

A NEW LEAN SERVICE MODEL -

THE VALUE OF CUSTOMER INTEGRATION INTO SERVICE OPERATIONS

DAVID ARFMANN

A thesis submitted to

The University of Gloucestershire

in accordance with the requirements of the degree of

Doctor of Business Administration

in the Business School

August 2015

Abstract

Purpose – The purpose of this thesis is to explore the implications of value co-creation on lean service operations. Given that only customers are able to create value, the integration of customers becomes more and more important. This thesis investigates customer integration through applying and enhancing lean principles. The overall goal of this study is to develop and test a model to integrate customers into service operations in a lean way, considering value co-creation theory.

Design/methodology/approach – The overall research strategy of enquiry consists of action research and mixed methods approaches. A systematic literature review is conducted on customer integration methods considering 27 relevant studies. Afterwards, a meta-synthesis of these studies is provided to develop a model for lean customer integration. Seven propositions are formulated to test the model. Therefore, the model is implemented in two independent pole case companies (SMEs) within pure service businesses. Six different mixed methods are applied to investigate effects of model implementation. Beside interviews, process observations and customer workshops, document analysis, Monte Carlo Simulation, regular debriefing sessions are conducted. To clarify arising anomalies, an experiment is conducted with 46 participants in 4 different groups. Finally, a revised model is presented.

Findings – The findings show that through synthesizing selected studies, a model is developed that should facilitate customer integration into firm's service operations in a lean way. Application of the model in the case companies reveals that it enables a company to enhance operational performance, as well as value creation. Findings further show that a significant portion of unavoidable waste can be turned into either functional or emotional value. This emphasizes the relevance of developing and applying service specific lean tools in order to cope with service specific challenges.

Research limitations and practical implications – As the findings are based on a systematic literature review and tested within a pure service environment (SMEs), the proposed model should be tested in other circumstances to further improve the results. The findings may be of interest to scholars in the field of lean or service operations, as well as practitioners seeking to enhance their operational performance through lean customer integration.

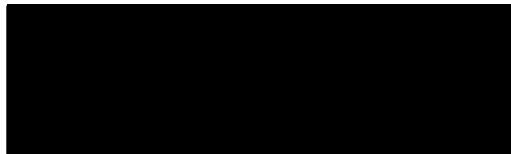
Originality/value – This thesis contributes to knowledge in the field of lean service operations, as it provides the first validated model to integrate customers in operations in a lean way. It also provides a new approach to practitioners seeking not only to ‘streamline’, but also to ‘valueline’ their value creation processes. In particular, the role of customers as value (co-) creators is considered from an operational perspective and provides important insights on how customer value can be enhanced in pure services.

Declaration of Original Content

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Gloucestershire and is original except where indicated by specific reference in the text. No part of the thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas.

Any views expressed in the thesis are those of the author and in no way represent those of the University.

Signed:

A solid black rectangular box used to redact the author's signature.

David Arfmann

Date: 13/08/2015

Acknowledgements

Though this section is provided in the beginning of this document, it represents one of the final steps on my doctoral journey. More than three quite intense years have been passed since I started the DBA program. My driving force to go on this journey was to bring up something universally meaningful. However, in the course of this program I realized that it may rather mean a lot to me as a researcher, practitioner and person than to the whole world. Writing the doctoral thesis particularly changed my way of thinking, parts of my behavior, as well as my self-perception. But it also affected my personal environment and my family. In the end, I am very pleased and thankful for the chance to undergo such a challenging and, at the same time, enlightening program.

In particular, I would like to offer my deepest gratitude to my supervisors Adele Carter and Federico Topolansky. First of all, thank you so much Federico for your unfailing advice and support. Your encouraging and friendly way of treating me and my dissertational, as well as personal issues and ideas was extraordinary. I hope that we will have the chance to stay in touch and, maybe, to work together on further projects in the future. Adele, I appreciate so much your constructive advices and sense for detail. You possess a special aptitude that kept my motivation high to further improve the thesis even at a later stage. It was really a pleasure to work with you! Thanks also to the lecturing and administrative staff of the University. In particular, I would like to thank Philippa Wards for her encouraging teaching and constant administrative support throughout the program, as well as to Charley Cooney for very helpful administrative advices. Both of you represent the high customer and student focus within your organization. Also the staff of the German Agency was always supportive and friendly.

Furthermore, I would like to thank all experiment participants and both case companies for their openness and motivation to support my project, as well as to all other persons, who contributed to this study. Without your support, no insights could have been gained!

Last but not least I would like to express my deepest gratefulness to my wife, who always encouraged me to stay the course and carried me along this stressful, sometimes even exhausting pathway. There would be nothing meaningful without you!

Publications

Journal articles:

Arfmann, D. and Topolansky, F. G. (2014). The Value of lean in the Service Sector: A Critique of Theory & Practice. *International Journal of Business and Social Science*, 5(2), 18-24.

Conference papers:

Arfmann, D. (2014). Enriching lean service – A framework to integrate customers into service operations. Paper presented at the 4th DBA & DMC Annual Doctoral Colloquium, Berlin, Germany.

Table of Contents

ABSTRACT	3
DECLARATION OF ORIGINAL CONTENT	5
ACKNOWLEDGEMENTS	6
PUBLICATIONS	7
ABBREVIATIONS.....	12
LIST OF FIGURES.....	13
LIST OF TABLES.....	14
1 INTRODUCTION	15
1.1 BACKGROUND OF SERVICE MANAGEMENT DEVELOPMENT	16
1.2 VALUE CO-CREATION CONCEPT AND CUSTOMER INTEGRATION	18
1.3 LEAN SERVICE HISTORY.....	24
2 LEAN CRITIQUE IN THEORY AND PRACTICE	26
2.1 ARGUMENTS FOR BREAKING FREE FROM LEAN SERVICE TRANSFORMATION.....	27
2.1.1 <i>Argument 1: There is no lean service.....</i>	27
2.1.2 <i>Argument 2: lean effects in services are misinterpreted or invalid</i>	28
2.1.3 <i>Argument 3: lean scholars lost sight that service is different.....</i>	29
2.1.4 <i>Argument 4: From push to pull has no relevance in services.....</i>	31
2.1.5 <i>Argument 5: lean service thinking ends in organizational boundaries.....</i>	32
2.2 FIELDS FOR FURTHER RESEARCH	32
2.2.1 <i>Consider agreed service characteristics.....</i>	33
2.2.2 <i>Understand positive effects of lean methods and tools</i>	34
2.3 SCOPE OF THE THESIS.....	34
2.3.1 <i>Focus areas.....</i>	35
2.3.1.1 Provider, joint and customer sphere	36
2.3.1.2 Functional and emotional value.....	38
2.3.1.3 From unavoidable waste to value.....	38
2.4 RESEARCH PURPOSE	39
2.5 RESEARCH QUESTIONS AND OBJECTIVES.....	39
3 LITERATURE REVIEW.....	41
3.1 FINDINGS	41
3.1.1 <i>Study Familiarization</i>	41
3.1.2 <i>Thematic Framework.....</i>	43
3.1.3 <i>Understand demand in terms of type and frequency.....</i>	47
3.1.3.1 Time and duration	50
3.1.3.2 Methods and tasks.....	51
3.1.3.3 Characteristics of co-created value.....	52
3.1.3.4 Complementary observations.....	53
3.1.4 <i>Create single piece flow and routines.....</i>	54
3.1.4.1 Setup of operations	54
3.1.4.2 Way of customer integration	55
3.1.5 <i>Train staff and customers against demand.....</i>	56
3.1.5.1 Customer related aspects	56
3.1.5.2 Provider related aspects	57

3.1.6	<i>Performance measurement and continuous improvement</i>	57
3.1.7	<i>Functional and emotional value</i>	59
3.1.8	<i>Turn waste into value</i>	60
3.1.9	<i>Mapping and interpretation</i>	60
3.1.9.1	Model for customer integration	61
3.1.9.2	Value definition	62
3.1.9.3	Roles in value creation - from object of flow to value creators	64
3.1.9.4	Process design without waste	67
3.1.9.5	Training and regular review	69
3.2	THEORY PROPOSITIONS	70
3.3	CONCLUSIONS	73
4	FOCUS INDUSTRIES AND CASE COMPANIES	75
4.1	FITNESS AND HEALTH INDUSTRY	76
4.2	HAIRDRESSING AND OTHER BEAUTY TREATMENT	77
4.3	THE CASE COMPANIES	77
5	METHODOLOGY	79
5.1	PARADIGM	79
5.1.1	<i>Critical Realism</i>	81
5.1.2	<i>Critical Realist Approach</i>	82
5.2	RESEARCH STRATEGY	82
5.2.1	<i>Action Research</i>	86
5.2.2	<i>The Role of Researcher's Values and Skills</i>	88
5.2.3	<i>Mixed Method Approach</i>	89
5.3	SYSTEMATIC LITERATURE REVIEW	91
5.3.1	<i>Source selection, search boundaries and keywords</i>	92
5.3.2	<i>Search results</i>	93
5.3.3	<i>Quality assessment</i>	94
5.3.4	<i>Meta-Synthesis</i>	95
5.4	CASE STUDIES	96
5.4.1.1	The goal of case research in this thesis	97
5.4.1.2	Addressing the Problem of Validity	98
5.4.1.3	Case selection	100
5.4.1.4	Multiple-Case Research Process	103
5.4.1.5	Conducting the case research	104
5.4.1.6	Data analysis	109
5.5	EXPERIMENTS	110
5.5.1	<i>Experiment on customer perceptions</i>	111
5.5.2	<i>Hypothesis formulation and experiment validity</i>	112
5.5.3	<i>Experiment design for propositions testing</i>	115
5.5.4	<i>Data analysis</i>	117
5.6	RESEARCH DESIGN LIMITATIONS	117
5.6.1	<i>Methodological limitations</i>	118
5.6.2	<i>Researcher Bias</i>	120
5.6.3	<i>Translation dilemma</i>	121
5.7	ETHICAL CONSIDERATIONS	123
5.8	METHODOLOGY SUMMARY	124
6	FINDINGS	126
6.1	CASE STUDY FINDINGS	126

6.1.1	<i>Case company A</i>	126
6.1.1.1	P1 – Matching value propositions of customers and provider	128
6.1.1.2	P2 – Roles in value creation can be identified	129
6.1.1.3	P3 – Perceive customers as value (co-)creators.....	131
6.1.1.4	P4 – Customer sphere is relevant in pure service environment	132
6.1.1.5	P5 – Turn portion of waste into value.....	132
6.1.1.6	P6 – Training of all parties enhances value creation.....	133
6.1.1.7	P7 – Effects of theory application on performance and value creation.....	134
6.1.2	<i>Case company B</i>	138
6.1.2.1	P1 – Matching value propositions of customers and provider	139
6.1.2.2	P2 – Roles in value creation can be identified	141
6.1.2.3	P3 – Perceive customers as value (co-)creators.....	143
6.1.2.4	P4 – Customer sphere is relevant in pure service environment	144
6.1.2.5	P5 – Turn portion of waste into value.....	146
6.1.2.6	P6 – Training of all parties enhances value creation.....	146
6.1.2.7	P7 – Effects of theory application on performance and value creation.....	147
6.2	CROSS-CASE PROPOSITIONS VALIDATION.....	154
6.3	EXPERIMENT FINDINGS.....	155
6.3.1	<i>Hypothesis testing</i>	156
6.3.2	<i>P3 – Perceive customers as value (co-) creators</i>	157
6.3.3	<i>Complementary findings</i>	159
6.4	SUMMARY OF FINDINGS	160
7	DISCUSSION	161
7.1	PROPOSITIONS VALIDATION.....	161
7.1.1	<i>Matching value propositions</i>	161
7.1.2	<i>Roles identification in value creation</i>	163
7.1.3	<i>Customers as value (co-) creators</i>	164
7.1.4	<i>Customer sphere</i>	165
7.1.5	<i>Waste into value</i>	166
7.1.6	<i>Training</i>	167
7.1.7	<i>Effects on performance</i>	168
7.2	THE ROLE OF APPLIED LEAN TOOLS.....	170
7.3	LINKING PATTERNS AND DIFFERENCES.....	172
7.4	VALIDITY CONSIDERATIONS	174
7.5	CONTRIBUTION OF RESULTS	176
8	CONCLUSIONS	177
8.1	INTRODUCTION.....	177
8.2	RESEARCH CONTRIBUTIONS.....	178
8.2.1	<i>Adjusting lean service theory and practice</i>	179
8.2.1.1	Insight 1: Value focus needs to be enhanced in lean service projects.....	179
8.2.1.2	Insight 2: A revised lean mindset for service operations is mandatory	181
8.2.1.3	Insight 3: lean tools need to be adjusted for application in service.....	183
8.2.1.4	Insight 4: lean principles need to be linked to different value spheres	183
8.2.2	<i>Lean service model for customer integration into lean service operations</i>	185
8.2.2.1	Value definition and matching.....	188
8.2.2.2	Roles in value creation.....	189
8.2.2.3	Efficient design for value	190
8.2.2.4	Training and regular review	191
8.2.3	<i>Effects on performance and value creation</i>	192
8.2.4	<i>Managerial implications</i>	193

8.2.5	<i>Theoretical implications and future research</i>	194
8.3	RESEARCH LIMITATIONS.....	195
8.4	RESEARCH SUMMARY.....	196
REFERENCES		199
ANNEX I SYSTEMATIC LITERATURE REVIEW CHARTS AND TABLES		211
ANNEX II MONTE CARLO SIMULATION EXAMPLE AND VALUE CREATION MAPS.....		220
ANNEX III PROCESS OBSERVATION SHEETS.....		223
ANNEX IV BLANK INTERVIEW PROTOCOL		232
ANNEX V EXPERIMENT QUESTIONNAIRE (EXAMPLE)		233
ANNEX VI REFLECTIVE COMMENTARY		235

Abbreviations

ANOVA	=	Analysis of variances
AR	=	Action Research
ATO	=	Assemble-to-order
CCR	=	Customer contribution ration
CCT	=	Customer contribution time
CIP	=	Customer interaction point
CT	=	Cycle time
C&A	=	Complete and accurate
C/O	=	Changeover
FTE	=	Full-time equivalent
HR	=	Human Resources
IPA	=	Interaction point analysis
JIT	=	Just-In-Time
KPI	=	Key performance indicator
MCS	=	Monte Carlo Simulation
MTO	=	Make-to-order
MTS	=	Make-to-stocks
OM	=	Operations Management
PCR	=	Provider contribution ratio
PCT	=	Provider contribution time
RQ	=	Research question
SDL	=	Service-dominant logic
SLR	=	Systematic Literature Review
TPS	=	Toyota Production System
TQM	=	Total Quality Management
VA	=	Value adding
VCM	=	Value creation mapping
VSM	=	Value stream mapping
WIP	=	Work-in-process
ZMOT	=	Zero Moment of Truth

List of Figures

Figure 1 A comparison between the nature and locus of the value-in-use and value-in-exchange concepts (Gronroos & Voima, 2013)	19
Figure 2 Value creation spheres (adapted from Gronroos and Voima (2013)).....	20
Figure 3 Joint and provider sphere in a restaurant (adapted from Gersch et al. (2011))	21
Figure 4 Purposes and characteristics of provider, joint and customer sphere	22
Figure 5 Future focus of service operations	37
Figure 6 Systems archetype for transactional service systems (Seddon & O'Donovan, 2010)....	46
Figure 7 Basic lean service model for customer integration into service operations	61
Figure 8 Future state value stream map of an outpatients' department –case example (Brophy, 2013).....	64
Figure 9 Value Creation Map example for outpatient's department.....	66
Figure 10 lean service theory, model and tools	74
Figure 11 Inductive and deductive theory building and validation adapted from (Carlile & Christensen, 2004).....	84
Figure 12 Process of sequential mixed methods research approach.....	90
Figure 13 Process of propositions formulation and validation	91
Figure 14 Pathway of study selection.....	95
Figure 15 Process of applied mixed methods in case studies	103
Figure 16 Framework of data gathering	104
Figure 17 Data of 1,000 occasions of MCS for machine training.....	107
Figure 18 Experiment: Pre-test example for public transports (translated into English).....	113
Figure 19 Experimental design with 6 groups and N = ~90 participants randomly assigned in 4:1 ratio to treatment and control groups adapted from Kirk (2012).....	116
Figure 20 Research design framework adapted from Creswell (2009)	124
Figure 21 Picture of customer workshop flip chart in company A	137
Figure 22 Utilization of training machines (act, max. and target value)	137
Figure 23 Debriefing elaboration of scheduling principle	145
Figure 24 Trend of potential turnover per hour from Jan to Sep 2014 (drawn from system data analysis)	149
Figure 25 Picture of customer workshop flip chart in company B	152
Figure 26 Chart of actual duration and in time ratios of 30 minutes applying old planning	153
Figure 27 Chart of recommended duration and in time ratios of 25 minutes applying new planning	153
Figure 28 Average customer ratings before and after treatment	157
Figure 29 Scores of all participants after treatment for fitness centre and hairdresser	158
Figure 30 Difference in value creation	173
Figure 31 Improved lean service model for customer integration into service operations.....	186
Figure 32 VCM Case Company A 'before'	221
Figure 33 VCM Case Company A 'after'	221
Figure 34 VCM Case Company B 'before'	222
Figure 35 VCM Case Company B 'after'	222
Figure 36 Mind map guide for CIPs Check-In / Check-Out in case company A	231

List of Tables

Table 1: Types of waste in manufacturing and services (Bicheno & Holweg, 2009; Ohno, 1988)	30
Table 2 Studies addressing ‘understanding demand’ part 1	48
Table 3 Studies addressing ‘understanding demand’ part 2	49
Table 4 Studies addressing ‘understanding demand’ part 3	50
Table 5 Case study characteristics overview	78
Table 6 Example for applied process observation sheet	106
Table 7 Case company A – overview of methods to propositions	127
Table 8 Cycle time calculation for CIP ‘Check-out’	130
Table 9 Value adding rating of company A ‘before’ model application	135
Table 10 Value adding rating of company A ‘after’ model application	136
Table 11 Case company B – overview of methods to propositions	139
Table 12 Cycle time calculation for CIP ‘Dressing Zone’	142
Table 13 Value adding rating of company B ‘before’ model application	150
Table 14 Value adding rating of company B ‘after’ model application	151
Table 15 Summary of propositions validation through case research	154
Table 16 Overview of experiment groups	156
Table 17 ANOVA analysis results for treatment and control groups	157
Table 18 ANOVA results for different services within treatment group	159
Table 19 ANOVA results for different locations and group types	160
Table 20 Overview of propositions’ status after findings	160
Table 21 Traditional vs. new lean mindset	182
Table 22 List of excluded studies	211
Table 23 Study familiarization characteristics	215
Table 24 Indexing and charting results	216
Table 25 Studies rated with ‘D’	219

1 Introduction

The concept of lean management is of great interest in both, managerial practice and scholarly debate. It was derived from the Toyota Production System (TPS) and also applied to other disciplines beyond manufacturing, e.g. services (Pettersen, 2009). As a result, a controversial debate among scholars and practitioners began whether lean is applicable to service organizations. Some authors argued that service characteristics possess fundamental differences and that production-line approaches cannot be transferred to service circumstances (Seddon & O'Donovan, 2010). In contrast, lean service supporters highlighted similarities between manufacturing and services and that production-line approaches had always been successfully transferred into service organizations (Bowen & Youngdahl, 1998; Swank, 2003). However, though the authors argued from contrary perspectives, they all agree that service characteristics need to be considered when applying proven methods and tools from other disciplines.

This is evident when looking at the authors' conclusions: Bowen and Youngdahl (1998, p. 223) highlighted that the 'challenge for both researchers and practitioners is to identify the appropriate mix of service and manufacturing technologies for creating customer value'. Seddon and O'Donovan (2010, p. 13) concluded that 'the development of frameworks and techniques to provide greater rigour to the field of service management remains both relevant and urgent'.

This thesis places high value on the need for improving lean from a service perspective. As one distinct characteristic in services is the inseparability of service provision and consumption (Magrath, 1986), the integration of customers is of great interest in service management (Gronroos & Voima, 2013; Johnston, 1999). To develop a model how customers could be integrated in a lean way, the value (co-) creation concept of Vargo, Maglio, and Akaka (2008) is considered in the following and synthesized with lean management theory. This concept suggests that value can only be created by the user, e.g. of a product. Providers may only contribute to value creation through their product or service provisions.

To clearly encompass all service characteristics with minor goods related 'distortions', the model developed in this thesis is tested within a pure service environment.

In order to enable a thorough understanding of the main concepts, this chapter outlines service management, value (co-) creation, as well as lean service history in the following.

1.1 Background of service management development

Services can be seen as crucial to global markets. 'They are everywhere, accounting for over 70% of economic activity in the European Union, and a similar (and rising) proportion of overall employment' (European Commission, 2010). Hence, service business is of tremendous importance in global economies just as it is in science. However, the term 'service' is quite generalized as it includes many different types of businesses, e.g. financial services, health care, product-related services like maintenance or repair of technical products and many more.

