender
3. ID No.

Please remember your decision making process during the case study and answer the following questions from 1=completely disagree to 5=completely agree:

1. Well-defined targets for the supplier selection
2. Review of defined targets during the supplier selection process
3. Review of defined targets in the course of the final supplier selection decision
4. Search for decision-relevant information
5. Focus on decision-relevant information
6. Well-defined process for the supplier selection
7. Strictly organised supplier selection process
8. Pragmatic approach (facts & figure-oriented process) for the supplier selection
9. Well-defined evaluation criteria for the supplier selection
10. Evaluation of all suppliers based on defined evaluation criteria
11. Accurately elaborated consequences of an alternative choice
12. Accurately elaborated differences between all suppliers
13. Satisfaction with the supplier selection decision
14. Commitment to the supplier selection decision
15. Satisfaction with the process of supplier selection

Appendix 3.5: Expert solution for the indicator DMEE_1

The expert solution for the indicator DMEE_1 was computed by applying the following process: A calculation of the total costs per unit for all the suppliers, the usage of all accessible information, the calculation of total scoring points based on (total) costs-, time- and quality-measures, and the usage of a permutation algorithm to generate all combinations of supplier rankings.

1. Calculation of total costs per unit

Table A.3.5-1 displays the calculation of total costs per unit.

Table A.3.5-1: Calculation of total costs per unit[13]

	Supplier			
Type of costs	***S1: INK Paradies***	***S2: Das Tintenfass***	***S3: TP Discounter***	***S4: PRINT4YOU***
Order quantity	100 Units	100 Units	100 Units	100 Units
Product price 1 (from quotation)	2,305.00 €	2,227.00 €	2,393.00 €	2,280.00 €
– Discount 1 ("*Rabatt*") in %	20.00%	0.00%	10.00%	2.50%
= Product price 2	1,844.00 €	2,227.00 €	2,153.70 €	2,223.00 €
– Discount 2 ("*Skonto*") in %	0.00%	2.00%	3.00%	3.00%
= Total product price	1,844.00 €	2,182.46 €	2,089.09 €	2,156.31 €
+ Packaging and shipping costs	5.80 €	7.90 €	0.00 €	9.40 €
= Total costs	1,849.80 €	2,190.36 €	2,089.09 €	2,165.71 €
= Total costs per unit	**18.50 €**	**21.90 €**	**20.89 €**	**21.66 €**

[13] Table created by the author (expert solution - laboratory experiment).

2. Available supplier information (information request sheet)

Table A.3.5-2 displays all available supplier information.

Table A.3.5-2: Available supplier information[14]

	Supplier			
Type of information	***S1: INK Paradies***	***S2: Das Tintenfass***	***S1: INK Paradies***	***S1: INK Paradies***
Delivery time	Shipment 4-5 days after order confirmation	Shipment immediately after order confirmation	Shipment 2-3 days after order confirmation	Shipment 3-4 days after order confirmation
Reliability on delivery dates	Mostly on time	Normally on time	Always on time	Rarely on time
Complaint rate	From time to time	Few complaints	Frequent complaints	Very little complaints
Product quality	Quality test "moderate/poor"	Quality test "winner"	Quality test "good"	Quality test "o.k."
Legal form of the company	G.m.b.H.	O.H.G.	G.m.b.H.	O.H.G.
No. of CEOs	3	2	3	1
Average years of service (employees)	7	8	6	7
Average age (employees)	27.5	28.3	25.8	29.4
No. of subsidiaries	4	3	5	4
Equity ratio	50.0%	50.0%	50.0%	50.0%
Year of foundation	1994	1997	2004	2001

3. Calculation of total scoring points based on (total) costs-, time- and quality-measures

Table A.3.5-3 displays the calculation of the total scoring points.

Table A.3.5-3: Calculation of total scoring points[15]

	Supplier			
Scoring	***S1: INK Paradies***	***S2: Das Tintenfass***	***S3: TP Discounter***	***S4: PRINT4YOU***
Scoring (costs std. 1-4)	4	1	3	2
Scoring (time std. 1-4)	2	3	4	1
Scoring (quality std. 1-4)	1	4	2	3
Σ Scoring (costs, time, quality)	**7**	**8**	**9**	**6**
Total scoring points (costs, time, quality, std. 1-4)	**2**	**3**	**4**	**1**

[14] Table created by the author (expert solution - laboratory experiment).

[15] Table created by the author (expert solution - laboratory experiment).

Detailed explanation of the calculation of total scoring points:

- Scoring (costs std. 1-4): This ranking (from 1-4 / worst-best supplier) is based on the "calculation of total costs per unit". Results: S1: 4, S2: 1, S3: 3, S4: 2
- Scoring (time std. 1-4): This ranking (from 1-4 / worst-best supplier) is based on the summarised sub-scores "delivery time" and "reliability on delivery dates". Results: S1: 2 (summarised sub-score: 4), S2: 3 (summarised sub-score: 6), S3: 4 (summarised sub-score: 7), S4: 1 (summarised sub-score: 3)
- Scoring (quality std. 1-4): This ranking (from 1-4 / worst-best supplier) is based on the summarised sub-scores "complaint rate" and "product quality". Results: S1: 1 (summarised sub-score: 3), S2: 4 (summarised sub-score: 7), S3: 2 (summarised sub-score: 4), S4: 3 (summarised sub-score: 6)
- Σ Scoring (costs, time, quality)=Scoring (costs std. 1-4)+Scoring (time std. 1-4)+Scoring (quality std. 1-4)
- Total scoring points (costs, time, quality, std. 1-4): Ranked "Σ scoring (costs, time, quality)" from 1-4 / worst-best supplier

Based on the result of the "total scoring points (costs, time, quality, std. 1-4)", the best supplier ranking (=best combination) can be defined as:

1. **S3: TP Discounter (9 total scoring points)**
2. **S2: Das Tintenfass (8 total scoring points)**
3. **S1: INK Paradies (7 total scoring points)**
4. **S4: PRINT4YOU (6 total scoring points)**

4. Calculation of DMEE_1 (permutation algorithm)

For the calculation of the indicator DMEE_1 the author used a permutation algorithm to compute all combinations of supplier rankings. Table A.3.5-4 displays the results, the ranked scoring, and the standardised indicator DMEE_1.