Service management as a distinct discipline in science, as well as in management education emerged in the 1950s. It became an intensive influence in science during the 1970s (Heineke & Davis, 2007). But at this time it was merely a 'radical voice' (Akehurst, 2008, p. 2) arguing about the differences between service and manufacturing operations. McDonald's can be seen as a pioneer of transferring proven production-line approaches to services in the 1960's. This initiated a movement of industrializing services in the following decades. Earlier than other disciplines, the marketing scholars started with distinguishing services from goods, as well as treating services as systems (Chase & Apte, 2007).

Brown, Fisk, and Bitner (1994) identified three stages of emergence within the services marketing literature. From their point of view, there was an early stage of 'Crawling-out' in the years between 1953 and 1980. During these years service management became an independent discipline and gained wide recognition, due to the fact that the 'tertiary sector' of a national economy had become more and more important in industrialized countries. Around 60-70% of total employees worked in the service sector. The authors also pointed that a key issue within this early stage was to intensify the 'goods versus services debate', which led to a clear borderline between goods and services marketing. The following 6 years (1980-1985) Brown et al. characterized as

'Scurrying About' stage, where scholars and professionals held conferences about services marketing. This was supported by a change within service firms, where the importance of marketing activities increased remarkably. Furthermore, the American Marketing Association organized conference series on this emerging topic. The subsequent stage the authors called the 'Walking Erect' (from 1986 – 1994) where they noticed a dramatic increase in publications, as well as the trend to address specific service business problems.

This framework was picked up by Johnston (1999) in his widely recognized article 'Service operations management: return to roots'. Johnston agreed on the presented perspective, but entitled the stages in a more dramatic way 'service awakening', 'breaking free from product-based roots' and 'service management era' and enhanced Brown et al.'s article by adding operations management aspects, e.g. like application of total quality management (TQM) (Wilkinson, Snape, & Allen, 1990) and just-in-time (JIT) methods in service operations (Duclos, Siha, & Lummus, 1995). Furthermore, Johnston described a fourth stage, which he called 'return to roots'. He mentioned that the outcome of stage one was the consensus that 'service is different'. Stage two brought up service specific 'conceptual frameworks' in different disciplines like human resources (HR), marketing and operations management (OM). These were however predominantly based upon manufacturing or production-line principles. Within the third stage the frameworks were empirically tested, whereas stage four refocused service management into the origin disciplines. Nevertheless, this refocus aimed at incorporating service specific aspects and has led to various service specific concepts in services marketing and operations management respectively (Canel, Rosen, & Anderson, 2000; Parasuraman, Zeithaml, & Berry, 1988; Shostack, 1977).

As a consequence of this trend, Vargo and Lusch (2004a) aimed at turning the goods-based marketing activities into a new logic called 'service-dominant logic' (SDL). The authors suggested rethinking all marketing activities from customers' perspective. They proposed distinguishing between 'value-in-exchange' and 'value-in-use'. Referring to Aristotle, value-in-exchange focuses on the physical components of a product and its value as a sum of its single ingredients. Whereas value-in-use considers the personal value of consumption (Vargo et al., 2008). Thus, this new concept was intended to

refocusing organizations from goods to services. Furthermore, the concept of SDL particularly addressed the role of customers in service operations and their integration into value creation processes (Gronroos, 2011). However, the traditional 'product-dominant-logic' had significantly affected organizations for decades. Ng and Briscoe (2011) pointed out significant problems in transferring organizations into SDL thinking. These problems particularly impede creating value in co-operation with customers (Gronroos, 2011). This is particularly relevant in relation to value co-creation and customer integration as discussed in the following section.

1.2 Value co-creation concept and customer integration

The overall concept of value co-creation is of great interest for marketing scholars. One major discussion is about clear definitions and classification of its single components value, value creation and co-creation (Gronroos & Voima, 2013). Aristotle debated about 'use value' and 'exchange value'. He argued that 'use value' is something quite individual, whereas 'exchange value' can be objectively defined, e.g. through the weight of a certain material (Fleetwood, 1997). Following this line of argument, any (individual) 'use value' can only be created through the service or product user. Thus, users are not only a pre-condition to generate value, but also an active part of this process (Vargo, 2008).

Though both ideas are about 2,800 years old, value-in-exchange dominated business and scholarly debates (Vargo et al., 2008). It is understandable that objective value definitions were preferred in order to be able to establish e.g. the monetary system. Through this journey it seems that value-in-use was largely ignored and led, even in services, to a monotype value definition that is 'embedded in firm output and captured by price' (Vargo et al., 2008, p. 145). As product-dominant-logic could not explain customer behaviour logically and exhaustively, re-consideration of value-in-use was necessary. Following SDL and value co-creation means questioning various common management approaches in nearly all business research fields, not only in marketing, but also in operations, or R&D. Traditional feature focus and technical innovations may be less important to customers, if their actual value propositions are not fulfilled by the

firm's offerings (Dahiyat & Al-Zu'bi, 2012). Furthermore, SDL questions traditional operational designs in manufacturing and service operations respectively. For instance, if products need to be customized extensively, new supply chain networks and approaches are necessary. One of such approaches is postponement, meaning that a neutral product is manufactured and customized in the last possible process step - sometimes even at the customers' site. This method has been applied to manufacturing, as well as to service organizations (Xiong, Juga, & Pekkarinen, 2012; Yang & Burns, 2003).

Whilst operations and supply chain scholars seek to find practical solutions to cope with customization, marketing scholars also address the theoretical part. Gronroos and Voima (2013) presented a model considering different spheres of value creation. The authors argued that in the past, value-in-exchange was created in a provider sphere. A series of value adding activities along the manufacturing process sequentially added value to a product. In the end, this product was sold to a customer. Afterwards, the creation of value-in-use began, which represents the customer sphere (see *Figure 1*). Value-in-use is created continuously over time by the customer (or consumer) along the lifecycle of the product.

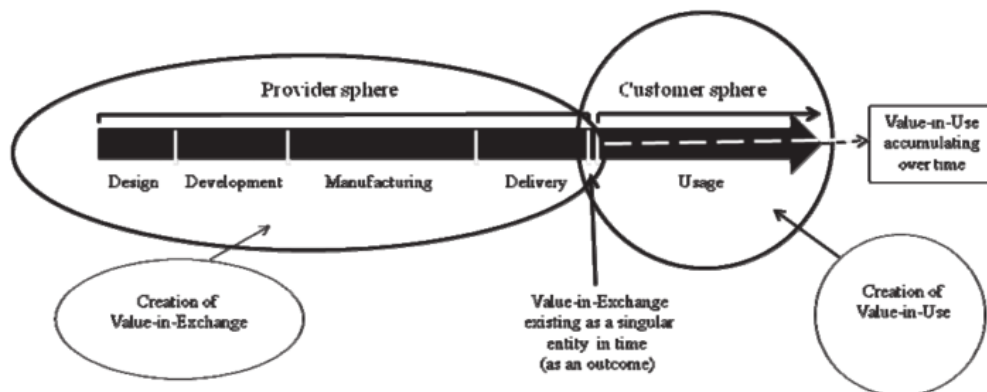


Figure 1 A comparison between the nature and locus of the value-in-use and value-in-exchange concepts (Gronroos & Voima, 2013)

Gronroos and Voima (2013) defined the value-in-use concept 'as an accumulating experience during the usage (or [provider's] resource integration) process' (Gronroos & Voima, 2013, p. 8). As the provider has control over the production, the customer has control over the value creation over time. Hence, value creation is less a single event,

but a longitudinal process that may be disrupted and is sporadically evolving (Vargo et al., 2008). This means that the provider is often not a constant part of value-creation, but a facilitator, either through providing products or through service provision. Hence, it can be argued that there is an additional sphere where customers and providers interact directly – the joint sphere (see *Figure 2*).

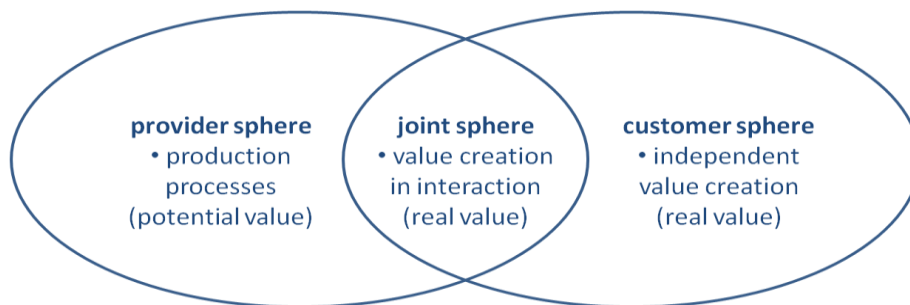


Figure 2 Value creation spheres (adapted from Gronroos and Voima (2013))

Through this figure the authors addressed the production perspective, where physical goods are made, sold and used afterwards. This model follows the SDL concept. It shows that the provider is never the creator of value. These are rather facilitator and co-creator, to support value creation of customers. For pure service business Gronroos and Voima (2013) presented a similar approach. But they additionally highlighted the aspect that no provider sphere exists due to inseparability of services. Therefore, the authors suggested distinguishing between direct and indirect interactions of customers and service provider through defining different roles. Within the direct interaction, or joint sphere, customers are either value creators or co-creators, whereas the provider is always co-creator of value. Within the indirect interaction (customer sphere) customers are in the role of creating individual value. This process should be supported by the service provider.

The mentioned irrelevance of provider sphere in pure services seems not logical. If we consider inseparability consequently, we would also have to argue that a customer sphere cannot exist. Thus, value in pure services would solely be created within the joint sphere.

In order to better understand the impact of value-creation theories on service operations, it is necessary to apply these ideas to a sample service business. Gersch, Hewing, and Schöler (2011) presented a business blueprint of a restaurant, where they allocated all activities in five different categories; interaction, visibility, internal interaction (provider), order related and non-order related activities. The authors placed a 'line of visibility' that could be seen as the borderline between the joint and provider sphere. Tasks like order placing or food serving were allocated to the joint sphere, whereas others like cooking or preparing food were allocated to the provider sphere (see *Figure 3*). In this example, the authors disregarded a customer sphere, where e.g. customers value the service experience afterwards.

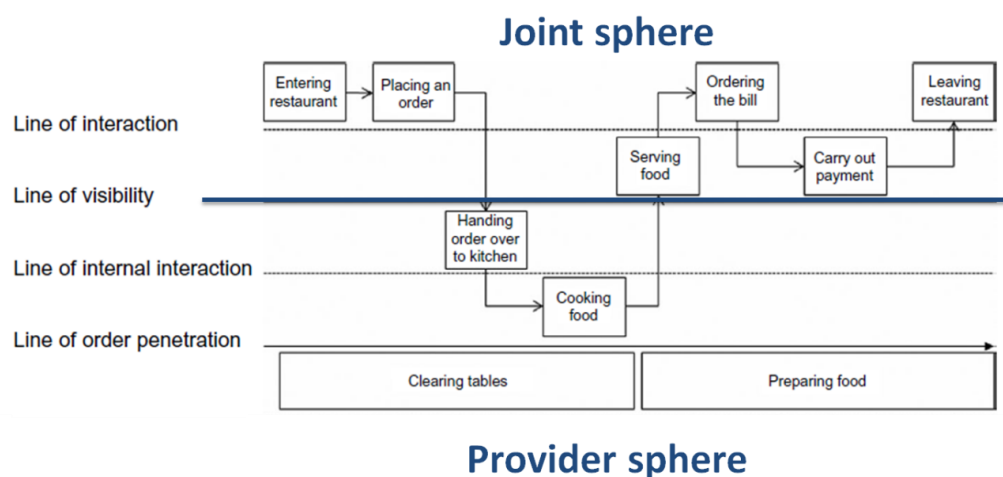


Figure 3 Joint and provider sphere in a restaurant (adapted from Gersch et al. (2011))

Though from a theoretical perspective it could be argued that in pure services value is created solely within the joint sphere, it would be a fallacy to assume that provider, as well as customer sphere could be disregarded. There seems to be a relevance of provider sphere, e.g. preparation of food, as well as of the customer sphere. However, these models show that there are significant differences in value creation aspects between the three spheres. Thus, this could be seen as a starting point for rethinking current service operations approaches. The theory of value co-creation represents a fundamental change in the value creation concept of manufacturing approaches seeking a high degree of homogeneity in value propositions (Vargo & Lusch, 2004b). From a value-in-exchange manufacturing perspective, the provider is able to create value independently from customers. This thinking seems to fail explaining value

creation in both, the joint and customer sphere. Thus, the roles of customers and firms have to be rethought thoroughly to identify implications on service operations. The above models aimed at explaining the nature and difference of value-in-exchange and value-in-use. But what can we derive from the models in regards to the development of service operations?

The definition of core purposes and characteristics of the three spheres may support a better understanding of what should be considered when designing operations within these spheres. *Figure 4* provides suggestions of purposes, main drivers and operational focus for each sphere.

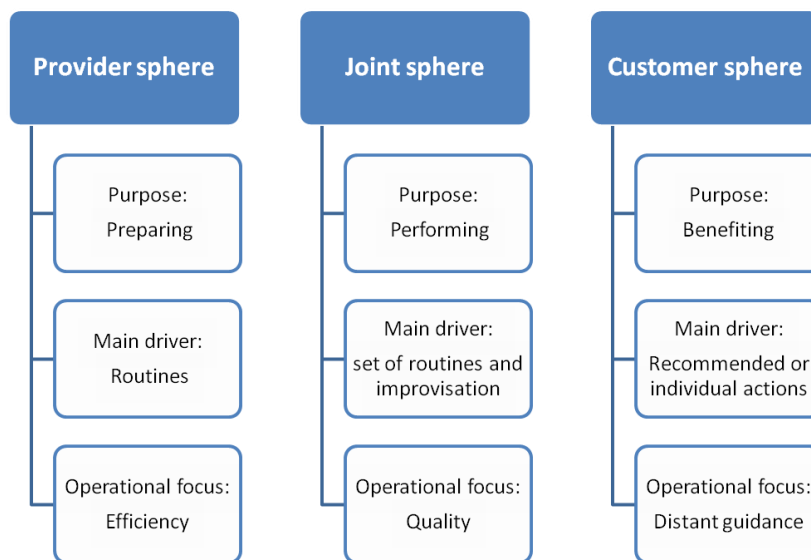


Figure 4 Purposes and characteristics of provider, joint and customer sphere

In line with Gronroos and Voima (2013) the figure displays ‘preparing’ as the purpose of provider sphere. This can be seen as either preparing products or service provisions. Though the authors denied the relevance of provider sphere in services, it can reasonably be argued that a preparation stage is also relevant in services, e.g. restaurants. Beside this, preparation could also mean setting-up necessary resources or training of staff. In this circumstance, routines play a significant role. Thus, it is relevant in any service provision. These routines, e.g. processes, should ideally be highly efficient and reliable. This was highlighted by various manufacturing, as well as service scholars (Johnston & Clark, 2008; Pettersen, 2009; Womack, Jones, & Roos, 1990).

Within the joint sphere, the provider 'performs' in terms of product or service provision. This is mainly based on established routines or improvisation, e.g. when unexpected customization occurs or handling exceptions is necessary (e Cunha, Rego, & Kamoche, 2009; Seddon & Caulkin, 2007). Here, the quality of products or service is of high interest. This is predominantly related to customer value perceptions rather than to functional and standardized quality aspects. 'The critical issue in the perception of relative homogeneity and heterogeneity is who is making the judgment. Fundamentally, standardization is concerned with quality [...] from the manufacture's perspective [...]. From the consumer's perspective, however, the issue is different' (Vargo & Lusch, 2004b, p. 329). Thus, quality can be seen as individual value and should therefore not be considered as something definite here. However, the operational focus should be to provide (individual) quality to customers.

Finally, the customer sphere is the place where customers 'benefit' from the products or services independently from the provider. These benefits could either be guided by the provider or be fully individual. Nevertheless, the provider should be interested in guiding value creation in that sphere in order to ensure positive customer perceptions and enhance customer loyalty (Fredberg & Piller, 2011; Sichtmann & von Selasinsky, 2010).

In conclusion it can be summarized that the concept of value-in-use denies any provider actions that do not aim at supporting and providing value to customers. Furthermore, value creation cannot take place without customer contribution in both service and product provisions. Without debating in detail the potential differences between manufacturing and service operations at this stage, it can be argued that each sphere fulfils specific purposes within the overall value creation process. This seems to be valid for service and product provisions. Thus, a model for customer integration needs to consider these purposes in order to develop appropriate solutions in service operations design.

1.3 Lean service history

Lean can be defined as a production practice that aims to minimize waste along entire value streams and create more value for customers (Andersson, Eriksson, & Torstensson, 2006; Brophy, 2013). According to lean principles, any use of resources that does not deliver consumer value is a target for change or elimination. This management philosophy has mainly been applied in manufacturing, notably in Toyota, and the Toyota Production System, from where lean originates. However, lean has also been widely applied in non-manufacturing areas (Swank, 2003; Womack & Jones, 2003).

To better understand the lean principles against a service background, it is necessary to get back to its roots. Ohno (1988) reported of the successful transformation of Toyota, coping with decreasing demand after World War II in Japan. Toyota had to change something as economies of scale through mass production could not be kept up without loss of profitability. New concepts were needed to successfully overcome emerging issues. Instead of mass production, Toyota followed the principle objective 'to produce many models in small quantities' (Ohno, 1988, p. 2). Following this idea, they subsequently invented holistic solutions for their problem over four decades. Beside concepts like JIT, a main focus was to involve workers and management actively in improving their operations (Ohno, 1988).

Recognizing the great success of Toyota through applying TPS in terms of quality, profits and innovativeness, it became of interest to scholars and consultants all over the world (Seddon & O'Donovan, 2010; Spear & Bowen, 1999). The idea was to scrutinize TPS aiming at making it adaptable also for other companies.

The term 'lean' was predominantly established by Womack and Jones (1996) through their book 'Lean thinking: banish waste and create wealth in your corporation'. From their perspective reducing wasteful activities systematically like Toyota did, would be beneficial to all organizations. The era of mass production was coming to an end. Waste elimination and thinking in value stream maps were discussed and explained extensively in literature. This should enable practitioners identifying all inefficiencies

along their manufacturing operations (Åhlström, 1998; Ben Naylor, Naim, & Berry, 1999; Hines & Rich, 1997).

Not only lean, but also TQM and six sigma have been derived from TPS (Andersson et al., 2006). In literature lean is often used synonymously with JIT or cellular manufacturing. All of these approaches follow a similar strategy of banishing waste and subsequently creating wealth (Alony & Jones, 2008). Overall it can be summarized that specific ideas, which were developed by Toyota, have been inherited and improved by scholars. However, it seems that agreed definitions of these concepts are absent. This 'divergence can cause some confusion on a theoretical level, but is probably more problematic on a practical level when organizations aim to implement the concept' (Pettersen, 2009, p. 127).

Since McDonalds applied mass production principles to their service operations in the 1960'ies (Levitt, 1972), it became a trend to apply manufacturing concepts also in services. The same has been done with lean. Amongst others, Bowen and Youngdahl (1998) and Swank (2003) recommended the application of lean in service companies without intensively debating service differences, as had been done particularly by marketing scholars (Gronroos, 1978; Parasuraman, Berry, & Zeithaml, 1991; Parasuraman et al., 1988). This lack of considering service specific characteristics strongly influences lean service thinking in theory and practice up to today. It already bears some major problems in applying a lean system to service organizations, e.g. not considering the effects of inseparability on lean operations. In the following, a series of lean implementations in service companies had been reported by various authors (Abdi, Shavarini, & Seyed Hoseini, 2006; Arbós, 2002; Carter et al., 2011; Staats, Brunner, & Upton, 2011). However, all these studies seem to contain theoretical and practical issues that are discussed within the next chapter more in detail.

2 Lean critique in theory and practice

Despite all the work conducted in the area of lean, there is no debate over the usefulness and usability of lean service. One of the tensions arises when trying to apply lean principles to intangible products. Some of these tensions are made evident by the examples below:

Radnor and Johnston (2013) argued that the UK government's lean transformation mainly focused on cost reduction without considering customer value. They claimed that lean service has been applied - by management - in the wrong way and that a new model is necessary to guide managers to the right starting point. However, they did not question the usefulness of the transformation. It seems that efforts are mainly put in adjusting lean principles to make them fit in non-manufacturing areas without debating about the real value of lean principles when applied to the service sector.

Burgess (2012) concluded, in her mixed-methods research of four case studies, that there is 'no firm evidence that lean implementation improves performance at an organizational level' (Burgess, 2012, p. 288). Nevertheless, she recommended that improvements should be measured at a local level and subjective perspectives should be included to support improvements. In spite of the inconclusive evidence from the study, the author recommended applying lean. It seems to be an assumption that lean manufacturing approaches work well in services and somehow scholars and practitioners do not tend to question this credo (Arfmann & Topolansky, 2014).