Table A.3.5-4: Calculation of DMEE_1[16]

No.	Result of supplier ranking (Supplier no.)				Scoring (1-24 / worst – best)	Standardised scoring (DMEE_1)
1	S3	S2	S1	S4	24 Scoring points	5.000
2	S3	S2	S4	S1	23 Scoring points	4.826
3	S3	S1	S2	S4	22 Scoring points	4.652
4	S3	S1	S4	S2	21 Scoring points	4.478
5	S3	S4	S2	S1	20 Scoring points	4.304
6	S3	S4	S1	S2	19 Scoring points	4.130
7	S2	S3	S1	S4	18 Scoring points	3.957
8	S2	S3	S4	S1	17 Scoring points	3.783
9	S2	S1	S3	S4	16 Scoring points	3.609
10	S2	S1	S4	S3	15 Scoring points	3.435
11	S2	S4	S3	S1	14 Scoring points	3.261
12	S2	S4	S1	S3	13 Scoring points	3.087
13	S1	S3	S2	S4	12 Scoring points	2.913
14	S1	S3	S4	S2	11 Scoring points	2.739
15	S1	S2	S3	S4	10 Scoring points	2.565
16	S1	S2	S4	S3	9 Scoring points	2.391
17	S1	S4	S3	S2	8 Scoring points	2.217
18	S1	S4	S2	S3	7 Scoring points	2.043
19	S4	S3	S2	S1	6 Scoring points	1.870
20	S4	S3	S1	S2	5 Scoring points	1.696
21	S4	S2	S3	S1	4 Scoring points	1.522
22	S4	S2	S1	S3	3 Scoring points	1.348
23	S4	S1	S3	S2	2 Scoring points	1.174
24	S4	S1	S2	S3	1 Scoring point	1.000

Table A.3.5-4 shows all combinations of the supplier selection process, including the "unstandardized" scoring from 1 to 24 and the standardised scoring from 1 to 5 on a Likert scale which is used as the DMEE_1 indicator in the laboratory experiment. Formula A.3.5-1 is used to calculate the economic efficiency indicator 1 (DMEE_1).

Calculation of DMEE_1 $$DMEE_1 = 1 + \left(\frac{Scoring - Min_{Scoring}}{Max_{Scoring} - Min_{Scoring}} * 4\right) = 1 + \left(\frac{Scoring - 1}{23} * 4\right)$$

Formula A.3.5-1: Calculation (DMEE_1)

[16] Table created by the author (expert solution – laboratory experiment, permutations generator van de Moortel). In this case, four potential suppliers will lead to twenty-four possible supplier combinations (4!=24).

Appendix 4: List of evaluations by specialists[17] working in the field of strategic supplier selection processes for the field study

Appendix 4 contains a list of specialists which were used to pre-test and improve the questionnaire. Table A.4-1 shows the list of the expert reviews conducted between May 2015 and June 2015.

Table A.4-1: List of specialists for the field study[18]

No.	Name (Initials)	Education	Function	Type of organization
1	AJ	Ph.D.	Strategic Marketing Manager	Manufacturing Enterprise
2	AF	Master	Manager Production & Forecasting	Manufacturing Enterprise
3	JK	Master stud. Ph.D.	Senior Lecturer, Logistics Consultant	University
4	JR	Engineering Degree	CEO	Manufacturing Enterprise
5	KB	Master stud. Ph.D.	Head of Marketing	Trading Company
6	MT	Ph.D.	Head of Corporate Development	Aviation Industry
7	MS	Ph.D.	In-house Consultant Logistics, SM, SCM	Manufacturing Enterprise
8	RJ	Master	Product Manager	Manufacturing Enterprise
9	CE	Ph.D.	Professor, Consultant	University of Applied Sciences
10	ES	Bachelor stud. Master	CEO, Head of Purchasing	Consultancy
11	PW	Ph.D.	Purchasing Manager	Manufacturing Enterprise
12	AS	Master	CEO	Consultancy
13	AM	Master	CEO	Consultancy
14	RH	Master	SCM Manager, Head of Purchasing	Manufacturing Enterprise
15	RP	Master	Manager SM, LM	Manufacturing Enterprise
16	JO	Master	SCM Manager, Head of Purchasing	Manufacturing Enterprise
17	CK	Ph.D.	Sales Manager	Manufacturing Enterprise
18	SM	Master	Head of Logistics & SCM	Manufacturing Enterprise
19	AS	Master stud. Ph.D.	CEO, Head of Purchasing	Trading Company
20	SV	Ph.D.	Head of Logistics, Purchasing, SCM	Manufacturing Enterprise
21	HJ	Master	CEO, Head of Logistics & SCM	Manufacturing Enterprise
22	CW	Master stud. Ph.D.	CEO	Consultancy
23	WS	Ph.D.	In-house Consultant Production	Manufacturing Enterprise

[17] See appendix 2 for the further definition of "specialists".

[18] Table created by the author.

Appendix 5: Field study

Appendix 5 contains the German and the summarised English version of the questionnaire which was used in the field study.

Appendix 5.1: Questionnaire (German[19])

Untersuchung des individuellen Entscheidungsverhaltens bei der Auswahl von neuen Lieferanten in deutschsprachigen Unternehmen

Montanuniversität Leoben - Lehrstuhl für Industrielogistik
Universität Lettlands, Riga - Fakultät für Wirtschaft und Management
Univ.-Prof. Dr. Helmut Zsifkovits
Univ.-Prof. Dr. Josef Neuert
Manuel Woschank, M.Sc.

Sehr geehrte Damen und Herren,

der nachfolgende Fragebogen ist Teil einer wissenschaftlichen Studie zur Untersuchung des **individuellen Entscheidungsverhaltens bei der Auswahl von neuen Lieferanten in deutschsprachigen Unternehmen**. Ziel ist es zu untersuchen, wie Einkäufer bei der Auswahl von für das Unternehmen wichtigen (=strategischen) Lieferanten vorgehen, wobei der Fokus dieser Untersuchung auf dem Reifegrad und der Erfolgswirkung des Entscheidungsprozesses liegt.

Sollten Sie nicht der richtige Ansprechpartner sein, leiten Sie den Fragenbogen bitte an eine geeignete Person bzw. mehrere geeignete Personen in Ihrem Unternehmen weiter!

Ihr Nutzen

- Als kleines Dankschön erhalten Sie auf Wunsch (basierend auf der freiwilligen Erfassung Ihrer Kontaktdaten am Ende des Fragebogens):
- die **aggregierten Ergebnisse dieser Studie** in Form eines **praxisorientierten Abschlussberichts**,
- **aktuelle Neuigkeiten** aus den Bereichen Einkauf und Logistik per **Newsletter**,
- die Möglichkeit zur persönlichen Teilnahme an einem **Gewinnspiel mit zahlreichen Sachpreisen,** wie mehreren **Tablet PCs, einem Thermengutschein**, etc.

Vielen Dank für Ihr Vertrauen und Ihre Unterstützung!

Univ.-Prof. Dr. Helmut Zsifkovits
Univ.-Prof. Dr. Josef Neuert
Manuel Woschank, M.Sc.

[19] For further information see appendix 5.2: Questionnaire (summarised English version).

Zusätzliche Hinweise

- Sollten Sie bei einer Frage nicht ganz sicher sein, so bitten wir Sie bewusst um Ihre subjektive Einschätzung bzw. Ihre eigene Erfahrung. Es gibt hier keine richtigen oder falschen Antworten!
- Im Verlauf des Fragebogens werden verschiedene Sachverhalte durch ähnliche Fragestellungen erfasst. Wir bitten Sie um Verständnis, da dies aus methodischen Gründen zwingend erforderlich ist. Die Vollständigkeit Ihrer Antworten ist für den Erfolg der Studie von sehr großer Bedeutung!
- Alle Angaben dienen zu rein wissenschaftlichen Zwecken und werden selbstverständlich anonym ausgewertet und streng vertraulich behandelt!
- Die Bearbeitung des Fragebogens sollte nicht mehr als 7-9 min Ihrer wertvollen Zeit in Anspruch nehmen.

Für weitere Rückfragen steht Ihnen Herr Manuel Woschank, M.Sc. jederzeit per E-Mail unter m.woschank@woschank.com zur Verfügung.

Aufgabenstellung

Bitte wählen Sie gedanklich EINE von Ihnen durchgeführte Entscheidung zur Auswahl eines neuen Lieferanten aus, welche die folgenden Kriterien erfüllt:

- Die Entscheidung sollte maximal 12 Monate zurückliegen.
- Sie waren an der Entscheidung maßgeblich beteiligt.
- Sie sind in der Lage, dass Sie die Leistung des ausgewählten Lieferanten (Preisentwicklung, Qualität, Lieferzeit) eindeutig beurteilen können.
- Der endgültige Lieferant sollte am Anfang noch nicht eindeutig festgestanden sein (d.h. es waren anfangs genügend gleichwertige Alternativen vorhanden).
- Es sollte sich um ein Produkt (=produktbezogenes Beschaffungsobjekt) handeln, welches kritisch für den Erfolg Ihres Unternehmens ist (hohe Wertigkeit und dementsprechendes Beschaffungsrisiko, z.B. „A-Teil").

Bitte beziehen Sie alle Ihre Antworten während des Fragebogens jeweils auf diese, von Ihnen jetzt gedanklich ausgewählte, Entscheidungssituation!

- **Welches Produkt wurde in der von Ihnen ausgewählten Entscheidungssituation beschafft?**

Antwort:

- **Vor wievielen Monaten wurde die (endgültige) Entscheidung für den Lieferanten getroffen?**

Antwort:

- **Denken Sie nun bitte an die von Ihnen vorhin ausgewählte Entscheidungssituation zur Wahl des neuen Lieferanten.**

Bitte geben Sie an, inwieweit die unten stehenden Aussagen zutreffen!
(von **1=trifft überhaupt nicht zu** bis **5=trifft voll und ganz zu**)

	1	2	3	4	5
Ich habe vorab klar definiert, welche Anforderungen der „ideale" Lieferant zu erfüllen hat					
Vor der endgültigen Auswahl habe ich das Erreichen der vorab festgelegten Anforderungen nochmals überprüft					
Die vorab festgelegten Anforderungen wurden von mir in die endgültige Entscheidungsfindung miteinbezogen					

Bitte geben Sie an, inwieweit die unten stehenden Aussagen zutreffen!
(von **1=trifft überhaupt nicht zu** bis **5=trifft voll und ganz zu**)

	1	2	3	4	5
Im Zuge der Entscheidung habe ich umfassend nach relevanten (Lieferanten-)Informationen gesucht					
Ich habe bei mich der Informationssuche auf relevante Informationen fokussiert					

Bitte geben Sie an, inwieweit die unten stehenden Aussagen zutreffen!
(von **1=trifft überhaupt nicht zu** bis **5=trifft voll und ganz zu**)

	1	2	3	4	5
Die durchzuführenden Aufgaben zur Auswahl eines neuen Lieferanten waren eindeutig festgelegt					
Ich habe meinen Entscheidungsprozess vorab straff durchorganisiert					
Ich bin pragmatisch (=sachlich, fakten-orientiert) vorgegangen					

Bitte geben Sie an, inwieweit die unten stehenden Aussagen zutreffen!
(von **1=trifft überhaupt nicht zu** bis **5=trifft voll und ganz zu**)

	1	2	3	4	5
Für die endgültige Entscheidung waren klar definierte Bewertungskriterien festgelegt (d.h. eindeutig messbare Kriterien wie z.B. Qualität, Lieferzeit, Kosten)					
Die in Frage kommenden Lieferanten wurden von mir entsprechend der vordefinierten Bewertungskriterien beurteilt					
Ich habe die alternativen Lieferanten vollständig beurteilen können (d.h. Vor- und Nachteile eines alternativen Lieferanten waren klar)					
Ich habe alle Unterschiede zwischen den einzelnen, potentiellen Lieferanten klar herausgearbeitet					

- **Denken Sie nun bitte an die von Ihnen vorhin ausgewählte Entscheidungssituation zur Wahl des neuen Lieferanten.**

Bitte beurteilen Sie die folgenden Fragen zur Leistung des gewählten Lieferanten aus heutiger Sicht (=im Vergleich zu ihren Erwartungen am Beginn der Lieferantenbeziehung)!
(von **1=sehr schlecht** zu bis **5=sehr gut**)

	1	2	3	4	5
Beurteilung der Entwicklung der Gesamtkosten seit Beginn der Lieferantenbeziehung					
Beurteilung der Preisstabilität seit Beginn der Lieferantenbeziehung					
Vergleich der aktuellen Kosten zu den Kosten bei Beginn der Lieferantenbeziehung					
Beurteilung der Einhaltung von Qualitätsanforderungen (z.B. Ausschussquote)					
Beurteilung zum Auftreten von Reklamationen und Beschwerden					
Beurteilung der exakten Einhaltung von Lieferzeiten (On-Time-Delivery)					
Beurteilung der Zuverlässigkeit von Lieferungen bezogen auf die Vollständigkeit der Lieferungen					
Beurteilung der Zuverlässigkeit von Lieferungen bezogen auf die zeitgerechte Anlieferung					

- **Bitte geben Sie an, inwieweit die folgenden Aussagen über ihre Zufriedenheit zutreffen!**

(von **1=trifft überhaupt nicht zu** bis **5=trifft voll und ganz zu**)

	1	2	3	4	5
Ich bin mit der von mir getroffenen Entscheidung zufrieden					
Ich bin letztendlich zufrieden mit dem ausgewählten Lieferanten					
Ich bin zufrieden mit dem generellen Ablauf des Entscheidungsprozesses					

- **Wie viele Jahre haben Sie spezifische Erfahrung in ihrem Fachbereich (Einkauf, Logistik, SCM)?**

0-4 Jahre	
5-9 Jahre	
10-14 Jahre	
> 14 Jahre	

- **Bitte geben Sie die höchste Stufe Ihrer Ausbildung an!**

Lehre	
Matura/Abitur	
Fachhochschule/Universität	
sonstige Ausbildung	

- **Detailbeschreibung der Ausbildung (wenn „sonstige Ausbildung" gewählt) :**

Antwort:

- **Ist es möglich, dass man in Ihrem Unternehmen leistungsbezogenen Bonus erhalten kann (z.B.: Bonuszahlungen, sonstige leistungsbezogene Zusatzleistungen)?**

Ja	
Nein	

- **Arbeiten Sie mit ausgewählten Lieferanten gemeinsam an Qualitäts- und Prozessoptimierungsprojekten?**

Ja	
Nein	

- **Branchencode (wenn mehrere vorhanden bitte die der Haupttätigkeit des Unternehmens angeben):**

Herstellung von Waren (ÖNACE 2008-C)	
Bau (ÖNACE 2008-F)	
Handel; Instandhaltung und Reparatur von Kraftfahrzeugen (ÖNACE 2008-G)	
sonstige Branche	

- **Detailbeschreibung der Branche (ÖNACE Code):**

Antwort:

- **Anzahl der Mitarbeiter (am Standort) des Unternehmens:**

0-49	
50-249	
250-499	
500-999	
>1.000	

- **Interesse an Ergebnisse, Newsletter und Gewinnspiel?**

Zusammenfassende Studie	
Newsletter	
Gewinnspiel	

- **Bitte geben Sie hier (freiwillig) Ihre Kontaktdaten an! Diese werden getrennt zur Studie erfasst und dienen nur zur Benachrichtigung für die Ergebnisse, den Newsletter und das Gewinnspiel.**

Antwort:

Vielen Dank für die Beantwortung des Fragebogens!