The above pitfall is partially discussed by Seddon and O'Donovan (2010) who argued that lean service must be rethought due to inappropriate management assumptions to work on costs and worker activities instead of managing systems and values as Deming (2000) proposed. They also pointed out that the concept of failure demand needs to be taken into consideration. Failure demand is defined by Seddon and Caulkin (2007, p. 17) as 'demand caused by a failure to do something or do something right for the customer; it is the consequence of poor service design'.

Seddon and Caulkin (2007) suggested combining the ideas of Taiichi Ohno with systems thinking instead of command and control management behaviour. These considerations may challenge current assumptions regarding the value of lean service.

There may be alternative ‘better’ practices than current lean service approaches to improve the outcomes of streamline service organizations.

2.1 Arguments for breaking free from lean service transformation

In this section lean principles and their applicability to service organizations is discussed.

2.1.1 Argument 1: There is no lean service

More than 127,000 results were retrieved from Google Search by using the search term ‘Lean service operations’. Articles, consulting agencies, presentations, workshops and many more sources aim at explaining to the reader what lean service is and how to lean service operations. Dozens of success stories and white papers refer to cases with practical use of lean approaches in services. These were also reported by service management or operations scholars (Arbós, 2002; Piercy & Rich, 2009; Teehan & Tucker, 2010). Interestingly, ‘there is a clear theoretical gap when it comes to defining and profiling the conceptual framework of lean service [...] with little empirical support’ (Suárez-Barraza, Smith, & Dahlgard-Park, 2012, p. 368). Furthermore, these authors found that lean service is used in the literature as a conglomerate of different approaches like TQM, lean thinking and application of single lean methods or tools. This issue seems to be inherited from lean manufacturing as similar problems occur in this subject’s literature (Pettersen, 2009). Hence, it seems that service managers and scholars rigorously followed recommendations by Bowen and Youngdahl (1998) that ‘manufacturing logic has and, even should still, transfer to service operations’ (Bowen & Youngdahl, 1998, p. 207).

When ideas, frameworks, models are adapted, shortcomings as well as benefits are transferred. These benefits are what the success stories were about. But as there seems to be no lean service framework, it is reasonable to ask if it is really lean transformation, the application of single lean tools and methods or something else that creates observed performance improvements. Returning to lean’s roots may provide

an answer to this fundamental question. At this stage, it is at least questionable if something like lean service really exists.

2.1.2 Argument 2: lean effects in services are misinterpreted or invalid

There are similar approaches to lean such as TQM and six sigma (Andersson et al., 2006). All of them come from the same origin the Toyota Production System. Ohno (1988) argued that the major reason for developing this system was extremely low demand, in Japan, during the postwar period. The fundamental change of these approaches was the idea that instead of 'pushing, their products onto the market [...] customers, or users, [...] pull the goods they need, in the amount and at the time they need them' (Ohno, 1988, p4). This represented a new radically different mindset, or paradigm, than a simple idea. This pull concept seemed to be a kind of North Star for Toyota and all further activities were derived from it. One of the aims of demand-pull was to minimize inventory and eliminate non-value-adding work at all levels of operations and hierarchies (Womack et al., 1990).

Though Ohno (1988) strongly advised against codifying the methods Toyota invented and implemented through its journey of becoming an example of a high quality and efficient organization, various scholars recommended to do so (Bowen & Youngdahl, 1998; Marr & Neely, 2004; Spear, 2005; Staats et al., 2011; Womack & Jones, 1996). Their argument was that codified lean methods 'create wealth for your organization' (Womack & Jones, 2003). In contrast to these success stories, when scrutinizing such studies 'it cannot be said (as does Spear, 2005), that the [...] organisations which were studied work 'like Toyota'' (Suárez-Barraza et al., 2012, p. 369). However, even if they are not lean in the Toyota way, there is still profound evidence provided that operations in the case studies actually improved. Why should these inconsistencies be problematic?

The problem is that service scholars report about improvements in performance that they seem to be unable to grasp and explain in a sufficient manner. As Burgess (2012) concluded a lack of evidence to support positive effects of lean transformation on organizational performance the question is: what really caused these effects if not lean

transformation? The answer could be that the attention on particular problems and the willingness of management to understand the underlying reasons and mechanisms led to actions that helped to improve the business. For instance, Ohno sent his managers to the shop floor for several weeks to study and understand production processes. Hence, their further actions were based on reasoned choice and enabled significant improvements (Ohno, 1988). Therefore, it may be considered that it is not knowledge about lean methods, tools or even transformation processes that help organizations to improve their performance. It is knowledge about daily business reality that counts and enables managers to take actions that really improve their performance (Seddon & O'Donovan, 2010). This is often described as lean methods application to service. However, this has nothing to do with pull concepts or waste reduction. It may simply be called operations knowledge.

2.1.3 Argument 3: lean scholars lost sight that service is different

A framework that aims at improving the efficiency of service organizations must consider the key five characteristics of services: intangibility; perishability; inseparability; variability and lack of ownership (Gronroos, 1978; Parasuraman et al., 1988; Vargo & Lusch, 2004b). It is a fallacy to assume that a model developed for the manufacturing sector can be applied and work in services. Here lies one of the problems of lean service (Johnston, 1999; Seddon & O'Donovan, 2010). If something in the codified lean concept does not fit into service operations, it is subtly turned into something completely different but still labelled as lean. This is evident when looking at the 7 types of waste in manufacturing and services described below by Bicheno and Holweg (2009) (see *Table 1*).

7 types of waste in manufacturing	7 types of waste in services
Overproduction of goods not demanded by customers	Duplication like re-entering data, repeating details on forms and similar
Time on hand (waiting) for the next process step, machine, or similar	Delay in terms of customers waiting for service delivery
Transportation of goods that is not necessary to create value	Lost opportunity to retain or win customers by ignoring them, unfriendliness or similar
Processing itself like unnecessary (quality) inspections within the process	Unclear communication with customers or internally leading to clarification circles
Stock on hand (inventory) that are simply waiting for further / future needs	Incorrect inventory being out of stock and hence not able to deliver
Movement of workers that is unnecessary is it does not add value to the product	Movement in terms of handing over orders, queuing customers several times and similar
Making defective products that cannot be sold or have to be reworked	Error in the service transaction including product damages in product-service bundle

Table 1: Types of waste in manufacturing and services (Bicheno & Holweg, 2009; Ohno, 1988)

Interestingly, some types of waste - such as inventory – were interpreted in opposite ways for the manufacturing and service sector respectively. In manufacturing, any unneeded stock was classified as waste while in service the waste was being out of stock. Why this opposite point of view? Is service striving for more ‘inventory’ to cover demand? Would this be in line with lean principles? As services cannot be stored like goods, it is essential when offering a product-service bundle to be able to deliver spares to field engineers. If an organization fails to deliver both resources in time, the service cannot be provided and a waste of capacity occurs. Hence, waste of being out of stock is comprehensible, but again, is this really lean? These kind of inconsistencies at a theoretical level create challenges to those organizations that aim at implementing lean (Pettersen, 2009). Lean services fail to address the challenges of the service sector because it is a concept originally developed for another sector. Lean services seem to fail in acknowledging the differences between services and manufacturing organizations.

2.1.4 Argument 4: From push to pull has no relevance in services

As already discussed, TPS brings new ways of thinking to the manufacturing sector. One of its core ideas is that goods should be pulled through the supply chain. If applied correctly, TPS has the potential to create financial benefits and increase productivity by reducing, or even eliminating, all work-in-process (WIP) inventory (Ohno, 1988).

The idea of moving from push to pull has proved beneficial to manufacturing companies in different industries (Womack et al., 1990). But how relevant is this concept when analyzing the service sector? In order to answer this question, it is necessary to refer back to some of the characteristics of service such as perishability, inseparability and heterogeneity. It is clear when considering these characteristics that pull processes are key in a services business. Interestingly, service management never labelled it 'pull'.

Service organizations cannot produce and store products to be sold at a later stage, though they would appreciate having this option. Therefore, it is a matter of capacity management and how to deal with variety in volume and type of demand (Johnston & Clark, 2008). This implies that many service managers have already applied some of the principles of 'pull'. If service managers are now told to work in a pull concept, what would they do? It would be like trying to reinvent the wheel. It is important to notice that services in general are pulled and the challenge faced by this sector is how to 'push' some portion of their capacity into markets in order to be more efficient and, at the same time, not trade off quality.

Summarizing, pull has already been adopted by service organizations. The difficulty lies in pushing services into markets in order to increase efficiency in terms of utilization and in-time delivery. The fundamentals of lean, developed to address the issues faced by the manufacturing sector, do not compensate some of the challenges faced by service organizations. Therefore, it is questionable whether lean should be transferred from manufacturing to services.

2.1.5 Argument 5: lean service thinking ends in organizational boundaries

It can reasonably be argued that the research conducted by Seddon and O'Donovan (2010), on lean services and their approaches to overcome barriers, would have benefited from widening their perspective beyond organizational boundaries. Their focus is set, as in most lean guides, on the internal service system (Brophy, 2013). Customers are encouraged to express what they want and to provide quality feedback from this system. According to Seddon and O'Donovan (2010), the organization is trained to address the predictable and unpredictable value demand as efficiently as possible.

The above approach with a focus only on the internal organization has led to create inefficiencies. If the discourse on lean recognizes these inefficiencies it would be advisable to also explore inefficiencies in the external environment. Perhaps the mindset that 'customer is king' (Harris, 1991) should be critically analyzed in a service context. This is not to say that customers' wishes should not be considered in the process. On the contrary, this thesis even suggests that 'Lean service' may consider training customers in order to support efficient and reliable value creation. However, this is not a novel concept. The idea of co-creation has been extensively discussed by service marketing scholars (Vargo et al., 2008).

Lean origins in TPS assume that customer input is correct. It is seen as a kind of constant in an equation. It is never questioned by lean operations theory, neither in manufacturing nor in service. This could be another flaw of the theory when applying it to service organizations. As customer co-creation is a fundamental truth and pre-condition in the majority of service operations reality, it would be negligent not to consider it.

2.2 Fields for further research

The above discussion indicates that lean principles, grounded on TPS, need to be rethought before applying them to services as a lean service system. Some of the ideas of TPS were developed to meet the challenges faced by manufacturers in a low demand environment. It is wrong to assume that concepts developed in a different

context will work in a service environment. There are ideas developed by scholars (Ohno, 1988) that may help service organizations to achieve the objectives that lean fulfil for manufacturing firms. This is not to say that lean has no room within the service industry. Some of the ideas developed by lean may help the services to improve quality and cost efficiency.

However, these concepts and methods have to be integrated to a framework that addresses the challenges of service environment. And most importantly, it should be free from manufacturing dogmas. In the next section, some potential areas for future research are evaluated against the background of lean service.

2.2.1 Consider agreed service characteristics

The preceding discussion suggests that an alternative method to TPS should be developed to fit the characteristics of service organizations. In doing this, the roots of service management must inform the development of the system (Johnston, 1999, 2005). Such a system should focus on customer value, consider service characteristics, eliminate waste and consider the pull-push approaches. A good example to inform the development of a new framework would be the failure demand concept discussed by Seddon (2005). It addresses a major type of waste in service organizations and is quickly adaptable in practice. It also contemplates one of the important characteristics of services such as heterogeneity enabling service providers to deal with variety.

Other service characteristics may be addressed in different ways. Perishability, for example, could be addressed by postponement, a concept that has been used in several supply chains (Choi, Narasimhan, & Kim, 2012; Xiong et al., 2012; Yang & Burns, 2003). It may also be addressed through pushing services into the market and increasing the WIP of planned activities waiting for activation when capacity is available. These activities must be agreed with customers as they are part of service creation.

The intangibility and non-ownership characteristics of services provide opportunities for further research. Though intangibility could raise disadvantages, tangibility often is

a limiting factor in distribution (Vargo & Lusch, 2004b). Further research is necessary to reveal its effects on an improved service operations or system thinking framework.

Inseparability could be seen as a key factor of services. In order to improve value demand, quality and efficiency the concept of co-creation should be linked to service operations management. How could customers be integrated in a way that is beneficial to both, providers and users? There seems to be a huge lever as lean theory up to now mostly disregarded this aspect.

2.2.2 Understand positive effects of lean methods and tools

This review indicates that the application of lean tools to services can sometimes generate specific positive effects. There are examples where value stream mapping has revealed areas for improvement (Arbós, 2002), Kaizen practices have helped to eliminate waste (Piercy & Rich, 2009), and a change in call centre agents behaviour created superior quality (Etherington, 2008).

Future research should seek to improve and validate these methods. In order to do this, scholars and managers must be clear about what they want to achieve and what method will help them to fulfil their objectives. It might often be beneficial to apply already proven models and practices (Harré, 2008). However, it is important to understand the principles that underpin a model, for what purpose it was invented and how this fits to the given situation in service environment.

Key performance indicators (KPI) often indicate things that managers were taught to be relevant, e.g. like utilization of call centre agents. Hence, there is a need for a practical guide that would enable managers to learn about their organization.

2.3 Scope of the thesis

The presented arguments based on literature indicate that there is a lack of debate and understanding about the real value of lean principles when applied to service organizations. There seems to be a strong belief that a principle derived from the

manufacturing industry works in a service context (Bowen and Youngdahl (1998). Because of this assumption, not many have challenged this dominant discourse to the point of even ignoring contradictory findings (Burgess, 2012; Radnor & Johnston, 2013).

A closer look upon lean history revealed fundamental differences between manufacturing and service operations environments. The answers Toyota found for their operations problems through the development of TPS or lean do not provide an answer to many of the challenges faced by service organizations. The principles do not necessarily work because service is different in push and pull practice, in the inability to store capacity, in the value creation process and especially in the variety of demand.

In order to find a better way to streamline service operations, this thesis addresses the service specific characteristic of inseparability. The value creation processes with customers as value (co-) creators need thorough attention when looking at the specific differences between manufacturing and services.

This thesis explicitly addresses the topic of service operations and does not cover all aspects and facets of a service encounter or service delivery in general. Thus, this thesis provides an operations perspective on different value creation spheres with and without customer interaction, as well as on the value creation processes within pure service organizations.

2.3.1 Focus areas

This thesis addresses three major aspects for changing the current lean service thinking in terms of inseparability. Approaches for overcoming current issues are suggested, discussed and further explored. These are:

1. Service operations design should not only consider the provider and joint sphere, but also the customer sphere. It can be seen as beneficial to expand focus beyond internal processes to integrate customers as value creators into service operations.
2. A distinction between functional and emotional value is proposed and further explored. It seems that the term 'value' is used as conglomerate of various

meanings trying to address what matters to customers or what they are willing to pay for.

3. To rethink 'value' appropriately, the meaning of its negative: 'waste' needs thorough attention accordingly. It is most likely that a revised perspective on value leads to necessary adjustments of e.g. lean categories of waste.

2.3.1.1 Provider, joint and customer sphere

Lean principles have been applied to various sectors like healthcare, banking, public sectors, restaurants, higher education and many others. The main focus however was twofold. Either practitioners or scholars aimed at systematically reducing waste within the organizational processes, or they focused on creating flow through levelling capacity along the process steps (Suárez-Barraza et al., 2012). In contrast to this, TQM and Total Customer Service address the quality of a service in relation to customer expectations (Andersson et al., 2006; Wilkinson et al., 1990). It seems that customer expectations have been formulated in a one-way direction; from customers to the service provider. The provider afterwards defined how to achieve the attributes, often formulated in statements like '[our] aims were to achieve the best quality products with excellent customer service' (Wilkinson et al., 1990, p. 292), or '[Lean] capability is about the elegance to do more with less, to ensure exceptional outcomes with intellect and ingenuity' (Brophy, 2013, p. 46). Both studies follow the idea that 'fundamental to a lean Approach is the determination of customer value then aligning the operational processes to deliver it in a coordinated and efficient way' (Radnor & Johnston, 2013, p. 10). This pathway is suggested by Womack and Jones (1996), first define value, then arrange operations accordingly. However, these concepts do not consider the diversity of individual value proposition. Here lies one of the major problems as lean seeks to reduce complexity in order to achieve highly standardized processes without wasteful activities (Seddon & O'Donovan, 2010).

Radnor and Johnston (2013) pointed that without a thorough value definition, streamlining processes is not effective. The authors also identified that service practitioners seem to fail in defining value when applying lean. This is understandable

as current way of lean thinking is not able to overcome barriers of value diversification. In order to overcome these threats, Seddon and O'Donovan (2010) recommended replacing standardized, or even automated, process steps by highly trained people. This could enable the service system to cope with exceptions and variations from standard procedures. This seems to be in conflict with the principle of 'flow', where variation (Japanese 'mura') is explicitly defined as waste and to be eliminated. Further it is also focused on the internal organization, not considering co-creation. Hence, lean service perspective needs to be expanded. It seems necessary to go beyond the joint sphere as proposed by Gronroos and Voima (2013). The authors pointed that without considering customer sphere, the whole potential of value co-creation cannot be streamlined. Therefore, it is essential when applying lean in service operations to cover also pre- and follow-up activities in customer sphere that may play a significant role in value creation. The recommended focus for this study is presented in *Figure 5*.

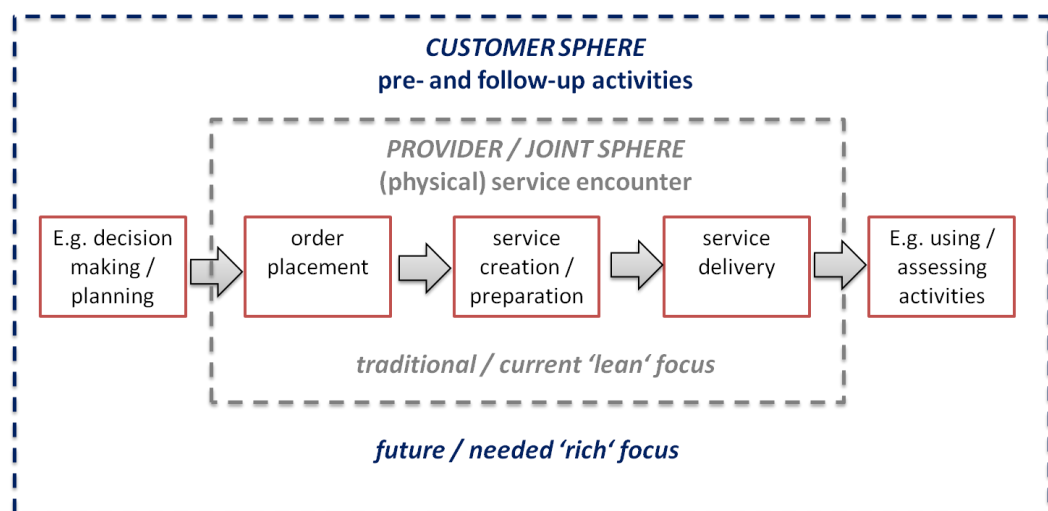


Figure 5 Future focus of service operations

The figure illustrates a sample service process with five process steps. Two of them, the pre- and follow-up activities, are in the customer sphere. The remaining steps take place at the service encounter. Customer sphere process steps could be seen as crucial for service quality perception by customers (Gronroos, 2011; Gronroos & Voima, 2013). But these steps could also be beneficial from an operations perspective. The decision making and planning activities of customers have tremendous effects on demand occurrence. Hence, interacting with customers at this early stage may enhance transparency for capacity management (Johnston & Clark, 2008). There are similar

approaches already applied in other disciplines such as ‘demand and supply integration’ in Supply Chain Management (Esper, Ellinger, Stank, Flint, & Moon, 2010; Stank, Esper, Crook, & Autry, 2012).

2.3.1.2 Functional and emotional value

Another important aspect is to distinguish between functional and emotional value for customers. Functional value means predominantly the logical and practical value of a service, whereas emotional value refers to personal experience of a service (Ng & Briscoe, 2011). Current lean practice solely focuses on functional value, due to its origin in product manufacturing. This does not mean that marketing scholars disregarded this aspect from a product perspective, but it is largely ignored in operations management, especially in lean manufacturing (Seddon & Caulkin, 2007). Considering emotional value may be seen as a major part in enhancing current lean practice. Furthermore, lean service operations should be enabled to cope with variety in individually perceived value. Therefore, the current lean service theory and practice needs to be adjusted. This is already adopted in other fields, especially service marketing (Mattsson, 1992; Vargo & Lusch, 2004a).

2.3.1.3 From unavoidable waste to value

Another major aspect is to think about transforming certain types of unavoidable waste into value through co-creation. Following current lean, there is no other option than banishing waste. If it is not possible to remedy waste quickly, it should be done in the near future (Brophy, 2013). Following lean scholars like Bicheno and Holweg (2009), there are seven or more categories of waste in service organizations. One of them is ‘customers waiting for service delivery’. Hence, lean seeks to banish any waiting situations. Nevertheless, often wait times cannot be totally avoided (Marr & Neely, 2004; Seddon, 2012). In the lean paradigm this is simply waste, but from a value co-creation perspective this could be a chance to add value, e.g. when the customer ‘resource’ is not fully utilized. Instead of waiting, customers could be engaged in creating individual value. For instance, they could paint their individual

paper cup, while waiting for their coffee to-go. Such things could enhance emotional and functional value. In a model for customer integration, unavoidable waste should be addressed explicitly to also consider any potential transformation into value.