Appendix 5.2: Questionnaire (summarised English version)

An Investigation on the Decision Making Behaviour in Strategic Supplier Selection P in Manufacturing Enterprises

Task: Please recall one specific strategic supplier selection decision from the past, which fulfils the following criteria:[20]

The decision was made within the last 12 months, the (final) decision was mainly made by yourself, you are able to assess the supplier performance (price, quality, time), the decision for the final supplier was not clear in the very beginning of the supplier selection process, the required procurement object should be a material, which is strategically important for the corporate success of your enterprise (e.g., an A-part, a part with high procurement risk).

Please refer all your answers in the survey to this specific supplier selection decision!

1. Which procurement object was requested by you?
2. When did you make the final decision for the strategic supplier (how many months ago)?

Think about this particular supplier selection process and answer the following questions from 1=completely disagree to 5=completely agree:

1. Well-defined targets for the supplier selection
2. Review of defined targets during the supplier selection process
3. Review of defined targets in the course of the final supplier selection decision
4. Search for decision-relevant information
5. Focus on decision-relevant information
6. Well-defined process for the supplier selection
7. Strictly organised supplier selection process
8. Pragmatic approach (facts & figure-oriented process) for the supplier section
9. Well-defined evaluation criteria for the supplier selection
10. Evaluation of all suppliers based on defined evaluation criteria
11. Accurately elaborated consequences of an alternative choice
12. Accurately elaborated differences between all suppliers

[20] In order to "frame" the decision making situation and/or in order to avoid common decision making biases the author has defined criteria for the further specification of the strategic supplier selection processes. These criteria were based the systematic deduction in chapter 1 of this thesis and on criteria which were used in state of the art research studies in the field of supply management. E.g. Riedl (2012), p. 15, Riedl (2012), p. 45, Riedl et al. (2013), p. 27, Kaufmann et al. (2012b), p. 80, and Kaufmann et al. (2014), p. 107.

Please evaluate the following questions regarding the supplier performance from 1=very bad performance to 5=very good performance:

1. Supplier performance: Development of total costs since the beginning of the supplier selection
2. Supplier performance: Price stability since the beginning of the supplier selection
3. Supplier performance: Comparison of actual costs to costs at the beginning of the supplier selection
4. Supplier performance: Adherence to quality standards
5. Supplier performance: Frequency of quality complaints
6. Supplier performance: On-time delivery performance
7. Supplier performance: Reliability in terms of complete deliveries
8. Supplier performance: Reliability in terms of on-time deliveries

Please evaluate the following questions regarding your personal satisfaction from 1= completely unsatisfied/no commitment to 5= completely satisfied/full commitment:

1. Satisfaction with the supplier selection decision
2. Commitment to the selected supplier
3. Satisfaction with the process of supplier selection

Additional questions:

1. Experience (0-4 years, 5-9 years, 10-14 years, >14 years)
2. Education (apprenticeship certificate, high school education, university education, other Education)
3. Performance-related reward systems (yes, no)
4. Cooperative quality and process optimization projects together with the strategic suppliers (yes, no)
5. Branch code (C, F, G, others)
6. No. of employees (0-49, 50-249, 250-499, 500-999, >1,000)
7. Contact information (survey results, additional information, etc.)

Appendix 6: Detailed statistical results

Appendix 6 contains all detailed and/or additional statistical analyses of the laboratory experiment and all detailed and/or additional statistical analyses of the field study divided into: The IBM SPSS Statistics analyses (laboratory experiment), the IBM SPSS Statistics analyses (field study), and the SmartPLS analyses (laboratory experiment and field study).

Appendix 6.1: IBM SPSS Statistics analyses (laboratory experiment)

6.1.1 Evaluation of significant differences in all indicator values (DMPM, DMEE, DMSPE)[21] between "pre-test", "main-test", and "post-test" group in the laboratory experiment

In Table A.6.1.1-1, a Kruskal-Wallis test is used to evaluate significant differences in all indicator values (variables: DMPM, DMEE, DMSPE) between "pre-test", "main-test" and "post-test" groups in the laboratory experiment.

Grouping: "Pre-test" group (group 0, n=32), "main-test" group (group 1, n=62), and the "post-test" group (group 2, n=23).

Results: No significant differences in all indicator values between "pre-test", "main-test", and "post-test" group.

Table A.6.1.1-1: Kruskal-Wallis test[22]

Test Statistics[a,b] – (1/2)							
	DMPM TO_1	***DMPM TO_2***	***DMPM TO_3***	***DMPM INF_1***	***DMPM ORG_1***	***DMPM ORG_2***	***DMPM ORG_3***
Chi-Square	1.181	.921	1.583	1.338	2.704	2.557	5.588
df	2	2	2	2	2	2	2
Asymp. Sig.	.554	.631	.453	.512	.259	.278	.061

Test Statistics[a,b] – (2/2)								
	DMPM HEUR_1	***DMPM HEUR_2***	***DMPM HEUR_3***	***DMPM HEUR_4***	***DM EE_1***	***DM SPE_1***	***DM SPE_2***	***DM SPE_3***
Chi-Square	.618	3.769	2.254	.386	1.822	.429	.798	5.941
df	2	2	2	2	2	2	2	2
Asymp. Sig.	.734	.152	.324	.825	.402	.807	.671	.051

a. Kruskal Wallis Test
b. Grouping Variable: Test group[23]

[21] **Decision making process maturity** (DMPM), ***decision making economic efficiency*** (DMEE), and ***decision making socio-psychological efficiency*** (DMSPE).

[22] Table created by the author (survey data – laboratory experiment, SPSS output).

[23] "Pre-test" group (group 0, n=32)," main-test" group (group 1, n=62), "post-test" group (group 2, n=23).

6.1.2 (Normal) distribution tests of all indicator values (DMPM, DME, DMSPE)[24] in the laboratory experiment

In Table A.6.1.2-1, a Kolmogorov-Smirnov test and a Shapiro-Wilk test are used to evaluate the (normal) distribution of all indicator values (variables: DMPM, DMEE, DMSPE) in the laboratory experiment.

Results: Significant differences in all indicator values between (empirical) data and normal distributed data. No normally distributed data.

Table A.6.1.2-1: Normal distribution tests[25]

Tests of Normality						
	Kolmogorov-Smirnov[a]			***Shapiro-Wilk***		
	Statistic	df	Sig.	Statistic	df	Sig.
DMPMTO_1	.240	105	.000	.876	105	.000
DMPMTO_2	.220	105	.000	.894	105	.000
DMPMTO_3	.250	105	.000	.856	105	.000
DMPMINF_1	.219	105	.000	.869	105	.000
DMPMORG_1	.179	105	.000	.909	105	.000
DMPMORG_2	.187	105	.000	.904	105	.000
DMPMORG_3	.246	105	.000	.813	105	.000
DMPMHEUR_1	.262	105	.000	.778	105	.000
DMPMHEUR_2	.249	105	.000	.845	105	.000
DMPMHEUR_3	.211	105	.000	.905	105	.000
DMPMHEUR_4	.273	105	.000	.858	105	.000
DMEE_1	.179	105	.000	.885	105	.000
DMSPE_1	.252	105	.000	.840	105	.000
DMSPE_2	.258	105	.000	.848	105	.000
DMSPE_3	.285	105	.000	.859	105	.000
a. Lilliefors Significance Correction						

6.1.3 Comparison of DMPMINF_1[26] indicator measures in the laboratory experiment

Figure A.6.1.3-1 shows the distribution of the indicator DMPMINF_1 (respectively DMPMINF_1_Records and DMPMINF_1_Survey) in the laboratory experiment. DMPMINF_1_Records is based on the actually supplier information accessed (as recorded by a scientific assistant during the process of supplier selection) and DMPMINF_1_Survey is based on the post-experimental questionnaire. To measure the DMPMINF_1_Records indicator, the actually accessed decision-relevant information is standardised to a five-point

[24] **Decision making process maturity** (DMPM), ***decision making economic efficiency*** (DMEE), and ***decision making socio-psychological efficiency*** (DMSPE).

[25] Table created by the author (survey data – laboratory experiment, SPSS output).

[26] ***DMPM-information orientation*** (DMPMINF).

Likert scale (from 1=strongly-disagree to 5=strongly agree). The DMPMINF_1_Survey indicator is also measured by using a five-point Likert scale (from 1=strongly-disagree to 5=strongly agree).

Results: The mean of all DMPMINF_1_Records (actually accessed decision-relevant information from the records taken by the scientific assistant) indicators is higher than the mean of all DMPMINF_1_Survey (from the questionnaire) indicator. Participants tend to overestimate their ability to search for useful (decision-relevant) information.

Further results: DMPMINF_1_Records (mean: 2.446, median: 2.000, standard deviation: 1.174) < DMPMINF_1_Survey (mean: 3.768, median: 4.000, standard deviation: 1.027).

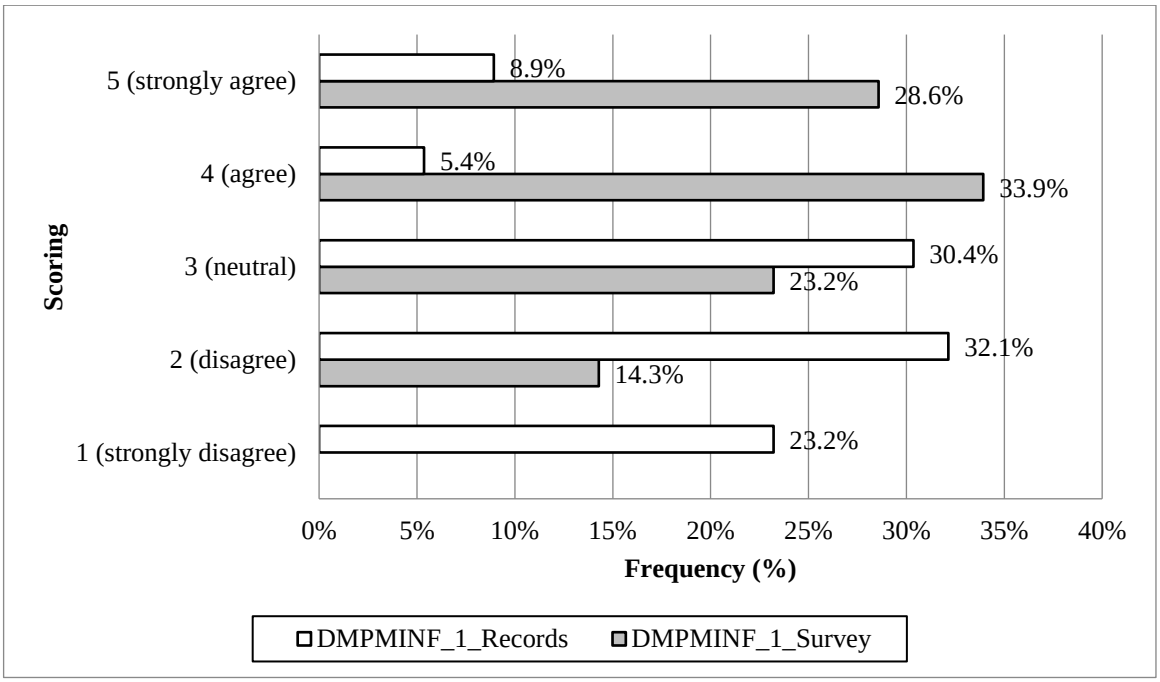

Figure A.6.1.3-1: Comparison of DMPMINF indicators[27]

6.1.4 Evaluation of significant differences in the DMPMINF_1[28] indicator values between DMPMINF_1_Records "actually accessed decision-relevant information" and DMPMINF_1_Survey "estimated accessed decision-relevant information" in the laboratory experiment

In both Table A.6.1.4-1 and Table A.6.1.4-2, a Mann-Whitney U test is used to evaluate significant differences in the DMPMINF_1 indicator values between DMPMINF_1_Records "actually accessed decision-relevant information", recorded by a scientific assistant in the

[27] Figure created by the author (survey data – laboratory experiment, SPSS output).

[28] ***DMPM-information orientation*** (DMPMINF).

process of supplier selection and DMPMINF_1_Survey "estimated accessed useful information, recorded by using a post-experimental questionnaire" in the laboratory experiment.

Grouping: DMPMINF_1_Records (group 0, n=56) and DMPMINF_1_Survey (group 1, n=56).

Results: Significant differences in all indicator values between DMPMINF_1_Records "actually accessed decision-relevant information" and DMPMINF_1_Survey "estimated accessed decision-relevant information". Participants significantly overestimate their ability to search for useful (decision-relevant) information.

Table A.6.1.4-1: Mann-Whitney U test (test statistics)[29]

Test Statistics[a]	
	DMPMINF
Mann-Whitney U	650.000
Wilcoxon W	2246.000
Z	-5.473
Asymp. Sig. (2-tailed)	.000
a. Grouping Variable: DMPMINF_1 group[30]	

Table A.6.1.4-2: Mann-Whitney U test (ranks)[31]

Ranks				
Group		***N***	***Mean Rank***	***Sum of Ranks***
DMPMINF	0.00	56	40.11	2246.00
	1.00	56	72.89	4082.00
	Total	112		

Appendix 6.2: IBM SPSS Statistics analyses (field study)

6.2.1 Evaluation of significant differences in all indicator values (DMPM, DMEE, DMSPE)[32] between "manufacturing" and "manufacturing-related" enterprises in the field study

In both Table A.6.2.1-1, a Mann-Whitney U test is used to evaluate significant differences in all indicator values (DMPM, DMEE, DMSPE) between "manufacturing" and "manufacturing-related" enterprises in the field study.