2.4 Research purpose

The purpose of this thesis is to explore the implications of value co-creation on lean service operations. Considering that only customers are able to create value and that customer individual value propositions increase in markets, the integration of customers into service operations becomes more and more important. Customer integration should be investigated by applying and enhancing lean principles. Therefore, core lean principles are assessed against their validity in service business. Afterwards, these are adjusted, if necessary. The overall goal of this study is to develop and test a model to integrate customers into service operations in a lean way, considering value co-creation theory.

2.5 Research questions and objectives

Considering the purpose of this study, the following research questions are derived to address the overall goal:

RQ 1: How can customers be integrated into service operations in a lean way?

RQ 2: What effects result from lean service customer integration on customer service and operational performance?

The underlying research objectives are set as follows:

- To describe a lean specific service theory as conceptual framework
- To develop a model and methods for customer integration based on lean service theory
- To test the theory propositions and model implementation in real market conditions

- To determine main effects of model application on value creation and customer service
- To measure the effect of model application on operational performance

3 Literature review

The goal of this section is to develop a framework to enable customer integration into service operations, in order to streamline not only the internal (firm) but also the external (customer) system addressing RQ1: “How can customers be integrated into service operations in a lean way? “

Objectives are to systematically review current literature on customer integration and co-creation methods. Furthermore, this section aims to develop a potential model for customer integration considering lean theory and service characteristics.

In the following, findings of the systematic literature review (SLR) are presented. A detailed outline on SLR method in terms of sources, search boundaries, quality assessment and meta-synthesis is provided in the methodology chapter (5.3).

3.1 Findings

The findings are presented following the ‘framework’ process. In the first section there is a familiarization with the studies and the data followed by identification of a thematic framework. Then, the data is indexed and charted. Finally, the charts are critically discussed and a model is presented to summarize the findings.

3.1.1 Study Familiarization

Selected studies were generally from two different research fields, namely marketing and operations management. 16 studies were addressing marketing topics, whereas 11 studies covered operations problems or questions. Marketing studies focused on product or service innovation and development, lead user identification or web 2.0 applications. One study investigated the service experience of customer groups in different social settings (Finsterwalder & Kuppelwieser, 2011). Operations management studies primarily addressed business process modelling or mass customization as specific methods or themes. Except one, all studies were published at least one year after Vargo et al. (2008), what indicates a research design of all studies, which is directly related to their work. However, 18 of 27 studies did not refer to this

work at all. From operations management, all studies that were addressing mass customization, as well as 12 out of 18 marketing studies did not reference directly to the work of Vargo et al. (2008).

Most studies (15) applied case study research design. Between one and 10 companies participated in these case studies from around 10 (Andreu, Sánchez, & Mele, 2010; Schaarschmidt & Kilian, 2013; Watcharapanyawong, Sirisoponsilp, & Sophatsathit, 2011) up to 23,000 participants (Füller, Hutter, & Faullant, 2011). 5 of the studies did not mention the number of participants in their case study. The predominantly applied methods in the cases were surveys or questionnaires (15) and interviews (18), either exclusively, or in combination with other methods. Document analysis was applied in 8 studies as a common method supporting the case studies. Belz and Baumbach (2010) designed a non-participatory netnography research approach and Franke and Schreier (2008) applied experimental testing in their study about lead user identification. Overall, selected studies were a homogenous mix of quantitative and qualitative research designs and mixed-method approaches.

Though all studies sought to integrate customers, the degree of involvement clearly diverged. Considering categories of customer involvement suggested by Fredberg and Piller (2011), marketing scholars solely proposed methods for customer co-creation in terms of 'design by customers' (mode 3). Whereas operations management studies predominantly addressed 'design for or with customers' (mode 1 and 2). The level of integration in mode 3 methods was significantly higher than in mode 1 or 2. Furthermore, 12 studies considered not only the joint sphere, but also the customer sphere in their conceptualizations. Three of them were operations management and 9 marketing studies.

From the familiarization with the studies three main aspects should be considered in the following. First, co-creation is not only of great interest in the area of marketing, but also in operations management. Second, the direct influence of the work of Vargo and Lusch (2004a) and Vargo et al. (2008) on value co-creation is limited as 55% of operations studies and 69% of marketing studies have no direct reference to their work. Hence, both concepts of value co-creation, as well as the SDL cannot be

recognized as directly linking concepts for co-creation research. As indirect links have not been assessed, these cannot be ruled out. However, the idea of co-creating value was shared amongst all studies. Therefore, a meta-synthesis could be conducted. Third, operations management scholars predominantly discussed co-creation within mode 1 or 2. This means that a design beyond organizational boundaries was merely considered. This provides further evidence to the argument, that current lean (service) operations concepts end in organizational boundaries. All discussed characteristics are shown in *Table 23 (Annex I)*.

3.1.2 Thematic Framework

The thematic framework builds the basis for subsequent analysis. According to Ritchie and Spencer (1994) it is indispensable for the researcher to be open minded in regards to themes and issues arising from the data. As the thematic framework is key in meta-synthesis, applied criteria need to be reasoned thoroughly (Downe, 2008).

As this thesis aims at enhancing current lean practice by customer integration, it is comprehensible to start with traditional lean principles. Brophy (2013) argued that 'lean is based on five principles [...] [which] are supported by two pillars called continuous improvement and respect for people' (Brophy, 2013, p. 10). The principles are *purpose, system, flow, perfection*, as well as *people*. These are briefly explained in the following according to Brophy:

Purpose means that all lean activity should enable an organization to prosper. Therefore an in-depth understanding of customers' implicit and explicit needs is necessary through all organizational levels.

System is seen as a set of integrated and dependent elements collaborating to fulfil a certain purpose. The system is regularly changing, interacting and continuously improved. Without considering system's complexity, unintended side-effects of improvements may counteract the desired outcomes.

Flow generally means to focus on adding value without wasteful activities (*muda*), high variations in the processes (*mura*), and any overburden (*muri*) of resources.

Perfection is a central ambition of any lean thinking organization. Though it cannot be fully reached, it is the constant goal in order to ensure continuous improvements towards an ideal state.

People are seen as the core driver of lean in organizations. People should be motivated intrinsically and play an active role in daily problem solving, as well as in waste reduction activities.

These five principles can be seen as the core elements of any lean activities. Thus, the thematic framework should be set up accordingly. However, the principles are defined too general to merge them into a framework without providing more detail on it. Furthermore, it is important that service characteristics are considered in the conceptual framework.

A controversial discussion about the application of lean in service circumstances was provided by Seddon and O'Donovan (2010). It follows the idea of returning service to its roots and developing a service specific way of (Lean) operations (Johnston, 1999, 2005). The authors pointed that service is specific and that service has to be captured as a system. In his book 'Out of the crisis' Deming (1982) highlighted the systems thinking approach. He argued that management should focus on working on systems' improvements. Thus, managers should not think in isolated disciplines or silos, but understand the flow of work through their organization in order to achieve tremendous improvements. His work significantly influenced the work of Japanese managers (Deming, 2007).

A core idea of Taiichi Ohno was to establish a system that is strictly customer demand orientated and increasing 'production efficiency by consistently and thoroughly eliminating waste' (Ohno, 1988, p. xiii). Nevertheless his approach, originally, was not to invent methods making managers work on efficiencies. He wanted his managers to understand the roles of each working area, in order to identify causes for waste and banish these afterwards. Thus, this approach is not driven by methods, but by understanding a system and its core purpose. Furthermore, Ohno argued that 'standards should not be forced down from above but rather set by production workers themselves'. These standards 'should be thought of not only as production

department's standards but also as top management's' (Ohno, 1988, pp. 98-99). In this sense, standards should be established bottom-up considering organizations specific conditions. Hence, standards could never be exactly the same in other organizations.

TPS highlighted the meaning of workers as a source of improvement. In contrast to this idea of managing flow and systems the command and control leadership practice seeks to top down control and improve isolated actions (Seddon, 2005). As TPS was invented as a system, service should be treated as a system as well. Nevertheless, codified lean methods, derived from TPS, should not be adapted to service organizations without considering their original purpose. It is important that purpose defines measures and afterwards necessary methods – and not the other way round (Dunnion & O'Donovan, 2012). Thus, future lean service should establish systems thinking on all levels of hierarchy and closely be linked to demand. Furthermore, it should lead to individual measures with individually adaptable methods (Seddon & O'Donovan, 2010).

The core paradigm behind the system thinking approach can be summarized as follows:

1. Managers and workers must understand service as a specific system
2. Standards should be set bottom-up and hence are individual
3. Methods and tools depend on their purpose
4. Managers can only initiate and facilitate improvements and change

Following this paradigm Seddon and O'Donovan (2010) provided a systems archetype for transactional service systems (*Figure 6*). The authors argued that there are three steps to be considered to create an efficient service system. First, demand has to be understood thoroughly by type and frequency (addressing lean principle *purpose*) and put into work as a single piece flow. This could either be resolved at once, or is put further into subsequent processes (addressing *system and flow*). The authors pointed that it is essential to train staff against high frequency predictable value demand and provide support to them in terms of knowledge (addressing *people*). It is also important that performance measures are set in order to ensure improvements and learning cycles (addressing *perfection*). The presented archetype considers all of the mentioned

five lean principles and was specifically designed for service. An important improvement of this model is that high variation in demand (complexity) is accepted and should be resolved or 'cleaned' within the first contact – described as 'prevention'.

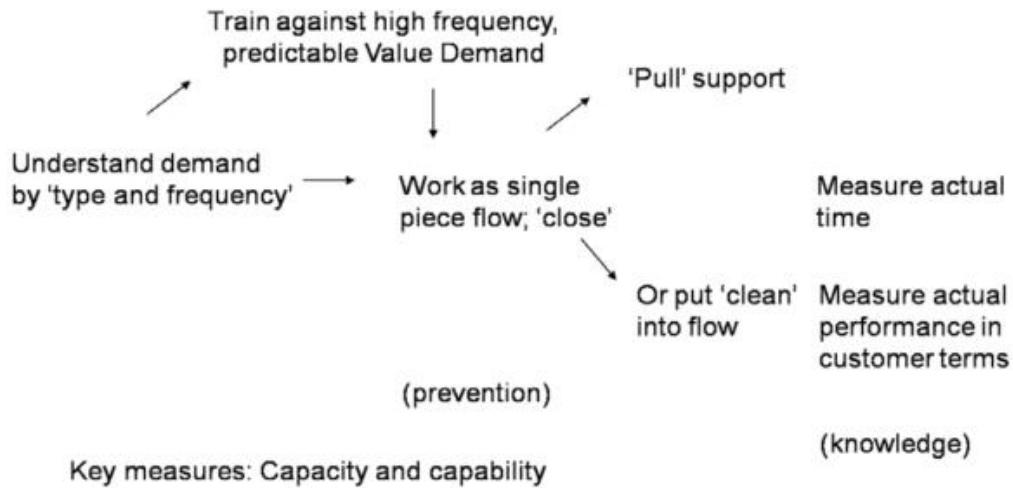


Figure 6 Systems archetype for transactional service systems (Seddon & O'Donovan, 2010)

As this framework was originally designed for the internal service system only, this thesis expands the perspective also considering customer sphere. Hence, each step has to be co-created. Therefore four criteria are considered in the following:

1. Understand demand in terms of type and frequency
2. Create single piece flow and routines
3. Train staff and customers against demand
4. Ensure performance measurement and continuous improvement

Furthermore, the issues mentioned in 2.3.1.2 and 2.3.1.3 need to be considered, as both were identified as major shortcomings of current lean practice:

5. Consider functional and emotional value
6. Check possibility to turn unavoidable waste into value

At this stage it can be summarized that these six criteria build a service specific thematic framework considering core lean principles. Hence, it is applied in meta-synthesis. In the following sections each criteria is applied for indexing and charting selected studies.

3.1.3 Understand demand in terms of type and frequency

In order to better understand value demand, three main themes could be derived from the selected studies. First, the time and duration of recommended activities were addressed by several authors. Second, concrete methods and tasks for understanding customers, value and demand were identified as a main theme. Third, the selected studies provided insight into characteristics of co-created value. The following sections are referring to the tables below. These provide an overview about relevant studies addressing the topic of understanding demand in terms of type and frequency.

Reference	Field	Focus	Understand demand
Aichner, T. (2012)	Operations	Mass Customization	<ul style="list-style-type: none"> - Demand is created at ZMT - Customization increases with high product knowledge and product involvement - Customization is driven by extrinsic value drivers self-expression and individualism - Customers are willing to pay premium price for customization
Andreu, L., Sánchez, I., & Mele, C. (2010)	Operations	Business Process Modelling	<ul style="list-style-type: none"> - Customer preferences have to be carried out with provider - Customers see the provider as responsible for creation
Belz, F. M., & Baumbach, W. (2010)	Marketing	Lead users	<ul style="list-style-type: none"> - Lead users influence non-lead users views - Lead users are ahead of trends, highly involved, experienced in use and possess high product knowledge - Lead users are significantly dissatisfied
Dong, B., Hongmei, J., Zheng, L., & Kangcheng, D. (2012)	Operations	Mass Customization	<ul style="list-style-type: none"> - Use internet platforms as information exchange to provide tailored products
Finsterwalder, J. & Kuppelwieser, V.G. (2011)	Marketing	Service experience	<ul style="list-style-type: none"> - Distinguish between task orientation and social element of service creation
Franke, N., & Schreier, M. (2008)	Operations	Mass Customization	<ul style="list-style-type: none"> - Distinguish functional fit and perceived uniqueness of a customized product - Perceived uniqueness seems to be more important to experience than functional fit - Consumers possessing a high need for uniqueness appreciate customization
Fredberg, T., & Piller, F. T. (2011)	Marketing	Innovation and development	<ul style="list-style-type: none"> - Strong ties help to identify customer preferences and develop ideas beyond current preferences and needs - Expert knowledge is needed for significant innovations

Table 2 Studies addressing ‘understanding demand’ part 1

Füller, J. (2010)	Marketing	Innovation and development	<ul style="list-style-type: none"> - Intrinsically motivated as well as reward-orientated participants like to contribute best for understanding demand - Need-driven seek solution for specific problems - Curiosity-driven seek involvement in products, firm and others
Füller, J., Hutter, K., & Faullant, R. (2011)	Marketing	Innovation and development	<ul style="list-style-type: none"> - Self selection of value co-creators is recommendable
Füller, J., Matzler, K., Hutter, K., & Hautz, J. (2012)	Marketing	Innovation and development	<ul style="list-style-type: none"> - Task motivation is important for idea generation but not for further co-creation activities - Lead users seek / may turn ideas into concepts or prototypes
Füller, J., Mühlbacher, H., Matzler, K., & Jaweck, G. (2009)	Marketing	Innovation and development	-
Gersch, M., Hewing, M., & Schöler, B. (2011)	Operations	Business Process Modelling	<ul style="list-style-type: none"> - Usage phase must be redesigned and guided by provider to create value - Consider customer (group) specific needs and designs
Grissemann, U. S. and Stokburger-Sauer, N. E. (2012)	Operations	Business Process Modelling	<ul style="list-style-type: none"> - High quality contribution of customers did not lead higher satisfaction with provider - But it led to higher overall satisfaction - Customers are willing to pay for high integration and close collaboration
Hofmann, E., & Knébel, S. (2013)	Operations	Business Process Modelling	<ul style="list-style-type: none"> - Demand switches to individualized products and services
Kissimoto, K. O., & Laurindo, F. J. B. (2010)	Operations	Mass Customization	<ul style="list-style-type: none"> - Customer preferences are essential for customization - Mass customization focuses pre-defined options in catalogues
Kohler, T., Fueller, J., Stieger, D. and Matzler, K. (2011)	Marketing	Web 2.0	<ul style="list-style-type: none"> - Compelling experience enhances time spent on co-creation - Time is not passively spent, but enhances content and value to project - Recognize motivations

Table 3 Studies addressing 'understanding demand' part 2

			- Apply design competitions in virtual worlds to gain ideas
Kohler, T., Matzler, K., & Füller, J. (2009)	Marketing	Web 2.0	
			- Lead users are active in open innovations, receive more feedback on their ideas, provide more critical reviews to peers
Martínez-Torres, M. R. (2013)	Marketing	Lead users	
			- Understand current and future customer needs to set up new services - Observation of customers can reveal unexpressed preferences, requirements and usage behaviors - Prioritize observations and further improve with customers
Mota Pedrosa, A. (2012)	Marketing	Innovation and development	
			- Customer involvement needs more complex systems than only transferring preferences
Ryzhkova, N. (2012)	Marketing	Innovation and development	
			- Active dialogue with customers preferable, but seldom applied by companies
Schaarschmidt, M., & Kilian, T. (2013)	Marketing	Innovation and development	
			- Use customer segmentation, targeting and reward strategies
Sigala, M. (2012)	Marketing	Web 2.0	
			- Concurrent and direct multi-stakeholder collaboration in service development is beneficial - Participants should be identified at point of contact at provider's site
Tossavainen, P. J. (2013)	Marketing	Innovation and development	
			-Lead user identification through virtual communities is recommendable
Tuunanen, T., Bragge, J., Häivälä, J., Hui, W., & Virtanen, V. H. (2011)	Marketing	Lead users	
			- Value is not created at the end of a chain - Individual value has to be considered as customers constantly provide subjective needs
Zolnowski, A., & Bohmann, T. (2013)	Operations	Business Process Modelling	

Table 4 Studies addressing ‘understanding demand’ part 3

3.1.3.1 Time and duration

The theme of time and duration was addressed by several authors. The authors emphasized the question when demand actually is generated. Aichner (2012) identified the Zero Moment of Truth (ZMOT) as the moment when ‘a customer searches online

for a product and shows a certain degree of product knowledge and/or product involvement' (Aichner, 2012, p. 177). The author argued that it is likely that demand is created at this point of time, where customers decide whether customizing the product or not. As this decision is beyond the influence of the provider and thus, out of current service operations considerations. In this sense, Gersch et al. (2011) recommended that the usage phase (customer sphere) should be redesigned completely. The provider should actively guide the customer in creating value over time. This is in line with another argument that 'co-creation [...] extends the interactions beyond a value-chain logic with the customer on the receiving end of this chain' (Zolnowski & Bohmann, 2013, p. 1111). Hence, value is not created at the end of sequential manufacturing steps, but over the complete duration from pre-activities, service encounter and follow-up usage.

The presented time and duration themes confirm a need to cover not only the joint, but also the customer sphere when designing service operations.

3.1.3.2 Methods and tasks

The goal of understanding demand should not be limited to current customer needs. It was argued to also consider future needs, in order to set up matching products or services (Mota Pedrosa, 2012). Knowing customer's preferences can be seen as essential for further customization or set up of pre-defined customized features, e.g. for an online catalogue (Kissimoto & Laurindo, 2010). Hence, several studies strongly recommended to recognizing customer (group) specific needs and making use of segmentation, targeting and rewarding strategies (Gersch et al., 2011; Sigala, 2012). Furthermore, an active dialogue with customers on their needs and expected features was emphasized, but Schaarschmidt and Kilian (2013) pointed that it is rarely applied by companies. It was further argued by several authors that customer involvement increases complexity, as individual value propositions need to be considered (Ryzhkova, 2012; Zolnowski & Bohmann, 2013).

Studies indicate that it is important not only to consider expressed customer needs, but also unexpressed ones. These could be identified through observing customers in usage

phase (Mota Pedrosa, 2012). In addition to this, Franke and Schreier (2008) recommended to distinguish between functional fit and perceived uniqueness of a product or service. This should indicate the importance of customization from a customer perspective. Furthermore, it was suggested to encourage customers to actively express their preferences (Andreu et al., 2010). Nevertheless, customer integration should be a compelling experience to all participants as it significantly increases the level of contribution, as well as the willing to collaborate in the future (Kohler, Fueller, Stieger, & Matzler, 2011; Mota Pedrosa, 2012). Discussing and setting priorities were considered as final steps. Furthermore, iteration loops and guided processes by experts (agents) were recommended for ensuring a high quality of results and learning loops within development processes (Fredberg & Piller, 2011).

Regarding the selection of customers, it is worth to notice that customization was described in the selected studies as something that has not to be provided for all customers equally. Aichner (2012) pointed that the degree of customer's willingness to customize strongly depends on certain customer characteristics. Several studies explicitly addressed the identification of such a kind of users. These users were called 'lead users'. Interestingly, it was proposed to integrate lead users into innovation and design projects. Lead users were characterized as being ahead of trends, highly experienced in the use of provider's product or service and are intrinsically motivated to be integrated (Belz & Baumbach, 2010). Martínez-Torres (2013) concluded that lead users should play an active role in open innovation projects. The author found that they provided more ideas, feedback, as well as critical reviews on products or services than other customers.