[29] Table created by the author (survey data – laboratory experiment, SPSS output).

[30] DMPMINF_1_Records (group 0, n=56), DMPMINF_1_Survey (group 1, n=56).

[31] Table created by the author (survey data – laboratory experiment, SPSS output).

[32] **Decision making process maturity** (DMPM), ***decision making economic efficiency*** (DMEE), and ***decision making socio-psychological efficiency*** (DMSPE).

Grouping: "Manufacturing" (group 0, branch code=C, n=111) and "manufacturing-related" enterprises (group 1, branch code=F, G, others, n=28).

Results: No significant differences in all indicator values between "manufacturing" and "manufacturing-related" enterprises.

Table A.6.2.1-1: Mann-Whitney U test[33]

Test Statistics[a] – (1/3)							
	DMPM TO_1	***DMPM TO_2***	***DMPM TO_3***	***DMPM INF_1***	***DMPM ORG_1***	***DMPM ORG_2***	***DMPM ORG_3***
Mann-Whitney U	1529.000	1251.000	1486.000	1228.000	1538.500	1353.000	1487.500
Wilcoxon W	1935.000	1657.000	1892.000	1634.000	7754.500	7569.000	1893.500
Z	-.145	-1.782	-.412	-1.829	-.087	-1.102	-.383
Asymp. Sig. (2-	.885	.075	.680	.067	.931	.271	.702

Test Statistics[a] – (2/3)							
	DMPM HEUR_1	***DMPM HEUR_2***	***DMPM HEUR_3***	***DMPM HEUR_4***	***DM EE_1***	***DM EE_2***	***DM EE_3***
Mann-Whitney U	1329.500	1429.000	1371.000	1425.500	1382.000	1300.000	1256.500
Wilcoxon W	1735.500	7645.000	1777.000	1831.500	7598.000	7516.000	7472.500
Z	-1.319	-.713	-1.008	-.710	-.975	-1.465	-1.702
Asymp. Sig. (2-tailed)	.187	.476	.313	.477	.330	.143	.089

Test Statistics[a] – (3/3)								
	DM EE_4	***DM EE_5***	***DM EE_6***	***DM EE_7***	***DM EE_8***	***DM SPE_1***	***DM SPE_2***	***DM SPE_3***
Mann-Whitney U	1508.500	1449.000	1515.500	1410.500	1502.500	1526.500	1528.000	1530.000
Wilcoxon W	1914.500	7665.000	7731.500	1816.500	7718.500	1932.500	7744.000	1936.000
Z	-.261	-.589	-.217	-.878	-.292	-.174	-.157	-.135
Asymp. Sig. (2-tailed)	.794	.556	.828	.380	.770	.862	.875	.892
a. Grouping Variable: Industry[34]								

[33] Table created by the author (survey data – field study, SPSS output).

[34] Grouping: "Manufacturing" (group 0, branch code=0, n=111), "manufacturing-related" enterprises (group 1, branch code=1-4, n=28).

6.2.2 (Normal) distribution tests of all indicator values (DMPM, DMEE, DMSPE)[35] in the field study

In Table A.6.2.2-1, a Kolmogorov-Smirnov test and a Shapiro-Wilk test are used to evaluate the (normal) distribution of all indicator values (variables: DMPM, DMEE, DMSPE) in the field study.

Results: Significant differences in all indicator values between (empirical) data and normal distributed data. No normally distributed data.

Table A.6.2.2-1: Normal distribution tests[36]

Tests of Normality						
	Kolmogorov-Smirnov[a]			***Shapiro-Wilk***		
	Statistic	df	Sig.	Statistic	df	Sig.
DMPMTO_1	.296	139	.000	.723	139	.000
DMPMTO_2	.319	139	.000	.711	139	.000
DMPMTO_3	.347	139	.000	.659	139	.000
DMPMINF_1	.244	139	.000	.789	139	.000
DMPMORG_1	.250	139	.000	.807	139	.000
DMPMORG_2	.250	139	.000	.873	139	.000
DMPMORG_3	.274	139	.000	.738	139	.000
DMPMHEUR_1	.314	139	.000	.696	139	.000
DMPMHEUR_2	.264	139	.000	.754	139	.000
DMPMHEUR_3	.228	139	.000	.846	139	.000
DMPMHEUR_4	.229	139	.000	.842	139	.000
DMEE_1	.271	139	.000	.787	139	.000
DMEE_2	.278	139	.000	.733	139	.000
DMEE_3	.281	139	.000	.762	139	.000
DMEE_4	.280	139	.000	.758	139	.000
DMEE_5	.262	139	.000	.799	139	.000
DMEE_6	.277	139	.000	.793	139	.000
DMEE_7	.363	139	.000	.666	139	.000
DMEE_8	.265	139	.000	.782	139	.000
DMSPE_1	.374	139	.000	.578	139	.000
DMSPE_2	.334	139	.000	.650	139	.000
DMSPE_3	.242	139	.000	.821	139	.000
a. Lilliefors Significance Correction						

[35] **Decision making process maturity** (DMPM), ***decision making economic efficiency*** (DMEE), and ***decision making socio-psychological efficiency*** (DMSPE).

[36] Table created by the author (survey data – field study, SPSS output).

6.2.3 Evaluation of significant differences in all indicator values (DMPM, DMEE, DMSPE)[37] between "earlier", "average" and "later" received survey responses (=non-response bias) in the field study[38]

In Table A.6.2.3-1, a Kruskal-Wallis test is used to evaluate significant differences in all indicator values (DMPM, DMEE, DMSPE) between "earlier", "average", and "later" received survey responses[39] in the field study.

Grouping: "Earlier" (group 0, t=0-20 days, n=42), "average" (group 1, t=21-40 days, n=46), and "later" (group 2, t=41-60 days, n=51) received survey responses.

Results: No significant differences in all indicator values between "earlier", "average", and "later" received survey responses.

Table A.6.2.3-1: Kruskal-Wallis test[40]

Test Statistics[a,b] – (1/3)							
	DMPM TO_1	***DMPM TO_2***	***DMPM TO_3***	***DMPM INF_1***	***DMPM ORG_1***	***DMPM ORG_2***	***DMPM ORG_3***
Chi-Square	2.280	4.028	1.128	1.306	1.607	.435	.800
df	2	2	2	2	2	2	2
Asymp. Sig.	.320	.133	.569	.521	.448	.804	.670
Test Statistics[a,b] – (2/3)							
	DMPM HEUR_1	***DMPM HEUR_2***	***DMPM HEUR_3***	***DMPM HEUR_4***	***DM EE_1***	***DM EE_2***	***DM EE_3***
Chi-Square	.650	.501	.715	.176	.792	.666	.390
df	2	2	2	2	2	2	2
Asymp. Sig.	.723	.779	.700	.916	.673	.717	.823

Test Statistics[a,b] – (3/3)								
	DM EE_4	***DM EE_5***	***DM EE_6***	***DM EE_7***	***DM EE_8***	***DM SPE_1***	***DM SPE_2***	***DM SPE_3***
Chi-Square	.819	1.199	6.355	.692	1.286	.828	1.500	1.932
df	2	2	2	2	2	2	2	2
Asymp. Sig.	.664	.549	.042	.708	.526	.661	.472	.381

a. Kruskal Wallis Test
b. Grouping Variable: Response time group[41]

[37] **Decision making process maturity** (DMPM), ***decision making economic efficiency*** (DMEE), and ***decision making socio-psychological efficiency*** (DMSPE).

[38] The non-response bias test was initially developed by Armstrong & Overton (1977), pp. 396–402.

[39] Measured response time=Survey starting time – survey response time.

[40] Table created by the author (survey data – field study, SPSS output).

[41] Grouping: "Earlier" (group 0, t=0-20 days, n=42), "average" (group 1, t=21-40 days, n=46), and "later" (group 2, t=41-60 days, n=51) received survey responses.

6.2.4 Evaluation of significant differences in all indicator values (DMPM, DMEE, DMSPE)[42] between "recent conducted" and "more elapsed" strategic supplier selection processes (=recalling information bias) in the field study

In both Table A.6.2.4-1 and Table A.6.2.4-2, a Mann-Whitney U test is used to evaluate significant differences in all indicator values (DMPM, DMEE, DMSPE) between "recent conducted" and "more elapsed" strategic supplier selection processes[43] in the field study.

Grouping: "Recent conducted" (group 0, t<6 months, n=84) and "more elapsed" (group 1, t≥6 months, n=55) strategic supplier selection processes.

Results: No significant differences in all indicator values between "recent conducted" and "more elapsed" strategic supplier selection processes.

Table A.6.2.4-1: Mann-Whitney U test[44]

Test Statistics[a] – (1/3)							
	DMPM TO_1	***DMPM TO_2***	***DMPM TO_3***	***DMPM INF_1***	***DMPM ORG_1***	***DMPM ORG_2***	***DMPM ORG_3***
Mann-Whitney U	2166.000	2211.000	2120.000	2088.500	2241.000	2262.000	2266.000
Wilcoxon W	3706.000	3751.000	3660.000	5658.500	5811.000	3802.000	3806.000
Z	-.686	-.478	-.945	-1.019	-.316	-.216	-.208
Asymp. Sig. (2-	.493	.633	.345	.308	.752	.829	.835

Test Statistics[a] – (2/3)							
	DMPM HEUR_1	***DMPM HEUR_2***	***DMPM HEUR_3***	***DMPM HEUR_4***	***DM EE_1***	***DM EE_2***	***DM EE_3***
Mann-Whitney U	2268.500	2289.000	2202.500	2148.500	2147.000	2154.500	2297.000
Wilcoxon W	3808.500	3829.000	5772.500	5718.500	3687.000	5724.500	5867.000
Z	-.200	-.098	-.486	-.732	-.758	-.735	-.061
Asymp. Sig. (2-tailed)	.841	.922	.627	.464	.449	.462	.951
a. Grouping Variable: Recalling information bias group[45]							

[42] **Decision making process maturity** (DMPM), ***decision making economic efficiency*** (DMEE), and ***decision making socio-psychological efficiency*** (DMSPE).

[43] Measured timeframe=Date of the final supplier selection decision – survey response date.

[44] Table created by the author (survey data – field study, SPSS output).

[45] Grouping: "Recent conducted" (group 0, t<6 months, n=84), "more elapsed conducted" (group 1, t≥6 months, n=55) strategic supplier selection processes.

Table A.6.2.3-2: Mann-Whitney U test[46]

Test Statistics[a] – (3/3)								
	DM EE_4	***DM EE_5***	***DM EE_6***	***DM EE_7***	***DM EE_8***	***DM SPE_1***	***DM SPE_2***	***DM SPE_3***
Mann-Whitney U	2308.000	2226.500	2236.500	2114.000	2193.500	2142.000	1982.000	2184.000
Wilcoxon W	5878.000	5796.500	5806.500	5684.000	3733.500	5712.000	5552.000	5754.000
Z	-.009	-.384	-.340	-.983	-.542	-.874	-1.625	-.583
Asymp. Sig. (2-tailed)	.992	.701	.734	.325	.588	.382	.104	.560
a. Grouping Variable: Recalling information bias group[47]								

6.2.5 Additional test for the company-internal determinant variables

Moreover, the author has performed three additional tests for three **company-internal determinants *manager´s experience***, ***manager´s education***, and company´s ***reward initiatives***.

6.2.5.1 Evaluation of significant differences in the decision making process maturity, the decision making economic efficiency, and the decision making socio-psychological efficiency variable values between "lower" manager´s experience and "higher" manager´s experience in the field study

In Table A.6.2.5.1-1, a Mann-Whitney U test is used to evaluate significant differences in the DMPM, DMEE, DMSPE variable values[48] between "lower" manager´s experience and "higher" manager´s experience in the field study.

Grouping: "Lower" manager´s experience (group 0, 0-4 years and 5-9 years, n=47) and "higher" manager´s experience (group 1, 10-14 years and >14 years, n=92).

Results: No significant differences in the DMPM, DMEE, and DMSPE variable values between "lower" manager´s experience and "higher" manager´s experience.

[46] Table created by the author (survey data – field study, SPSS output).

[47] Grouping: "Recent conducted" (group 0, t<6 months, n=84), "more elapsed conducted" (group 1, t≥6 months, n=55) strategic supplier selection processes.

[48] The author used the latent variables scores of the **decision making process maturity** (DMPM), the ***decision making economic efficiency*** (DMEE), and the ***decision making socio-psychological efficiency*** (DMSPE) computed by using the SmartPLS/PLS algorithm for this calculation.

Table A.6.2.5.1-1: Mann-Whitney U test[49]

Test Statistics[a]			
	DMPM	***DMEE***	***DMSPE***
Mann-Whitney U	2043.000	1996.000	2125.000
Wilcoxon W	3171.000	3124.000	3253.000
Z	-.530	-.740	-.168
Asymp. Sig. (2-tailed)	.596	.459	.866
a. Grouping Variable: DMDETMEX[50]			

6.2.5.2 Evaluation of significant differences in the decision making process maturity, the decision making economic efficiency, and the decision making socio-psychological efficiency variable values between manager´s education "no university education" and manager´s education "university education" in the field study

In Table A.6.2.5.2-1, a Mann-Whitney U test is used to evaluate significant differences in the DMPM, DMEE, DMSPE variable values[51] between manager´s education "no university education" and manager´s education "university education" in the field study.

Grouping: Manager´s education "no university education" (group 0, other education, apprenticeship certificate, high school certificate, n=57) and manager´s education "university education" (group 1, university education, n=82).

Results: No significant differences in the DMPM, DMEE, and DMSPE variable values between "no university education" and "university education".