3.1.3.3 Characteristics of co-created value

The selected studies closely linked the characteristics of co-created value to the concept of value-in-use. Value seemed to be rather a question of individual perception than of objectivity. In this circumstance, the perceived uniqueness of a product or service was considered as more important to customer experience, than functional fit aspects (Franke & Schreier, 2008). Furthermore, it was emphasized that customers were willing to pay a premium price for customization (Aichner, 2012; Grisseemann &

Stokburger-Sauer, 2012). Hofmann and Knébel (2013) also identified a strong market trend towards individualization of products and services.

However, it is a fallacy to assume that customization is preferred over standardized products in any case. Customization seems to depend on both, individual customer preferences and their capabilities. It was reported that customers sometimes selected standardized items, though they would have preferred customization. Franke and Schreier (2008) argued that in such cases complexity of customization would exceed customer's knowledge. To make customization easier for customers, IT systems should be designed to reduce complexity and provide a kind of pre-defined customization (Dong, Jia, Li, & Dong, 2012; Kissimoto & Laurindo, 2010).

Summarizing co-created value characteristics, it seems that perceived value strongly depends on customer's skills, knowledge and capabilities. Furthermore, the way of integration is of great interest. Barriers might prevent customers from customizing products or services, though they would appreciate customization and even be willing to pay for it.

3.1.3.4 Complementary observations

Several studies argued that it is recommendable to prepare the whole organization for customer integration (Aichner, 2012; Grisseemann & Stokburger-Sauer, 2012). This contains purpose definition, visualization of the given operations, as well as an initial problem statement (Hofmann & Knébel, 2013; Leyer & Moormann, 2012). The remaining studies did not consider a preparation phase as necessary. These, predominantly product or service innovation driven methods, started with identification of relevant participants for e.g. focus groups (Mota Pedrosa, 2012), new media or online forums (Füller, Mühlbacher, Matzler, & Jaweck, 2009; Kohler et al., 2011; Kohler, Matzler, & Füller, 2009; Sigala, 2012).

Interestingly, all studies that recommended a preparation phase were from operations management. Whereas participant selection and developing knowledge sharing platforms was solely addressed in the field of marketing.

3.1.4 Create single piece flow and routines

Considering flow and routines, two major themes could be drawn from selected studies. First, the setup of operations strongly influences flow and routines. Second, the way of customer integration is of high interest in the studies.

3.1.4.1 Setup of operations

The setup is distinguished between a design process setup and a daily operations setup for providing a product or service.

In the design phase, three main stages were considered (Kohler et al., 2009; Mota Pedrosa, 2012). The authors proposed the identification of needs and idea generation. Next, the concept and design of a product or service should be accomplished. Finally, a testing and market launch stage was recommended. All stages should be supported through the application of IT systems. Especially the integration of virtual communities was mentioned as beneficial, e.g. due to a better cost efficiency and speed (Kohler et al., 2011; Tuunanen, Bragge, Häivälä, Hui, & Virtanen, 2011). Furthermore, it was argued that good IT support within virtual projects enhances the overall experience for participants leading to better results (Füller et al., 2009). When dealing with a high degree of complexity it was recommended to setup integrated co-creation workshops for gaining ideas, discuss these and develop a shared understanding of a possible solutions or innovation (Tossavainen, 2013). Füller (2010) furthermore highlighted providers' responsibility to define and control the overall the process of customer integration. This was seen as not only valid for the design process, but also for daily operations.

Despite all benefits of complexity Leyer and Moormann (2012) noticed that if variety in operations is 'overly heterogeneous [...] the complexity of the existing service process will be too high to allow for satisfactory operational control' (Leyer & Moormann, 2012, p. 1064). However, customization seemed to be a desired option for customers. Against this background Watcharapanyawong et al. (2011), as well as Dong et al. (2012) recommended to reduce lead times and to apply automated processes and improve

flow of information. Furthermore, it was recommended to apply make-to-order (MTO) operations strategies in the case of high variety in customer needs. However, if product availability was more important, assemble-to-order (ATO) or make-to-stocks (MTS) operations were seen as better solutions (Hofmann & Knébel, 2013).

These studies emphasized the need of setting up routines for pre-store (customer sphere), in-store (joint sphere) and product related after-sales activities, e.g. installations (joint sphere). Less support was provided in regards to the usage phase (customer sphere). However, this should be considered in the future at least for higher complex products or services (Andreu et al., 2010; Zolnowski & Bohmann, 2013).

3.1.4.2 Way of customer integration

The way of customer integration was seen as either active or passive, in order to subsequently design flow and routines (Fredberg & Piller, 2011). Active means that the provider actively seeks customer's contributions. This is not only a question of customers preferences (Kohler et al., 2011), but also of providers capabilities. For instance, employees need to be able to understand customer needs and contribution (Grisseemann & Stokburger-Sauer, 2012). Domain specific skills of all involved parties can be seen as crucial to the success of a project and overall performance (Füller, Matzler, Hutter, & Hautz, 2012). Hence, active customer integration demands a high degree of absorptive capacity and innovation culture on provider's side. In order to cope with this, customer interaction points (CIP) should be identified thoroughly. It was further argued that the degree of interaction should be adjusted due to customer's, as well as provider's skills and capabilities (Gersch et al., 2011). In this circumstance the authors noted that 'integrating the customer into the service development process must not mean to shift work from the company to the customer and, thus, saving financial and temporal resources' (Grisseemann & Stokburger-Sauer, 2012, p. 1490).

An interesting approach was provided by Füller et al. (2011). They argued that it might be beneficial that customers could decide by themselves whether to be integrated or not. Thus, enabling a 'pull' of value co-creation activities could be beneficial for all parties.

Considering above thoughts on customer integration three core ideas can be noticed. First, it was recommended for effective customer integration, to start with clustering activities. This should be done through classifying different types of activities, the degree of value creation, as well as different stages or spheres respectively (e.g. order preparation or delivery stage) (Andreu et al., 2010; Franke & Schreier, 2008; Leyer & Moormann, 2012). Afterwards, customer integration should be specified more in detail from a process perspective. It was recommended to consider process stages with and without customer involvement, as well as different types of demand (Aichner, 2012; Hofmann & Knébel, 2013). Finally, various studies pointed to visualize process needs and to subsequently derive suitable operations strategies and control mechanisms (Dong et al., 2012; Gersch et al., 2011; Kissimoto & Laurindo, 2010; Watcharapanyawong et al., 2011). See also *Table 24 (Annex I)*.

3.1.5 Train staff and customers against demand

Training in this case can be defined as a sort of knowledge creation, either on customers' or provider's side. Therefore, themes are distinguished between customer related and provider related aspects in the following.

3.1.5.1 Customer related aspects

In selected studies it was outlined as beneficial to train customers in advance to the service encounter. This could e.g. be done through websites with detailed information and examples for furniture use. Customers should be trained in each interaction to enhance their knowledge (Andreu et al., 2010). Zolnowski and Bohmann (2013) identified a high degree of interaction between customers and provider as a prerequisite to fulfil customer needs and gain knowledge. Furthermore, learning and knowledge creation should be supported by a compelling experience (Kohler et al., 2011; Schaarschmidt & Kilian, 2013). The authors further pointed that the behaviour of customers in customer sphere provides valuable insights to unexpressed preferences and requirements. Hence, this sphere could be seen as of high interest to gain knowledge and subsequently improve performance or overall service experience. For

instance, IT systems could be applied to support data collection in this area (Gersch et al., 2011). Füller (2010) and Mota Pedrosa (2012) emphasized that it could be beneficial to implement a sort of permeable learning set, where customers can either participate actively, or not. However, the provider should ensure that customers know how they could positively contribute to a service experience (Finsterwalder & Kuppelwieser, 2011; Hofmann & Knébel, 2013). This knowledge was understood to be essential for establishing target orientated and efficient learning or training.

3.1.5.2 Provider related aspects

In regards to the provider, knowledge increased with the degree of direct interactions with customers (Fredberg & Piller, 2011; Füller et al., 2011). Beside customers, also staff could be established as lead users. It was even recommended to integrate stakeholders from different levels of the service system, e.g. suppliers, to enhance knowledge and initiate improvements (Tossavainen, 2013).

For the provider it was seen as essential to facilitate the learning processes through customer integration tools and training of staff (Füller et al., 2009; Sigala, 2012). Moreover, knowledge creation could be supported by specific professional employees, educated in knowledge management or other techniques, like e.g. brainstorming (Füller et al., 2012). Hofmann and Knébel (2013) stressed importance of knowing customer needs and preferences, in order to set up efficient operations strategies. However, gathering too much data was also seen as risky. An overflow of data could cause problems to identify relevant information, which could delay or even impede innovations (Schaarschmidt & Kilian, 2013).

3.1.6 Performance measurement and continuous improvement

Two different themes can be derived from the studies in regards to performance measurement and continuous improvement. The rather traditional (mode 1 and 2) recommendations were about gathering data, e.g. buying behaviour, in order to identify market trends and opportunities for new products or services. Furthermore, costs and revenue potentials should be measured to point out areas for improvements

(Andreu et al., 2010; Gersch et al., 2011). Another important measurement was seen in analyzing process cycle times and productivity of resources (Leyer & Moormann, 2012). The data gathering should be supported by e.g. data mining and business intelligence software. Furthermore the authors strongly recommended to continuously improving these tools. This should ensure accuracy of data and speed of data mining, as well as data analysis (Füller et al., 2009; Kissimoto & Laurindo, 2010)

Mode 3 orientated studies did not discuss indirect, passive data mining. They in fact put strong emphasis on direct customer (group) interaction. Therefore, Füller et al. (2011) suggested implementation of persistent improvement communities of customers, and staff. Iteration loops of workshops within these communities were recommended. These should assess already made improvements, gain new ideas, discuss these and agree upon further improvements and next steps. A shared vision of the state to be was seen as essential for such communities (Fredberg & Piller, 2011; Tossavainen, 2013). However, the authors also mentioned that this kind of improvement activities is highly time consuming, not only for customers, but also for the company. Workshops must be prepared, facilitated, results documented and lots of information have to be shared among participants. Due to this fact, Zolnowski and Bohmann (2013) proposed to address specific customers that are willing to take this extra effort. These should be leveraged and accommodated in order to achieve regular customer interaction on improvements. Another recommendation was to enable pro-active, as well as re-active customer integration in learning cycles. This means that providers should create standardized ways for customers to contribute to improvements, independently from e.g. facilitated workshops or community events (Mota Pedrosa, 2012). Social media and virtual communities could be seen as potential platforms to combine pro-active, as well as re-active improvements.

From a process perspective on making improvements in general, authors pointed to critically review developed ideas in follow-up sessions. In such sessions remaining or new pitfalls should be identified and adjustments initiated. Furthermore, documentations like visualizations or written procedures could be improved (Andreu et al., 2010; Fredberg & Piller, 2011; Mota Pedrosa, 2012). However, all these activities

would mean significant effort for providers and participating customers (*Table 24 in Annex I*).

3.1.7 Functional and emotional value

Interestingly, not only marketing scholars were addressing different layers of value, but also operations scholars considered this aspect. Aichner (2012) argued that self-expression and individualism represent driving forces in decision making of customers. This could be considered as emotional value. It was emphasized that the emotional side of customized products is of great importance for customers. Franke and Schreier (2008) concluded 'that a self-designed product's perceived uniqueness contributes independently to the utility a customer experiences— beyond the aesthetic and functional fit the product delivers' (Franke & Schreier, 2008, p. 102). Also other studies distinguished between the emotional value of a product and its functional aspects (Füller et al., 2011; Füller et al., 2009). However, this is not only valid for products but also in service circumstances. Finsterwalder and Kuppelwieser (2011) concluded that in services task orientation (functional value) and a social element of service creation (emotional value) exist. It was found that In the same way that also self-designed services mean more to customers than standard ones (Grissmann & Stokburger-Sauer, 2012).

Nevertheless, several studies, e.g. Franke and Schreier (2008), Mota Pedrosa (2012) and Tossavainen (2013), identified a need to address the usage phase (customer sphere) of a product, when it comes to value. It was argued that the usage stage is not transparent to providers (Gersch et al., 2011). However, as mentioned before, observations may the transparency about this value-in-use.

The selected studies indicate that value is much more than a finished product or service provided at the end of a process chain. Value is constantly provided throughout all stages with direct and indirect customer interactions (Zolnowski & Bohmann, 2013). Hence, providers should shift their focus from value-in-exchange to value-in-use and redesign their operations accordingly. Such a trend has already been observed by

Tossavainen (2013) in their still ongoing longitudinal case study of two large Finnish companies.

3.1.8 Turn waste into value

Only four of the given studies were referring to something like turning waste into value. Hence, it is the less represented theme in this framework. However, there were some noticeable aspects provided. First of all, it was pointed that customization increases variety in demand, as well as in subsequent processes (Aichner, 2012; Franke & Schreier, 2008; Gersch et al., 2011). This fact was seen as a negative effect on efficiency and performance by operations management scholars, as a make-to-order approach would mean to increase the lead time. In order to cope with variety, lead times should be reduced, which in turn would mean to further streamline processes and integration of different IT systems (Dong et al., 2012; Watcharapanyawong et al., 2011). However, a shift from standardized to customized products would rather mean to increase lead times, than to decrease it. In order to keep availability high, postponement solutions could be applied, but these are based on higher stocks of unfinished goods (Hofmann & Knébel, 2013). Thus, variety due to customization means waste to operations, which has to be avoided or banished from a lean perspective.

However, from a customer perspective the meaning of customization seems to increase constantly, and studies indicated that customers are willing to pay for individualism (Grisseemann & Stokburger-Sauer, 2012). From this point of view, customization means value following lean thinking. This inconsistency needs to be resolved, in order to cope with customization and create wealth to the organization through it.

3.1.9 Mapping and interpretation

Beside lean service limitations mentioned in the introductory section, also the SLR indicates specific problems when applying lean to services. To cope with a strong trend to customization, the lean framework has to be adjusted. In the following the indexed

themes are rearranged and mapped. The goal is to deploy a model that considers customers as value creators, allows customization and reshapes value definition from a lean perspective.

3.1.9.1 Model for customer integration

Considering the characteristics of selected studies, value co-creation in terms of mode 3 is a predominantly marketing driven way of thinking. Except the study of Andreu et al. (2010), there is no real co-creation approach in operations management theory identified. This supports the argument that (Lean) service operations are currently kept in internal organizational boundaries. Customers are rather seen as demand creators than co-creators of value. Marketing scholars and practitioners already go beyond these barriers and provide evidence to the fact that to ‘enhance customer and company value, an active dialog is needed’ (Grisseemann & Stokburger-Sauer, 2012, p. 1491). Against the background of the thematic framework, the following steps could be derived from given studies (*Figure 7*):

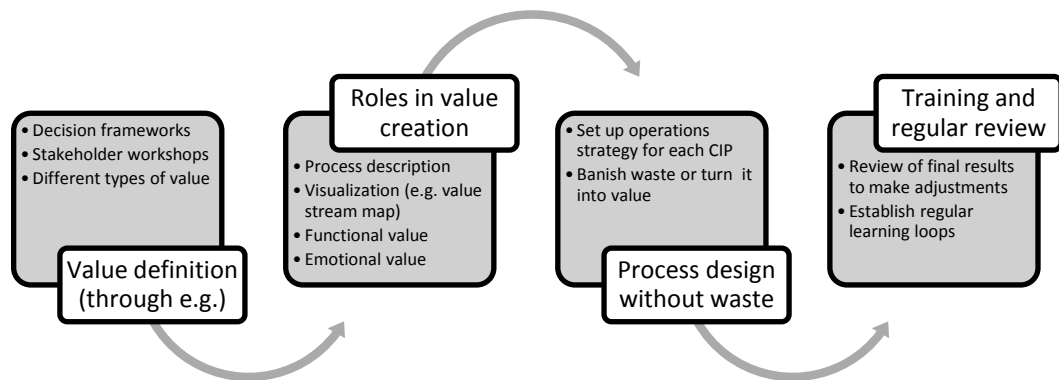


Figure 7 Basic lean service model for customer integration into service operations

First, value has to be defined by customers as well as by the organization. It is important to consider emotional, as well as functional value. An agreed understanding among customers and service provider is aimed. This step can be supported by decision frameworks (Edvardsson, Kristensson, Magnusson, & Sundström, 2012) or methods for multi-stakeholder integration workshops (Tossavainen, 2013). The second step aims at describing roles in the value creation process of both, customers and staff. This could

be done through applying models like the one proposed by Andreu et al. (2010) or Füller (2010). Third, the value creation process itself should be designed. Non-value adding tasks should be reduced to a minimum, including customers' tasks. At this stage, customer interaction points (CIP) need to be identified and suitable operations strategies have to be defined for different types of value demand. The final step is to review previous results of value definition and process design. This should be done by customers and staff of the firm. Despite ensuring quality through review actions, this step can also be seen as a kind of training for all value co-creating parties. Furthermore, introducing regular learning and improvement loops enables future improvements or necessary adjustments. This may furthermore strengthen the tie between the firm and its customers (Fredberg & Piller, 2011; Vaisnore & Petraite, 2011). A core element of co-creation is a trustful and open minded collaboration of all parties. If there are emotional, behavioural or institutional barriers, these have to be removed in order to avoid negative impacts (Collm & Schedler, 2012).

This customer integration process model could be applied to service companies in different ways, which depend on individual circumstances. It could be seen as beneficial to undergo all steps of the process in personal workshops. This would mean significant effort of around two to five days for customers and provider representatives, depending on service complexity (Brophy, 2013). However, especially small companies would probably not be able to cover this effort. Alternatively, all steps could be addressed separately via different methods like online communities, surveys, and interviews or similar. The decision how to apply the model has to be made case by case. In the following sections, each step is described more in detail.

3.1.9.2 Value definition

The definition of value is crucial in customer integration (Andreu et al., 2010). In order to identify value in this new customer integration model, it is essential to distinguish between emotional and functional value (Sandström, Edvardsson, Kristensson, & Magnusson, 2008). There are various options to elaborate value definitions. Edvardsson et al. (2012) provided a framework that can be used 'for deciding and

selecting appropriate methods [...] [that] are excellent for capturing live data regarding use value experience' (Edvardsson et al., 2012, p. 425). For instance, if purpose is to understand customization, they recommended customer group involvement, according to Dahlsten (2004). Ideation on the other hand could be achieved through empathic design, lead user methods or customer driven development (Edvardsson et al., 2012). Another possibility for defining value is to apply the Kano Model of customer satisfaction (Sauerwein, Bailom, Matzler, & Hinterhuber, 1996), or brainstorming techniques (Kuo, Lin, & Yang, 2011; Vaisnora & Petraite, 2011). However, the selection of an appropriate method is also an individual choice. It strongly depends on specific organizational circumstances and resources. After definition of value, it is necessary to reconsider the current service and product portfolio is still matching value propositions.

3.1.9.3 Roles in value creation - from object of flow to value creators

One main theme that is shared among all included studies is that customers are creating value. Hence, value is not created ‘for’, but at least ‘with’ or even ‘by’ them. This fundamental aspect can be seen as a core element of this customer integration model. In current lean practice the Value Stream Mapping (VSM) is frequently applied to visualize operations and point out potential improvements. It is argued that once ‘value’ has been defined, the value stream is mapped considering all necessary activities that are needed ‘to bring a specific product from raw material to end consumers’ (Braglia, Carmignani, & Zammori, 2006, p. 3929). This method is also applied to service operations in the same way.

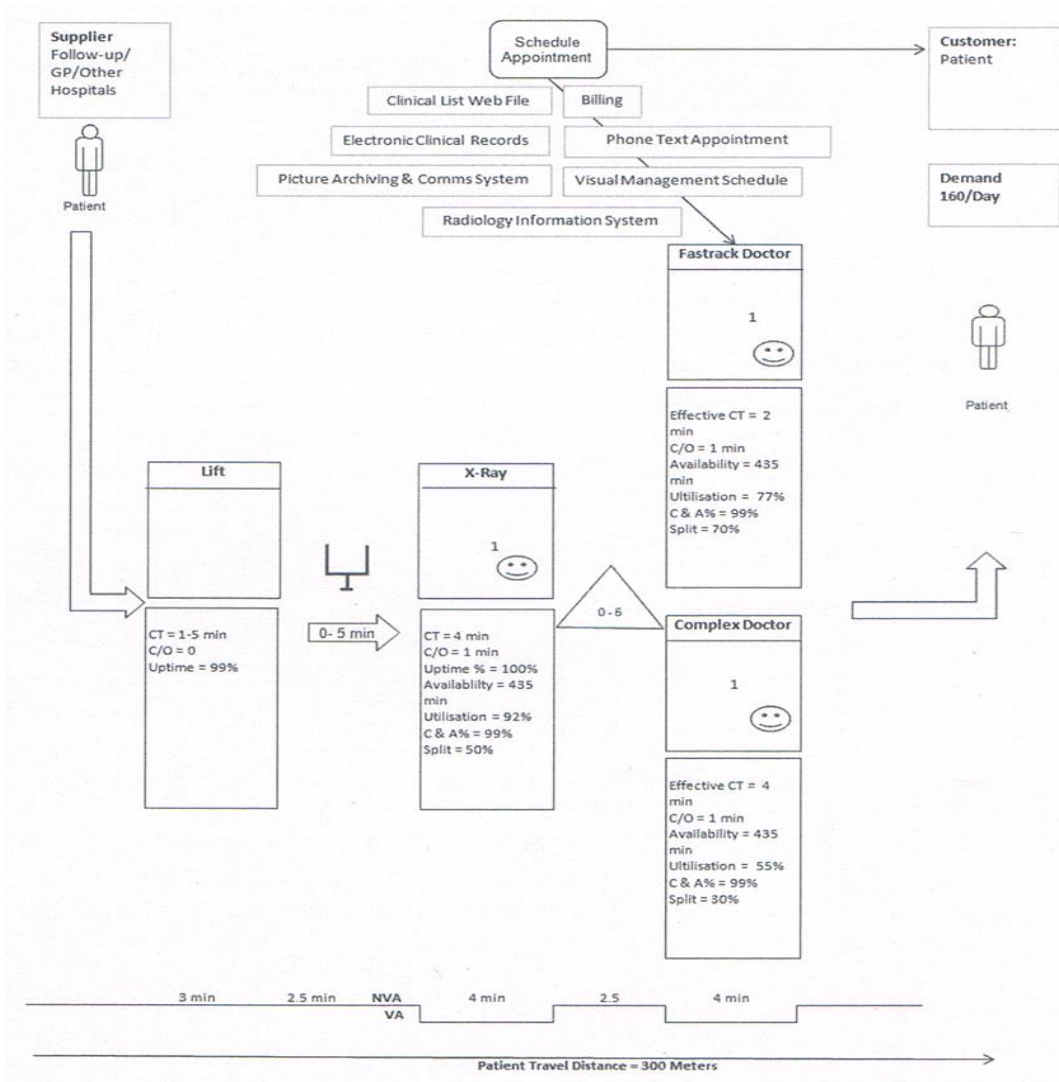


Figure 8 Future state value stream map of an outpatients' department –case example (Brophy, 2013)

As an example for an optimized future state VSM, a sample case of an outpatients' department of a hospital was outlined by Brophy (2013) (see *Figure 8*).

Without analyzing this case in detail, it is important to discuss some relevant aspects. In this example patients (customers) were treated as raw materials, passed through a production line and ending up as a finished good. In other words, customers are treated as objects of flow. This can be seen as consistent to the underlying manufacturing perspective. From this perspective, it is rather value adding 'to' customers, than 'for' them. The predominant goals of VSM are to increase efficiency through banishing waste. This has also been done successfully in this case example. Overall lead time was reduced from 181 minutes to 24, value adding ratio increased from 12 to 50 percent and instead of 11 employees working in this process, three remained. However, contribution of patients to value creation or potential customization is not considered in this concept. Furthermore, VSM is not designed to consider potential turn of waste into value.

To turn this perspective from working 'on' customers to working 'with' customers, some figures need to be added. Currently the box below each process step indicates effective cycle time (CT), changeover (C/O), uptime, availability, utilization, complete & accurate rate (C&A), as well as the split ratio of demand addressing the specific process step. These figures solely focus provider's resources. It should therefore be enhanced with four additional figures. First, the cycle time needs to be defined more in detail. It should be distinguished between customer contribution time (CCT) and provider contribution time (PCT). This is useful to identify the contribution of each party to value creation in terms of duration. Furthermore, the provider contribution ratio (PCR) is displayed and customer contribution ratio (CCR) in relation to the total cycle time.

Referring to the given case example, X-Ray has a cycle time of 4 minutes. It can be argued that the provider also contributes 4 minutes, as the X-Ray apparatus has to be configured and the patient has to be positioned correctly. However, also customers contribute as they take some clothes, watches, etc. off and follow instructions for correct positioning to ensure good quality photographs. Hence, it should be supposed that they also contribute 2 minutes to this process actively. In this case, the PCT would

be 4 minutes and CCT 2 minutes. The subsequent ratios would be PCR 100% and CCR 50% (Figure 9).

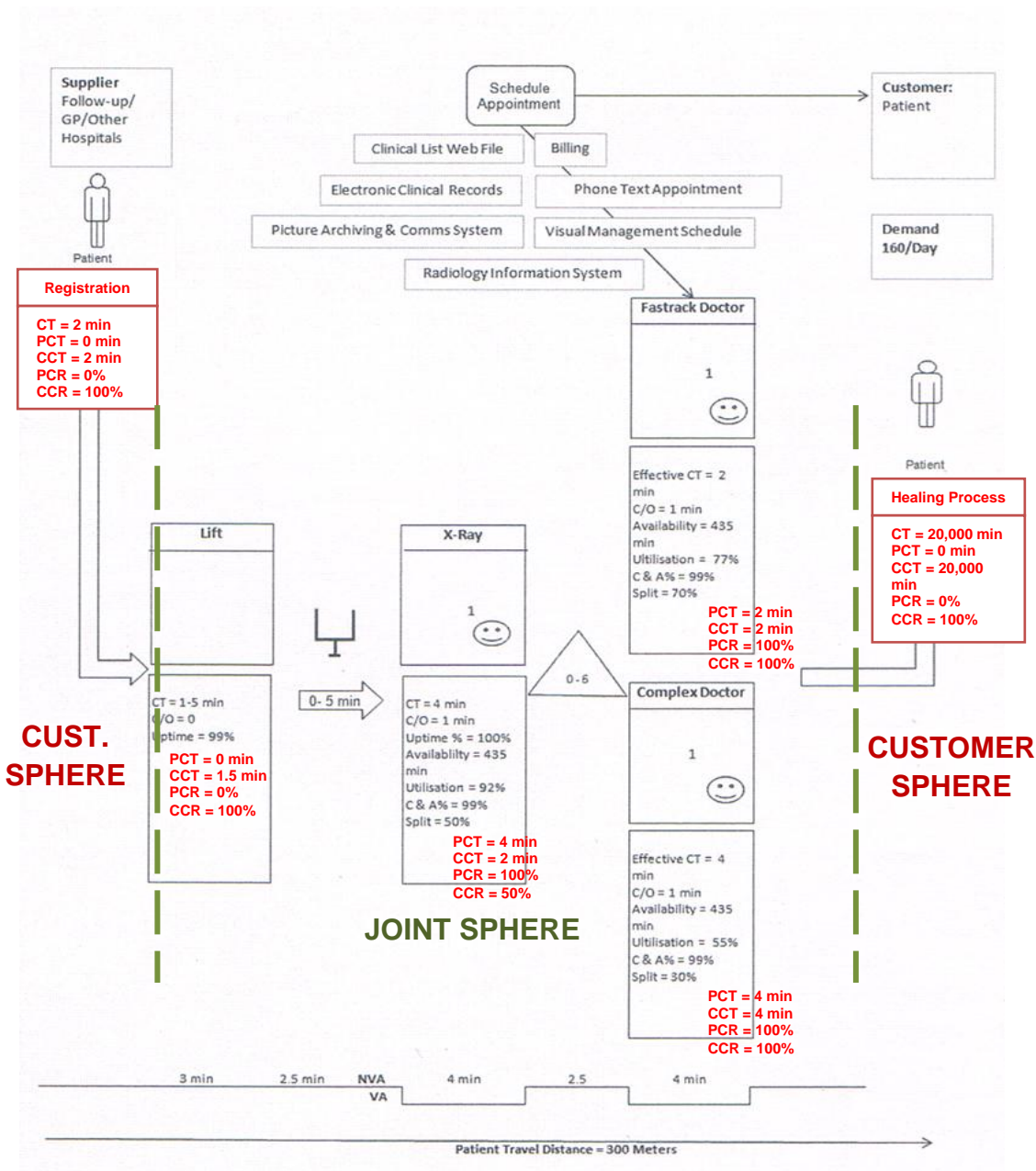


Figure 9 Value Creation Map example for outpatient's department

This differentiation enables to analyze contributions of providers and customers to value creation more in detail. For instance, it provides insights into potential capacity reserves for increasing value creation with the same cycle time. Even a decrease of total cycle time could be achieved through switching activities between provider and customer. This is possible if customers are perceived as sources for value creation, instead of objects of flow. But what could it look like?

It may be supposed that if both parties contribute 3 minutes, the same value could be created. For instance, if patients know in advance what correct position to take in the X-Ray. This could mean to decrease the cycle time of the process step by 25%. As X-Ray is the current bottleneck of the value stream, it would also mean that the overall demand per day could be increased by 25%. Without considering each party's contribution, such important opportunities for improvements might be dismissed. Furthermore, the traditional VSM disregards customer sphere activities. Thus, traditional VSM needs to be enhanced in order to be applied in the new lean service model. The revised method is called Value Creation Map (VCM).

VCM not only considers the joint, but also the customer sphere with pre-activities and usage stage. Applying VCM to the given example, the registration process, which has been outsourced from a personal front desk activity to an online service, is also considered and illustrated in the VCM. Further the healing process is expected to lead around 14 days (approx. 20,000 minutes) with no provider contribution. Though this stage might not be influenced by outpatient's department directly, it should be considered as it offers potentials for value creation. For instance, care services, or data collection along the healing process could enhance value and provide useful information to improve the overall service performance.

3.1.9.4 Process design without waste

After analysis and visualization of the process, the CIPs need to be identified and assessed. Hofmann and Knébel (2013) pointed that responsiveness of operations strategy to customer needs is crucial. The authors further mentioned that this is usually done for product or customer groups respectively. However, here lies a problem when it comes to service operations. Due the fact that a high degree of customization would neither support classification of customer groups, nor of products, a different approach is necessary. According to the thoughts presented by Gersch et al. (2011), operations strategies could also be defined for CIPs. This seems logical as it may support standardized, as well as customized strategies within the same service encounter. Referring to the outpatient's department example, 'complex doctor' activity might be

fully customized, whereas ‘fasttrack doctor’ consultations could be highly standardized. The idea behind it is to find a most efficient strategy to fulfil specific customer demand.

In service circumstances, there is not only one CIP, but several along the process. Hence, it seems to be useful to define operations strategy for each CIP. In order to identify the right strategy, several attributes have to be considered. First, the degree of necessary customization is important. A high degree of customization means that the provider does not know the configuration of the product or service in advance. Subsequently, an MTO strategy could be applied, which is equivalent to low standardized service procedures (Hofmann & Knébel, 2013). Furthermore, the variety in the product or service portfolio has to be considered. It is labelled as ‘type’ in the following as Seddon and O’Donovan (2010) suggested. A high variety in portfolio means that customers may choose various options. These options rely on standardized intermediates or procedures, but are not ready to be provided at once. Hence, the standardization is medium and an ATO strategy is commonly applied (Dong et al., 2012). Third, a high deviation of demand over a certain period of time, in the following ‘frequency’, is another important aspect. If demand occurs irregularly or in waves over time, e.g. in a café in the morning and after lunch, it is necessary to fulfil demand very quickly. This could be achieved through e.g. reducing lead times (Watcharapanyawong et al., 2011). However, this requires highly standardized procedures (Hofmann & Knébel, 2013).

In summary, the three attributes require mutual different strategies. A thorough assessment of these criteria can be beneficial to find the right operations strategy. Undergoing this procedure for each CIP is essential when applying this model. This thesis refers to this as ‘interaction point analysis’ (IPA) in the following.

After operations strategy definition, the ideal state process is designed. Therefore, waste is identified and minimized subsequently. Afterwards, the developed ideal state has to be checked for feasibility and eventually adjusted (Brophy, 2013). Then, unavoidable waste is identified, e.g. waiting. In co-operation with customers, ideas should be generated in how unavoidable waste could be turned into either functional or emotional value. Idea workshops or online communities may facilitate this process

(Füller et al., 2012; Tossavainen, 2013). Finally, implementation of the new process is planned and agreed among the parties. The latter step should enhance liability and commitment.

3.1.9.5 Training and regular review

The implementation of the new process demands training of all value creating parties. The SLR showed that it is useful to inform customers in advance how to use a service. This could be done through e.g. new media. According to Andreu et al. (2010) it can be argued that necessary training effort increases with the complexity of a service. Beside pre-information, customers gain knowledge through each interaction and service experience (Zolnowski & Bohmann, 2013). Therefore, staff plays a significant role in educating customers within their daily business (Hofmann & Knébel, 2013). Thus, it seems to be recommendable to train some employees in knowledge management techniques as e.g. Füller et al. (2012) proposed.

Implementing a regular review of performance and customer needs should ensure continuous improvement and performance measurement. The way in which it can be conducted again depends on specific circumstances. Indirect information gathering, e.g. through data mining (mode 1), is easier to apply than activities where customers are involved directly (mode 3). However, it seems to be beneficial to address specific customers, e.g. lead users, regularly (Zolnowski & Bohmann, 2013). For instance, this could be done personally or via surveys.

It is recommendable to measure performance for the overall process, as well as for each CIP. This enables the firm to identify changes in performance or demand, as well as related causes. Also the customer perspective needs regular considerations. This should be done on an overall process level and also for the CIPs. It is necessary to establish a process where both parties are enabled to learn and to introduce improvements in a collaborative way (Finsterwalder & Kuppelwieser, 2011; Schaarschmidt & Kilian, 2013).

3.2 Theory propositions

The presented model is based upon already approved models and enhanced with necessary tools or adjustments. To be able to test the model, some underlying propositions need to be defined. These should describe the circumstances when the new model is applicable (Carlile & Christensen, 2004). The propositions are directly derived from SLR and seek to cover all relevant aspects. Due to complexity of the topic the propositions cannot be exhaustive. However, the presented model is heuristic and not representational. It is reasonably hypothesized that these propositions reflect the theoretical background of the developed model. Thus, it can be seen as sufficient to define and validate the propositions as core attributes of it (Harré, 2009). In the following, the propositions are mentioned and briefly explained.

P1 Value propositions of provider and customers can be matched and do not diverge significantly

This proposition addresses SLR themes of ‘understanding demand in terms of type and frequency’, as well as ‘functional and emotional value’. Only when value propositions can be matched, real value co-creation and efficient operations can be generated. It is about knowing instead of presuming customers’ preferences (Dong et al., 2012; Mota Pedrosa, 2012). But it is also necessary to consider actual provider’s perspective on value (Zolnowski & Bohmann, 2013). A matching is crucial in order to avoid a common failure in lean implementation of ‘providing the wrong product or service in a highly efficient way’ (Womack & Jones, 1996, p. 141).

P2 Roles in value creation can be identified, assessed, and overall performance can be improved through adjustments of roles

This proposition addresses SLR themes ‘create single piece flow and routines’, as well as ‘performance measurement and continuous improvement’. It is necessary to define who is going to contribute in what portion at which stage to value creation (Andreu et al., 2010). This enables designing efficient processes and operations strategies

(Hofmann & Knébel, 2013), as well as continuous improvements and learning circles (Finsterwalder & Kuppelwieser, 2011).

P3 Customers are perceived as value (co-) creators

This proposition addresses SLR themes ‘understand demand in terms of type and frequency’, ‘create single piece flow and routines’, as well as ‘train staff and customers against demand’. Only if customers are willing to (co-) create value, it is possible to actively integrate them into service operations. Intrinsic motivation is a key aspect (Tuunanen et al., 2011). However, if a “serve me” mentality is given, it is likely that customers refuse contribution and hence, no co-creation is possible. Providers need to facilitate and encourage customer contribution, instead of impeding it (Collm & Schedler, 2012). Büttgen (2007) pointed three major factors affecting if customer integration into services. These are awareness, capabilities and willingness. Willingness is identified as most important. However, the author argued that willingness cannot be enhanced through direct actions, but through indirect ones, e.g. through increasing awareness and developing capabilities. Hence, it seems that perceiving customers as value (co-) creators is a pre-condition for successful customer integration.

P4 Customer sphere value creation is relevant in pure service environment operations

This proposition addresses the SLR themes ‘understand demand by type and frequency’, as well as ‘train staff and customers against demand’. Various studies in SLR put emphasise on the meaning of customer sphere. It is understandable that value-in-use within the usage stage is relevant in using a product (Andreu et al., 2010; Gersch et al., 2011). However, it is not clear that it is of the same importance within service operations. Inseparability of services allocates service use to the joint sphere. Nevertheless, e.g. the work of Andreu et al. (2010) or Sigala (2012) highlighted the relevance of customer sphere also in service businesses. Thus, it is applied as a proposition for the developed model.

P5 Waste can be turned into value (either functional or emotional)

This proposition addresses the SLR themes ‘functional and emotional value’, as well as ‘turn waste into value’. A problem of current lean practice is to focus waste instead of value (Arfmann & Topolansky, 2014; Radnor & Johnston, 2013). Thus, the idea of turning e.g. underutilization (waste) into potential value could be of high interest for both, providers and customers. Several studies reported that sometimes supposed waste, e.g. customization, is rather a way to increasing profits (Aichner, 2012; Franke & Schreier, 2008; Gersch et al., 2011).

P6 Training of all parties enhances value creation

This proposition addresses the SLR themes ‘train staff and customers against demand’, as well as ‘performance measurement and continuous improvement’. A core element of the model is to enhance value creation through training. SLR provides strong evidence to the fact that training at all stages of service design and improvement enhances overall value and performance (Füller et al., 2012; Leyer & Moormann, 2012). However, this should not be a one-sided approach of either training staff or customers. It is much more about amalgamating learning of customers and providers through facilitating learning circles and environments (Finsterwalder & Kuppelwieser, 2011; Hofmann & Knébel, 2013; Kohler et al., 2011).

P7 Positive effects on performance and value creation can be quantified

This proposition addresses all SLR themes. The proposed lean service model is aiming at enhancing performance, as well as value creation in service organizations. Thus, to validate the model, these effects must be measurable with quantitative figures. Providing quantitative evidence should prevent potential insufficiencies or misinterpretations of effects. Nevertheless, also considering qualitative findings will enhance understanding of causes and effects. Albeit this proposition is rather an

outcome than a prerequisite of this model, it is necessary to validate it. Without gaining positive effects on e.g. cost efficiency and service quality, the model would have no relevance in theory and practice. Furthermore, it directly addresses the second research question.

The above propositions need to be fulfilled to validate the model and its usefulness in practice. However, if one or several propositions cannot be validated, it does not necessarily mean that the overall model is insufficient. It may rather indicate a need for refining the model or identify areas for future research.

3.3 Conclusions

This SLR provides original value to knowledge and practice as it presents the first model for customer integration into service operations from a lean perspective. Studies from marketing and operations field of research are considered and a model is presented that should enable service firms to introduce value co-creation in a lean way. This is ensured through clear value focus, waste reduction methods, as well as continuous improvement cycles. Furthermore, the traditional VSM is adjusted to a VCM, which now considers also customer contribution to value creation. Also other tools have been proposed like the IPA.

The new service specific lean service theory builds the background for the developed implementation model and adjusted tools. It can be argued that the seven propositions reflect core elements of this theory. The lean service implementation model consists of four steps and is supported through tools application (*Figure 10*).

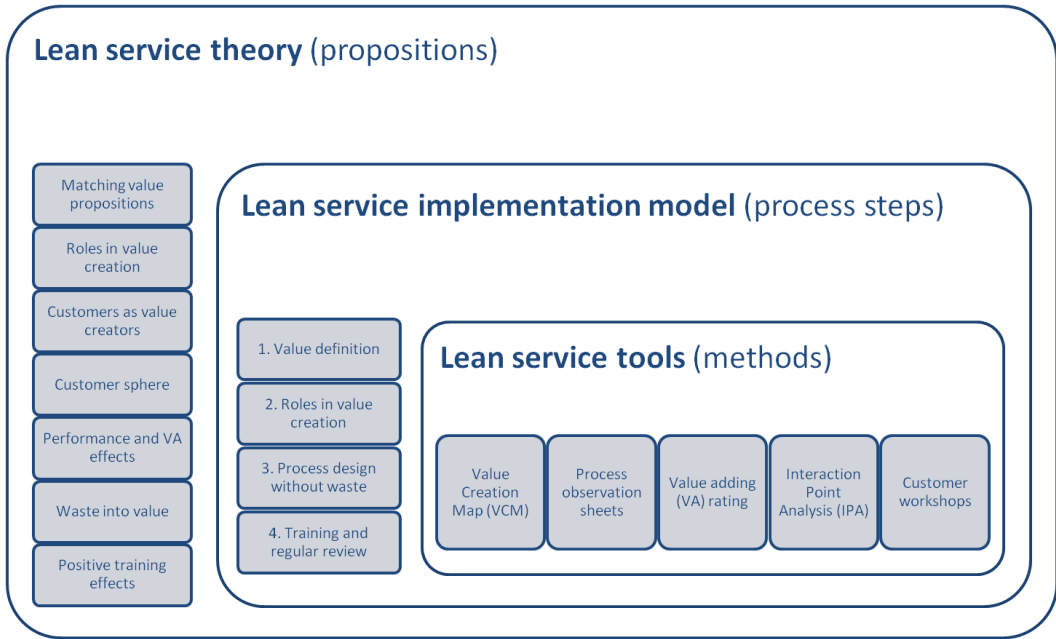


Figure 10 lean service theory, model and tools

All actions need to be based upon an in-depth understanding, not only possessed by managers and staff like Ohno (1988) proposed, but also by (informed) customers acting as efficient value (co-) creators. In the following sections, the lean service theory propositions are tested in practice and further improved. Therefore, the model of implementation, as well as lean service tools are applied in case companies.