Table A.6.2.5.2-1: Mann-Whitney U test[52]

Test Statistics[a]			
	DMPM	***DMEE***	***DMSPE***
Mann-Whitney U	2327.000	1977.500	1916.000
Wilcoxon W	5730.000	5380.500	5319.000
Z	-.043	-1.541	-1.843
Asymp. Sig. (2-tailed)	.966	.123	.065
a. Grouping Variable: DMDETMED[53]			

[49] Table created by the author (survey data – field study, SPSS output).

[50] Grouping: "Lower" manager´s experience (group 0, 0-4 years and 5-9 years, n=47), "higher" manager´s experience (group 1, 10-14 years and >14 years, n=92).

[51] The author used the latent variables scores of the **decision making process maturity** (DMPM), the ***decision making economic efficiency*** (DMEE), and the ***decision making socio-psychological efficiency*** (DMSPE) computed by using the SmartPLS/PLS algorithm for this calculation.

[52] Table created by the author (survey data – field study, SPSS output).

[53] Grouping: Manager´s education "no university education" (group 0, other education, apprenticeship certificate, high school certificate, n=57), manager´s education "university education" (group 1, university education, n=82).

6.2.5.3 Evaluation of significant differences in the decision making process maturity, the decision making economic efficiency, and the decision making socio-psychological efficiency variable values between "implemented company reward initiatives" and "not implemented company reward initiatives" in the field study

In both Table A.6.2.5.3-1 and Table A.6.2.5.3-2, a Mann-Whitney U test is used to evaluate significant differences in the DMPM, DMEE, DMSPE variable values[54] between "implemented company reward initiatives" and "not implemented company reward initiatives" (DMDETCRI) in the field study.

Grouping: "Implemented" company reward initiatives (group 0, company reward initiatives: yes, n=93) and "not implemented" company reward initiatives (group 1, company reward initiatives: no, n=46).

Results: No significant differences in the DMPM and DMSPE variable values between "implemented" company reward initiatives and "not implemented" company reward initiatives and significant differences in the DMEE variable values between "implemented" company reward initiatives and "not implemented" company reward initiatives.

Table A.6.2.5.3-1: Mann-Whitney U test (test statistics)[55]

Test Statistics[a]			
	DMPM	***DMEE***	***DMSPE***
Mann-Whitney U	2115.5000	1671.000	1997.500
Wilcoxon W	3196.500	2752.000	3078.500
Z	-.105	-2.097	-.648
Asymp. Sig. (2-tailed)	.916	.036	.517
a. Grouping Variable: DMDETMED[56]			

Table A.6.2.5.3-2: Mann-Whitney U test (ranks)[57]

Ranks				
Group		***N***	***Mean Rank***	***Sum of Ranks***
DMPM	0.00	93	70.25	6533.50
	1.00	46	69.49	3196.50
	Total	139		

[54] The author used the latent variables scores of the **decision making process maturity** (DMPM), the ***decision making economic efficiency*** (DMEE), and the ***decision making socio-psychological efficiency*** (DMSPE) computed by using the SmartPLS/PLS algorithm for this calculation.

[55] Table created by the author (survey data – field study, SPSS output).

[56] Grouping: "Implemented company reward initiatives" (group 0, yes, n=93), "not implemented company reward initiatives" (group 1, no, n=46).

[57] Table created by the author (survey data – laboratory experiment, SPSS output).

Table A.6.2.5.3-2: Mann-Whitney U test (ranks - continued)[58]

Ranks				
Group		***N***	***Mean Rank***	***Sum of Ranks***
DMEE	0.00	93	75.03	6978.00
	1.00	46	59.83	2752.00
	Total	139		
DMSPE	0.00	93	71.52	6651.50
	1.00	46	66.92	3078.50
	Total	139		

Appendix 6.3: SmartPLS analyses (laboratory experiment and field study)

Appendix 6.3 contains detailed analyses of the collinearity statistics (VIF) in the laboratory experiment and in the field study. Additionally, the author shows the standardised SmartPLS calculation settings which were used to compute the SmartPLS outputs in the course of this thesis.

6.3.1 Calculated discriminant validity IV: Collinearity statistics (VIF) values in the laboratory experiment

Table A.6.3.1-1 shows the calculated discriminant validity IV: Collinearity statistics (VIF) values for the laboratory experiment.

Table A.6.3.1-1 Computed VIF values (laboratory experiment)[59]

DMPM		DMEE, DMSPE	
Indicator	***VIF***	***Indicator***	***VIF***
DMPMTO_1	2.804	DMEE_1	1.000
DMPMTO_2	3.809	DMSPE_1	1.884
DMPMTO_3	2.889	DMSPE_2	2.010
DMPMINF_1	1.522	DMSPE_3	1.552
DMPMORG_1	1.407		
DMPMORG_2	1.600		
DMPMORG_3	1.515		
DMPMHEUR_1	2.200		
DMPMHEUR_2	2.093		
DMPMHEUR_3	1.628		
DMPMHEUR_4	1.678		

[58] Table created by the author (survey data – laboratory experiment, SPSS output).

[59] Table created by the author (survey data – laboratory experiment, SmartPLS output).

Results: All computed VIF values are higher than the recommend minimum value of 0.200 and lower than the recommended maximum value of 5.000 which indicates a good model fit.

6.3.2 Calculated discriminant validity IV: Collinearity statistics (VIF) values in the field study

Table A.6.3.2-1 shows the calculated discriminant validity IV: Collinearity statistics (VIF) values for the field study.

Table A.6.3.2-1: Computed VIF values (field study)[60]

DMPM		DMEE, DMSPE	
Indicator	***VIF***	***Indicator***	***VIF***
DMPMTO_1	2.319	DMEE_1	2.616
DMPMTO_2	2.982	DMEE_2	3.400
DMPMTO_3	2.500	DMEE_3	2.482
DMPMINF_1	1.652	DMEE_4	2.111
DMPMORG_1	1.707	DMEE_5	2.630
DMPMORG_2	1.671	DMEE_6	4.384
DMPMORG_3	1.536	DMEE_7	3.134
DMPMHEUR_1	2.008	DMEE_8	4.036
DMPMHEUR_2	2.393	DMSPE_1	3.955
DMPMHEUR_3	2.255	DMSPE_2	3.788
DMPMHEUR_4	2.099	DMSPE_3	1.545

Results: All computed VIF values are higher than the recommend minimum value of 0.200 and lower than the recommended maximum value of 5.000 which indicates a good model fit.

6.3.3 Standardised SmartPLS calculation settings

The author used the following settings in order to compute the PLS-algorithm, the bootstrapping procedure, and the blindfolding procedure in SmartPLS V. 3.2.3:

1. Standard settings for the PLS-algorithm: PLS algorithm, weighting scheme path, maximum iterations 300, stop criterion 7, use Lohmoeller settings no.
2. Standard settings for the bootstrapping procedure: Bootstrapping procedure, subsamples 500, do parallel processing yes, sign changes no, amount of results complete bootstrapping, confidence interval method bias-corrected and accelerated (BCa) bootstrapping, test type two tailed, significance level 0.05.
3. Standard settings for the blindfolding procedure: Omission distance 10.

[60] Table created by the author (survey data – field study, SmartPLS output).