4 Focus industries and case companies

Nowadays, service represents more than 70% of today's economies in the United States and the European Union (European Commission, 2010; Suárez-Barraza et al., 2012). Hence, this development has been labelled 'as "the post-industrial society", "the knowledge economy", "deindustrialisation" and "the new information society" but no one label can really capture the essential essence of what is happening' (Akehurst, 2008, p. 1). Variation in different kinds of services constantly increases. Also interdependencies and connections between products and services-bundles get more and more important. Hence, service as a distinct industry is hard to capture. In line with this development Godlevskaja, Iwaarden, and Wiele (2011) pointed out a movement from product-based to service-based business strategies. The authors further mentioned that many companies refine or at least complement their core manufacturing business with various sorts of services like financial, transportation, repair, maintenance and many more.

'Service is a universal pattern of coordination and production acts, performed by the executor of a transaction for the benefit of its initiator, in the order as stated in the standard pattern of a transaction' (Albani, Terlouw, Hardjosumarto, & Dietz, 2009, p. 5). Thus, service is more than just providing immaterial goods to customers. This fact is also reflected in the NACE list of the European Union, where all industry sectors are classified. On a macro level, it distinguishes between the primary (agriculture), secondary (manufacturing) and tertiary sector (services) (Daniels, 2002). The list contains sections from A to Q, each with one or several sub-sections represented with numbers. The service industry consists of sections G (hotels and restaurants) to O (other services).

As there are dozens of different industries within the overall tertiary sector, it is necessary to identify key boundaries to find an appropriate industry for case research. The following considerations will form a guideline for industry selection:

1. The developed model allows analyzing pure services, where customer contribution is high. Hence, an industry should be chosen where this is the case.

2. The research methodology requires the application of pole case studies. Hence, also another pure service industry should be chosen, where customer contribution is low.
3. In service industries, traditional lean has been predominantly applied 'in health care, education, banks and finance, airlines and hotels and restaurants' (Suárez-Barraza et al., 2012, p. 362). Therefore, other industries should be considered, to expand current knowledge.
4. Each industry should be of (high) interest in Germany (or even Europe), in order to make results relevant to practice.

Considering these boundaries, the fitness and health industry, in particular fitness centres, is selected in this thesis. First, this is a business where customer contribution is essential and quite high throughout the service encounter. Second, up to now, there are no lean service studies identified addressing fitness centres. And third, it is a fast growing industry with significant influence on Western societies.

Beside the fitness and health industry, also the hairdressing and other beauty treatment industry is of great interest in Germany. German government reports a significant level of illicit work, respectively 'black labour'. It is argued that especially in hairdressing customers are not willing to pay higher prices. Thus, black labour occurs especially in this industry (Härtel, 2004). Though this is an oversimplified perspective, it indicates that especially in this industry, cost efficiency and high degree of value creation play key roles. Hence, also this industry is considered in this study.

4.1 Fitness and health industry

Fitness centres industry is the fastest growing sports market in Germany. The consultant agency Deloitte reports every two years about the fitness market in Germany. According to their report 'Der deutsche Fitnessmarkt 2014' (available from Deloitte website), the number of members in fitness centres increased from 6.1 million to 8.1 million between 2008 and 2013. This is equal to a yearly growth of 5.9 percent. Today, more German people hold a membership in fitness centres than in football clubs (6.3 million members).

In 2013 the fitness centre industry reported earnings of €4.55 billion. For the upcoming years, further growth is expected by Deloitte experts, as the German market still has great potentials in comparison to other European markets. Hence, this industry is of high interest and subsequently it is very important for companies to be competitive in terms of cost efficiency, but also in terms of value creation.

About 75 percent of all companies have less than 5 employees. Hence, there is a significant target group for this study, as small companies are preferred due to reduced complexity of operations.

4.2 Hairdressing and other beauty treatment

According to an industry report of the GWS (Gesellschaft für Wirtschaftliche Strukturforschung mbH) around 64,000 hairdressing companies are registered in Germany with earnings of around € 6.0 billion in 2013. The yearly growth is estimated with approx. 1.5 percent.

GWS estimates that around €2.9 billion are additionally earned through black labour in both, registered as well as unregistered companies. This can be seen as a serious economical impact, especially in terms of unpaid taxes. Thus, unregistered companies would have a significant cost advantage in comparison to their lawful acting competitors. To overcome, or at least reduce, this disadvantage, registered companies are forced to provide better quality. Furthermore these companies need to work as cost efficient as possible. This thesis explicitly addresses both aspects of service operations. Against this background, the hairdressing industry is also of great interest.

4.3 The case companies

This section introduces relevant aspects of the case companies and briefly compares both operational designs. The selection process of the specific case companies is explained under 5.4.1.3 in the methodology chapter more in detail. *Table 5* provides an overview of case companies' characteristics. Both companies share relevant characteristics like location, range of annual earnings, number of employees, as well as

customer interaction points. Furthermore, both companies were founded in 2012 and are family owned.

	Company A (fitness centre)	Company B (hairdressing)
Location	Northern Hessen, Germany	Northern Hessen, Germany
Annual earnings	~ € 250,000	~ € 200,000
Number of employees (FTE)	5	4
Number of customer interaction points	4	4
Founded in	2012	2012
Type of organization	Family owned	Family owned
Prior application of lean	No	No
Prior application of customer integration techniques	No	No
Duration of case study	10 weeks	8 weeks

Table 5 Case study characteristics overview

Neither company A, nor company B have ever applied lean tools before. Furthermore, no systematic management approach has been applied by the companies to integrate customers prior to the case study. These similarities are important in order to make findings comparable. Both case studies were carried out within two to three months. The second case study could be conducted quicker due to lessons learned from the first case company. For instance, process observation sheets were developed in the first company and subsequently applied to the second one as well.

5 Methodology

This chapter aims at developing an overall research design that is suitable to sufficiently respond to the research questions. Therefore, the selected paradigm, research approach and applied methods are discussed. Furthermore, potential limitations are considered and reasons are provided to justify choices.

The research design needs to enable and support the following specific criteria:

1. The overall research philosophy (paradigm) must not contradict overall lean philosophy, e.g. respect for people or perfection as a consequence of improvements.
2. It needs to provide a guided process that facilitates theory development, as well as theory testing.
3. It should be able to cope with quantitative and qualitative aspects as lean implementation in practice always addresses monetary figures, as well as behaviour.
4. Research findings need to provide a certain degree of generalizability, in order to ensure relevance for managerial practice of this thesis.

These main criteria are considered in the following to develop a research design that is suitable to answer research questions and contribute to theory and practice. A summary section that considers this goal is provided at the end of the methodology chapter.

5.1 Paradigm

To understand either natural or social phenomena in a comprehensive and sufficient manner, researcher's perspective needs to be considered. It is important to define what a certain phenomenon means to the researcher and how he or she is going to formulate and approach specific research questions (Guba & Lincoln, 1994). Furthermore, researchers need to be aware of how to act during the research process. They have to decide upon the way of analyzing data and how to provide meaning through interpretation.

Kuhn (1996) suggested using paradigms as maps that should be applied by researchers to simplify the complexity of nature. During the last 40 years many different approaches and schools were established. An early approach sought to distinguish between four different paradigms that depend on the degree of researchers' subjectivity or objectivity, as well as the sociology of radical change or regulation (Burrell & Morgan, 1979). Guba and Lincoln (1994) likewise proposed four competing paradigms where two poles, positivism and constructivism, are predominantly defined through objectivity or subjectivity of a researcher. Post positivism and critical theory are described as in between these poles. However, selecting a paradigm is more than mentioning a label or school for a research. It is about scrutinizing the phenomenon, as well as challenging and developing a personal worldview. Both components contribute to paradigm selection.

The given research questions combine two different approaches. The first question addresses the development of a model. This can be seen as rather theoretical work. The second one focuses on the effects of model application in practice. These effects could either be of quantitative, but also of qualitative nature. Reflecting more broadly on the nature of these research questions, it is likely that the underlying worldview is somewhere in between positivism and constructivism (Easterby-Smith, Thorpe, & Lowe, 1991). To answer research questions appropriately, it is necessary to reveal causes and effects from a quantitative perspective. But it is also relevant to achieve an in-depth understanding. Especially in investigating service organizations, it can be seen as crucial to consider thoughts and perceptions of people (Gronroos, 1978; Vargo, 2008). This is also valid when looking at the five lean principles, where respect for people is one major theme. It is the worker that performs in the end, though he or she strongly relies on e.g. physical conditions, as well as seamless process flow.

To successfully deal with these diverse and complex aspects, it seems to be essential that subjective, as well as objective perspectives should be accepted and considered. Ohno (1988) emphasized company specific solutions in terms of actual operations design. However, this design may be developed through standardized methods at the same time. The overall research philosophy should be able to combine all components of reality, the subjective and the objective one.

5.1.1 Critical Realism

Critical Realism (CR) is one approach that seeks to share ontology and epistemology for both, natural and social science (Sayer, 1992). It is based upon 'transcendental realism' and 'critical naturalism' and is predominantly associated with the work of the British philosophers Roy Bhaskar and Rom Harré, his mentor (Bergin, Wells, & Owen, 2008). Original CR has three core arguments according to Bhaskar (2010). First there is 'the necessity to disambiguate ontology and epistemology, based on a critique of [...] the epistemic fallacy' (Bhaskar, 2010, p. 1). Or in simple words, the real world is more than humans usually know and perceive. The author also argued that reality is differentiated and stratified. This reality can be stained through models to uncover all facets of it (Harré, 2009).

Second, Bhaskar (1998) claimed to differentiate intransitive from transitive aspects of knowledge. Intransitive is related to ontology and the world as it exists. In natural science, it is predominantly independent from actors, e.g. Newton's Laws. However, in social science intransitivity can be dependent as cultures or systems may be changed over time by actors. At the same time, their acting is based upon this culture or rules within a system. Transitivity is linked to epistemology and knowledge. It is a question of what knowledge is applied by people.

Third, CR scholars argued that ontological realism and epistemological relativism, as well as judgmental rationality are compatible. Judgmental rationality emphasizes science not to be arbitrary. It is plausible to judge theories and models to be better or worse than others as long as it is thoroughly based upon rational criteria (Bhaskar, 1986).

In summary, the paradigm of CR assumes ontologically that the real physical world is independent from human thoughts. This is essential to understand natural rules and mechanisms ('real domain'). However, human thoughts and knowledge play a significant role in people's perceptions. Thus, these people may create a subjective reality ('empirical domain'). The linking part between the 'real domain' and 'empirical domain' is the 'actual domain'. In this domain events and experiences are produced on

the basis of real causes and effects in combination with subjective perceptions. The three strata of reality build an essential root in CR (Sayer, 2000).

This clear distinction may positively contribute to revealing underlying mechanisms and effects of lean service model application in practice. Though (company) specific outcomes may vary, the defined model propositions may be universally valid.

5.1.2 Critical Realist Approach

Neither Harré nor Bhaskar provided concrete methods to be applied in CR studies. Hence, CR seems to provide 'a kind of scientific platform, which needs to be extended on a number of accounts when one is going to conduct fieldwork' (Jeppesen, 2005, p. 5). To fill this gap scholars like Sayer (1992, 2000) and Danermark (2002a, 2002b) invented frameworks and research designs to conduct fieldwork. Sayer (1992) distinguished between two different kinds of research designs; intensive and extensive. It is argued that both could be understood as in-depth and breadth approaches. This very simplified definition captures the core of both, but is definitely not exhaustive. However, the nature of intensive research design is to understand how something works and what mechanisms lead to certain effects or perceptions. The extensive one is about systems patterns and general regularities within a certain population. These approaches in general merely compete with each other. On the contrary, they in fact may complement one another.

Referring to the research questions, it can be argued that an in-depth understanding is necessary to provide a suitable new model for customer integration into lean service operations. However, a broader understanding of effects caused by model application is also targeted. Thus, this thesis should not only focus on intensive design, but also consider extensive aspects to provide a broader picture and relevance in practice.

5.2 Research strategy

Matching research methodology and methods with research questions is not always a streamlined process. Especially in social science, the initial research questions may

evolve over time. Guthrie (2007) pointed that the studied phenomenon is going to be discovered step by step and former unknown facets or aspects are described one after another. The phenomenon can be fully explained at the end of the research process. Against this background, the author described the pathway of researchers as artisans on their journey pursuing 'the creative blending of materials, tools, techniques, design, form, and function, often to enable them to realise the vision which inspired them' (Guthrie, 2007, p. 12). Furthermore, research questions may not be fully formed at the beginning, but will be resolved at the end of the journey. This can be seen as in line with the double-loop learning concept of Argyris and Schön (1978) and Argyris, Putnam, and Smith (1985). As the phenomenon itself cannot be understood in full in advance, it is likely that learning processes support necessary adjustments of research questions. However, research methodology and methods are crucial to find sufficient data and enable thorough analysis (Guthrie, 2007).

This thesis aims at developing a model that enables integration of customers into service operations (RQ 1). Additionally, subsequent effects on performance are investigated (RQ 2). The complexity of both questions indicates that an intensive research design like Sayer (1992) proposed is useful. This study is not about testing current lean service theory in practice. It much more seeks to develop a new, improved theoretical concept. Thus, an in-depth understanding of mechanisms and effects within a customer integration process is necessary. As one single method cannot cover these requirements, a mixed method approach is appropriate (Tashakkori & Teddlie, 1998). However, as a certain degree of generalizability is pursued, a suitable research strategy needs to be developed that seeks to avoid unidirectional thinking.

Also the role of the researcher needs to be considered thoroughly. As the research topic comprises a high degree of complexity, it demands a thorough guidance throughout the research process. In current lean application, specific lean agents attend and guide the overall implementation process. These guides are educated in lean methods and transformation. Lean projects that are not guided by lean educated people are more likely to fail (Brophy, 2013; Staats et al., 2011). Thus, it is important to notice that the quality of research findings in this thesis strongly depends on researcher's skills and capabilities.

Carlile and Christensen (2004, p. 14) guided the initial phase of designing the research as follows: ‘Am I resolving an anomaly by suggesting that prior scholars haven’t categorized things correctly? Am I running half a lap or a complete cycle, and why?’ The authors addressed the cycle of theory building in management research. They referred to and improved the former work of scholars like Kuhn (1962) and Glaser, Strauss, and Strutzel (1968) about deductive and inductive, as well as descriptive and normative research.

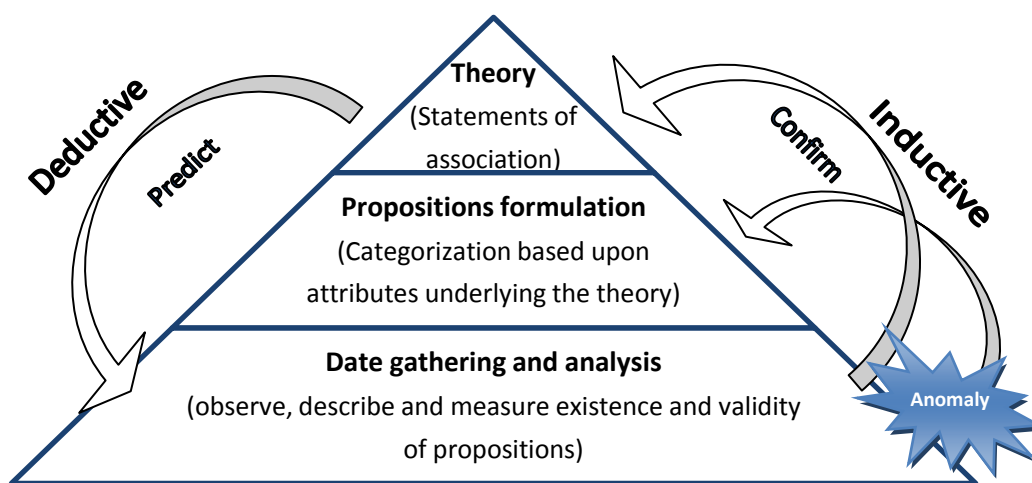


Figure 11 Inductive and deductive theory building and validation adapted from (Carlile & Christensen, 2004)

In Figure 11 the principle of deductive and inductive research approaches are illustrated with a pyramid containing three different levels. The top level represents the theory, which is expressed through statements of association referring to explanations of a phenomenon. Propositions are underlying the theory, representing categories of attributes. These propositions describe the circumstances in which the phenomenon can be or has been observed. The level below addresses data gathering and analysis. It is where observing, describing and measuring the phenomenon takes place or the process of research investigations respectively.

As the given research questions should develop a service specific lean model that is tested in practice, an inductive-deductive-inductive research design is selected in a normative way. This means that the process starts with theory building on existing data and formulating propositions (inductive) via SLR. Afterwards, the model is applied in

practice and validated through testing propositions (deductive). Finally, the model and propositions are improved and adjusted, if necessary.

This study explicitly encourages finding anomalies, as this means to continuously improve the propositions, 'which is the key to being able to apply the theory with predictable results' (Carlile & Christensen, 2004, p. 9). Hence, anomalies are much more considered as a chance to improve the theory, instead of a proof of insufficiency.

One may argue that seeking improvements and explanations is rather an abductive than an inductive approach. Referring to the work of Peirce on abduction, Fann (1970) labelled both approaches as ampliative or synthetic inferences, whereas other writers on Peirce's work refer abduction to deduction (Meyer & Lunnay, 2013). Is abduction about testing ideas (deductive), or is it about the process how new ideas are generated (inductive)? It could be argued that 'Peirce himself did not always keep this distinction in mind' (Fann, 1970, p. 9). Kapitan (1992) even argued that it is not necessary or beneficial to apply abduction as a distinct method as its single steps can either be replaced by inductive or deductive steps. Without further debating these perspectives in detail, it may be considered that abduction should enhance perspectives. This means that in traditional, predominantly positivistic, deductive approaches authors sought to prove or disprove hypotheses without thinking of alternative explanations. Amongst others, abduction should remedy this (Peirce, 2009). Furthermore, it was argued by some authors that proving hypotheses is difficult in social science (Danermark, 2002a; Meyer & Lunnay, 2013). However, the developed theory in this thesis is based on proven methods and clear propositions are applied to validate the model. Thus, an abductive approach, seeking further potential explanations, is not considered in this study. However, this could be relevant in future research projects seeking to further investigate customer integration into service operations in a lean way.

Nevertheless, Critical Realists need to consider not only that something is accepted or rejected after testing, also 'why' phenomena appear needs attention. It is important to work out the 'the causally efficacious generative mechanism or structure' (Bhaskar, 2010, p. 3). This need of understanding underlying mechanisms and structures is a core element in CR ontology. Hence, it is essential to also consider the 'why' in the research

design. Such a design is called retroduction and most CR scholars recommended application of retroduction to gain real insight and understanding (Bhaskar & Danermark, 2006; Sayer, 1992). Some authors even argued that new concepts, which led to real progress, were all derived from retroduction (Ayim, 1974; Meyer & Lunnay, 2013; Olsen, 2007). Without debating these radical statements, it seems that understanding the 'why' is essential to explain phenomena and subsequently 'predict' future implications. Thus, Downward and Mearman (2007) recommended methodological triangulation, the application of mixed-methods to investigate the same phenomena. This aims at facilitating retroduction throughout the research. Furthermore, Danermark (2002b) recommended to investigate extreme cases, where certain aspects of the phenomenon can be considered in a pure or extreme form. Also applying intensive research design several cases within a study is seen as beneficial in retroduction (Meyer & Lunnay, 2013).

Considering the goal of this thesis, it can be argued that it is essential to understand why things work and why not. However, this does not mean to change the inductive-deductive-inductive design. It rather means that data analysis and propositions validation should not solely be about a 'yes' or 'no', but also about thoroughly considering 'why'. Thus, retroduction is applied in this thesis to complement the design, instead of replacing it.

5.2.1 Action Research

A main difference between Action Research (AR) and non-interventionist research approaches is that researchers seek to intervene and co-operate with affected people. The overall goal is to introduce change to a better situation (Argyris et al., 1985). Bradbury and Reason (2001) characterized AR as participative and democratic, pragmatic, action orientated, as well as inspiring to people. It is a participatory way of conducting knowledge from the real world (Sayer, 2000). But is it possible to apply AR within a CR paradigm?

First, CR paradigm rather focuses on the way in which reality is created and perceived. It does not deny any personal perspective. In contrary, it even stresses the importance

of actively acting people as the driving force in the social world. In other words, human beings have to consider 'that they are people and so active agents trying to realise their projects with others' (Harré, 2009, p. 142). Though Sayer (1992) rather described non-interventionist approaches as typical methods like large scale surveys or ethnography, he also mentioned interactive interviews. Houston (2010, p. 73) even argued that this 'combination of philosophy [CR] and method [AR], [...] promotes anti-oppressive social work research and illuminates the processes shaping outcomes in programme evaluations'. In this thesis AR is applied due to the facts that first, implementation of the new model requires a lean educated agent. Second, AR is designed for cyclical inquiry. This is in line with the chosen research design and mixed methods approach.

There are dozens of different approaches of AR or closely related topics like participatory action research (PAR) (Baum, MacDougall, & Smith, 2006), action inquiry (Torbert & Cook-Greuter, 2004), or the learning organization (Harrison & Leitch, 2000). However, all different approaches seem to differ in terminology and marginally in content. Eikeland (2012) explained this fact that often 'the practices of action researchers are better than their conceptualizations of what they do' (Eikeland, 2012, p. 10).

Bradbury and Reason (2001) distinguished between a first, second, and third-person inquiry. Against the background of this thesis, third-person inquiry seems to be adequate, as it is about changing organizations and customer behaviour.

The third-person inquiry could be done in different ways. Fisher and Torbert (1995) suggested four different types including *framing*, which means to share a vision or intention among participants. Further there was *advocating*, characterized by setting a goal with a recommended strategy to achieve it, as well as *illustrating*, that offers a concrete visualized story of the observed. *Inquiring*, which especially means participation, can be done exclusively or in combination with the others. This approach can be seen as similar to the implementation process of the presented lean service model. It seems to be beneficial if the research process is in line with the model to be tested.

Though AR has been predominantly applied in organizational or team environments, Coughlan and Coughlan (2002) put emphasize on the fact that AR is also beneficial to operations management research. The authors strongly recommended applying AR for two main reasons. First, AR is about solving a problem and second, it is also seeking to contribute to science. This perspective of research corresponds well with the general idea of a DBA study. It is also about making contributions to both, science and practice.

5.2.2 The Role of Researcher's Values and Skills

The AR approach seeks to change the given situation to the better. This should be achieved through understanding its nature and collaborative activities. The AR researcher is not an isolated observer, but an interacting individual with feelings, experiences and skills that may contribute to a solution. However, an active researcher may also bias or even impede explanations of phenomena.

Discussing AR from an ontological and epistemological point of view could be done through thinking in boxes and arguing that action researchers apply critical theory as their philosophical background (Waterman, Tillen, Dickson, & de Koning, 2001). Other authors argued that AR consists of a participatory worldview as 'it is unique because it is context-bound and involves action which is designed to change local situations' (Koshy, Waterman, & Koshy, 2010, p. 13). Addressing this debate Carr (2006, p. 422) asked 'why it is felt necessary to define action research by reference to something called a 'methodology''. He intensively discussed this question and concluded that AR should not be seen as a social science research paradigm, but as 'post-modern manifestation of [...] practical philosophy' (Carr, 2006, p. 434). Thus, in one way or another, there is a philosophy underlying AR. As mentioned earlier, chosen philosophy provides insights on researcher's values. Especially in AR designs, it is relevant to consider these and their potential impacts upon research process and findings. The reflective commentary chapter (*Annex VI*) addresses these questions more in detail. It should guide the reader through the researcher's journey and help to better understand judgements and conclusions. An important overall goal in this circumstance is achieving a high degree of transparency on researcher's contribution an impact on

the results. In order not to disrupt the logical flow of this thesis, this detailed chapter is provided in the Annex.

Beside researcher values, participant values have to be taken into account as well. Especially the openness to unexpected happenings during the research process is critical to a successful outcome of AR. Thus, it is recommended to introduce change through overcoming resistances and facilitating a bias free research process as far as possible (Kirshner, Pozzoboni, & Jones, 2011). This means that it is important how participants' behaviour could have influenced the research.

Furthermore, researchers applying AR face challenges that require good management, as well as leadership skills. Furthermore, it is essential that they are able to get access to the core of organizational behaviour. Therefore, they need to set up and facilitate an effective network with participants and stakeholders (Koshy et al., 2010; Mackenzie, Tan, Hoverman, & Baldwin, 2012). Considering these aspects, it is recommendable that researchers have to carefully assess their own strengths and weaknesses.

According to Brophy (2013) lean agents face quite similar challenges when implementing lean in a company. Not only the AR and lean service process, but also the role and needed capabilities of the researcher and lean agent can be seen as matching. Thus, AR seems to be a suitable approach to facilitate a research process that enables successful completion of the overall research project.

5.2.3 Mixed Method Approach

To cover complexity of research questions, a mixed method approach is applied. The goal of applying qualitative, as well as quantitative data is to learn more about a certain phenomenon (Creswell, 2009). This should enrich research findings and derived conclusions. Creswell (2009) further argued that different methods could either be applied simultaneously or sequentially. Sequentially means that different methods are applied one after another, in order to enable multiple learning loops and validate former findings with different methods (Tashakkori & Teddlie, 1998).

Considering given research questions and following the inductive-deductive-inductive and normative research process, a sequential mixed method approach is selected. This enables theory development in several phases and from different perspectives.

The overall research approach is illustrated in *Figure 12*. Initially, an SLR is conducted for developing the first version of the model. This model is a synthesis of already proven models of customer integration and lean tools, as recommended by Harré (2008). However, there is still a need to complement some linking parts in this model, e.g. adjustment of some tools like VCM. Seven propositions are formulated to be able to test and further improve the model.

To validate these propositions and identify potential flaws or anomalies, the new model is applied in two case studies. These are conducted one after another, where anomalies in regards to the propositions and the overall model are identified. Potential anomalies are explored more in detail in experiments. Finally, a revised model is presented. This process should ensure overall quality of results, reduce bias and avoid misinterpretations as proposed by Carlile and Christensen (2004).



Figure 12 Process of sequential mixed methods research approach

A major goal of this approach is to validate the underlying propositions of the model. Therefore, a methodological triangulation is considered. First, a mix of qualitative and quantitative methods within case research should ensure triangulation. Further, for validating propositions it is necessary that evidence is provided by two additional and independent research methods. This means that a proposition could either be validated by both case studies, or by one case study and an experiment. If these criteria are not fulfilled, the proposition is rejected and the model needs to be refined. *Figure 13* (below) displays the process of proposition formulation and validation. Various

sources of data collection should enhance contextual richness of this thesis (Okoli, 2012).

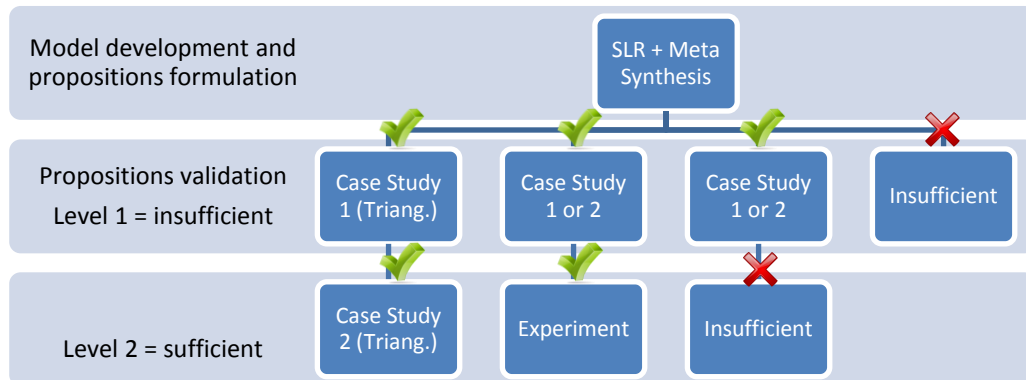


Figure 13 Process of propositions formulation and validation

In line with the quality assessment applied in the SLR, primary data collection methods, analyses and findings are assessed likewise through cross-referencing. However, uncertain results are further investigated with methods that enable an isolation of the phenomenon, e.g. experiments. Such methods provide a deeper insight into causes and effects. Against this background, the risk of falsely rejecting valid propositions, as well as accepting false propositions should be significantly reduced. This enhances overall quality of research findings (Kirk, 2012).

5.3 Systematic Literature Review

The way an SLR is conducted appropriately strongly depends on the research objectives. Literature in services marketing, as well as in service operations management encompasses both, quantitative and qualitative work. Especially scholars applying SERVQUAL method provide in general quantitative data and analysis (Grove & Fisk, 1992). Studies about lean service implementation are also measured by quantitative figures like cost efficiency, but often conducted in qualitative case studies (Barratt, Choi, & Li, 2011; Stuart, McCutcheon, Handfield, McLachlin, & Samson, 2002). Thus, literature review has to handle qualitative, as well as quantitative studies. Against this background, the guideline for management research of Tranfield, Denyer, and Smart (2003) is applied in the following to cope with different forms of data.

5.3.1 Source selection, search boundaries and keywords

Taking into account that there is probably a huge amount of relevant literature available, it is recommendable to focus on higher quality types of sources. Hence, only peer reviewed journals are considered in all data basis to receive good quality results. There are different boundaries needed to identify relevant studies. Three general criteria are set in terms of language, year of publication and object of investigation. These are furthermore applied to separate included from excluded studies. The year of publication is a relevant factor as the phrase 'value co-creation' was defined and introduced by Vargo et al. (2008). Thus articles publicized before 2008 are not considered. Furthermore, literature written in English language is focused in order to reduce the risk of inappropriate results due to mistranslations. As this thesis aims to explore service organizations, the research will investigate methods of value co-creation exclusively. Studies from the fields of health care and banking are not considered as these businesses are quite specific in regards to e.g. sensitive or confidential data. Furthermore, the majority of former lean service studies was conducted within these industries (Suárez-Barraza et al., 2012) without being able to overcome the limitations that should be resolved throughout this thesis. The keywords are designed according to search boundaries and applied to all sources equally. An overview about sources, boundaries and keywords is provided in the following tables:

Sources for journals:

Database Name	Type
Business Source Complete (EBSCO)	Online Database
ScienceDirect – Journals	Online Database
Emerald Journals (Emerald)	Online Database
Web of Knowledge (ISI)	Online Database
Zetoc	Online Database
Directory of Open Access Journals	Online Database
Google Scholar	Online Database

Search boundaries:

Criteria	Value to be included
Year of publication	from 2008 until today
Language	English
Object of investigation	Methods of value co-creation

Search terms and keywords:

service method value "co creation" article OR journal OR "case study" OR survey OR "case studies" "customer integration" –health -banking -handbook -books

5.3.2 Search results

Search provided 105 relevant results. 36 duplicates were deleted from the list and not considered in the 105 results. From Google Scholar the majority of results were retrieved. It delivered 72 of the 105 results, which is equal to 68.5 percent. The other sources provided the remaining 33 relevant results. This is understandable as Google Scholar accesses various further databases like Springer Link, Wiley Online Library and many more. Not considering quality aspects, Google Scholar was the major source of relevant studies.

To assess the studies' relevance to the research object, abstracts were screened. After abstract screening, 67 were rejected due to irrelevance in content. 42 of them addressed the research subject, but did not provide any concrete method or relevant insights that could be used for meta-synthesis. This is valid for approximately 62% of all rejected studies. The other 21 studies were rejected due to the fact that they did not focus customers. Most of them solely addressed internal processes without a clear customer focus, though they were referred to value co-creation. Another 4 studies focused the meaning of a brand and related stakeholder management in marketing communications, as well as in e-business and social media. Hence, these were rejected as well.

Interestingly, 76% of all rejected studies were retrieved from Google Scholar. This indicates that this source potentially delivers less relevant results than the other sources.

5.3.3 Quality assessment

For assessing the quality of remaining studies a rating from 'A' to 'D' was applied according to Downe (2008). Rating 'A' means that studies do not have flaws, or only few ones. The overall criteria of credibility, transferability, dependability and confirmability can be seen as high. Studies rated with 'B' are affected by some flaws, but these are unlikely to negatively affect one or several of the four criteria. The 'C' rating indicates that some flaws probably influence the quality of the study negatively. But these negative effects can still be seen as limited. If studies contain significant flaws that are very likely to affect either credibility, transferability, dependability, and / or confirmability, studies are rated with 'D' and subsequently are not considered in the meta-synthesis (Hirschman, 1986). All studies not rated with 'C' or better were rejected as there is a serious risk that low quality of single studies impairs the validity of the findings in the end.

After quality assessment 27 studies remain and are considered in the meta-synthesis. The rejection of 9 studies is explained more in detail in the following.

The goal of the meta-synthesis is to define a model for customer integration that is valid to be applied in practice. It can be argued that to ensure viability of a process or model, it should consist of parts that have already been proven (Harré, 2008). Therefore, the credibility and confirmability of studies are of special interest. Hence, every considered model or study must provide a sound background of primary, as well as secondary data. Studies that are predominantly derived from literature without proving applicability in practice are rated with 'D'. These studies are Collm and Schedler (2012), Edvardsson et al. (2012), Hongqi and Ruoyu (2008), Skaržauskaitė (2013), Vaisnora and Petraite (2011), Zhang, Miao, Li, and Zhang (2008). Further Wirtz, Nitzsche, and Ullrich (2014) are predominantly theory building upon secondary data and can be seen as not fulfilling quality criteria for this SLR. Ernst, Voigt, and Neumann (2012), as well as Mukhtar, Ismail, and Yahya (2012) describe an application of their models to practice, but do not provide sufficient information about the case company,

data collection and other details. Therefore, credibility of their results is questionable and both studies are rated with 'D'.

The sources of rejected studies are in line with overall proportion of selected studies. 67% of studies rated with 'D' have been retrieved from Google Scholar. Thus, it seems in this case that quality of studies does not depend on the source. A complete list of rejected literature, either due to irrelevance in content, or due to quality reasons, is provided in *Table 22* and *Table 25 (Annex I)*. The pathway of selection is illustrated in *Figure 14*.

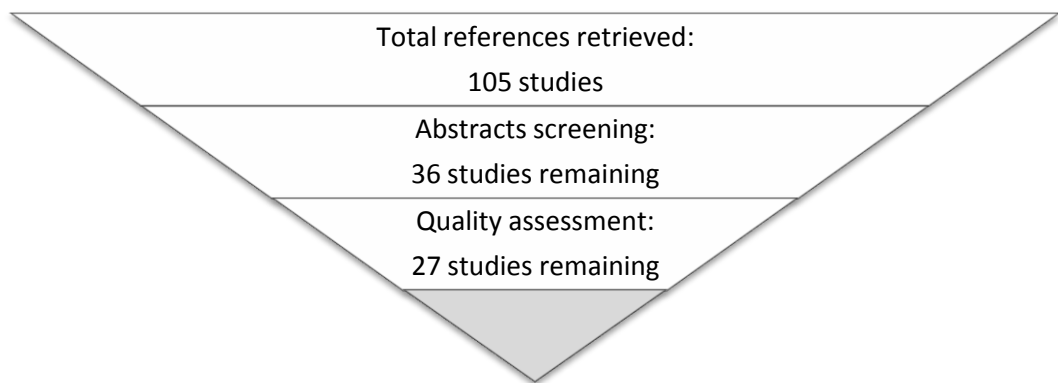


Figure 14 Pathway of study selection

5.3.4 Meta-Synthesis

Following Tranfield et al. (2003) the final steps in SLR are data extraction and synthesis. There are several techniques to do a synthesis of qualitative data. The approach applied in this study is called the 'framework' and describes five stages of analysis:

- 'Familiarization' with the selected studies and the way they are conducted
- 'Identifying' a thematic framework to identify emerging themes and issues (addressing research question)
- 'Indexing', which attempts to spot sections to a particular theme or issue
- 'Charting' means to rearrange the indexed data from the studies into topics or themes
- 'Mapping and interpretation' finally analyzes and interprets the charts and should provide a scheme of the phenomenon (Ritchie & Spencer, 1994)

As the 'framework' is in itself designed to visualize and explain findings in an understandable manner, it is applied in this SLR. Further reasons are that indexing and charting fits well to the research objective, which aims at merging proven processes from different research fields. Originally, issues and themes should arise from the data 'inside out'. An 'outside in' approach might dismiss further issues by focusing on objectives and corresponding core issues.

5.4 Case Studies

Various CR scholars recommended to apply (interactive) interviews and observations for data collection, when an intensive research design is selected (Bhaskar & Danermark, 2006; Danermark, 2002a; Sayer, 1992). It is important to identify relevant rules of behaviour within a system to reveal its underlying mechanisms. Though in qualitative orientated theory-building also other approaches like grounded theory or social constructivist approaches could be applied (Lynham, 2002), case research seems to be most appropriate to connect both research questions in this study (Baxter & Jack, 2008). Each case study can be seen as an instrument to gather data within specific circumstances. Furthermore, case studies provide a framework to categorize the findings for validating and interpreting statements of causality (Carlile & Christensen, 2004; Stake, 1995).

Though case studies may provide rich data, are they also applicable to formulate normative theory? Though some positivists would still argue that only large scale quantitative data could do so, various scholars argued that qualitative approaches are able to provide suitable reliability and validity (Golafshani, 2003; Guba & Lincoln, 1994; Olausson & Bunch, 2011). Furthermore, Voss (2009) stressed the importance of case research within operations management, as only case studies enable an in-depth understanding of phenomena, theories and derived models. However, some authors argued that theory building that only relies on a single case is hard to defend. Such a study may provide narrative richness, but for theory building it is widely seen as insufficient (Eisenhardt, 1989). Nevertheless, 18 years later the same author considered that a 'major reason for the popularity and relevance of theory building from case studies is that it is one of the best (if not the best) of the bridges from rich

qualitative evidence to mainstream deductive research' (Eisenhardt & Graebner, 2007, p. 25). This thesis agrees with this perspective and aims at achieving an in-depth understanding of lean service implementation to develop a relevant model. Yin (2009) argued that multiple case studies provide both, validated theory, as well as empirical richness.

But when should multiple-case research be applied? 'Multiple case study is appropriate when there is some knowledge about the phenomenon but much is still unknown' (Meredith, 1998, p. 452). In this thesis, the concepts of lean and value co-creation, as well as customer integration methods are already known, but have not been synthesized before. It is unknown how this process might work and what effects are likely to occur. Each of the mentioned concepts are quite complex. A combination of them is likely to further increase complexity. Multiple-case research is seen as appropriate to deal with this complexity. Therefore, it is applied in this thesis.

However, 'the challenge in multiple-case research is to stay within spatial constraints while also conveying both the emergent theory that is the research objective and the rich empirical evidence that supports the theory' (Eisenhardt & Graebner, 2007, p. 29). In order to overcome this threat, the authors recommended developing a theory in sections, where each section is validated through at least some of the cases. Eisenhardt and Graebner (2007) also suggested to summarize results in tables, which should support rigor of empirical grounding of theory. Especially the combination of case studies with other research methods 'can offer greater potential for enhancing new theories than either method alone' (Meredith, 1998, p. 441). However, even in a multiple-case approach, all cases should be conducted as independent single-cases. Only the findings should be analyzed and synthesized through cross or multi-case analysis (Dooley, 2002).

5.4.1.1 The goal of case research in this thesis

The goal of case research in this thesis is not to build theory only from the cases. This thesis rather follows Carlile and Christensen (2004) and applies case research as one of

several different methods. It seeks to increase external validity through reducing risks of bias, researcher agenda or misinterpretations.

Multiple-case research is applied due to the following main reasons: First, a referencing system is needed where the new model is applied to and where anomalies may be identified. Second, case research may provide in-depth insights and various perspectives through application of mixed methods to ensure internal validity and contextual richness. Third, AR approach facilitates that emerging improvements may be applied directly to the cases. For instance, lessons learned from the first case study can be adapted to the second one.

5.4.1.2 Addressing the Problem of Validity

A major debate on case research is about validity and reliability (Cook & Campbell, 1976; Gibbert, Ruigrok, & Wicki, 2008; Guba & Lincoln, 1994; Winter, 2000). Guba (1981) recommended to consider credibility, transferability, dependability and confirmability in qualitative research as equivalents to quantitative research quality standards.

Credibility (internal validity) is about congruence of the findings with reality. To ensure a high degree of credibility it is recommendable to apply well established methods, early familiarize with case companies, triangulation, frequent debriefing sessions and similar (Shenton, 2004).

Transferability (external validity) aims that findings are not only valid in one specific case, but also in other populations with similar settings. This means also to enhance the transferability of developed theory. To strengthen transferability of the findings, studies should follow three primary methods for enhancing it as recommended by Meredith (1998):

1. Methodological triangulation within each case study should be ensured, as well as in-depth observations applied to identify more independent variables, which are likely to be the same in other settings.

2. A theory should be applied sequentially to different populations to increase relevance. Furthermore, this process should enable improvement loops if anomalies occur that need to re-adjust the theory.
3. Multiple populations of different industries should be considered to observe the same phenomenon in different settings. It is recommended to select two different extremes or poles, when the researcher suspects that industry is irrelevant.

Also Eisenhardt and Graebner (2007, p. 27) emphasized application of 'polar types' in case research as an important form of theoretical sampling. The authors further highlighted that 'the resulting theory is so consistently supported by the empirical evidence, this sampling leads to very clear pattern recognition of the central constructs, relationships, and logic of the focal phenomenon'.

Shenton (2004) mentioned that dependability (reliability) is closely linked to credibility as the positivistic approach of reliability addresses the possibility to repeat the research generating same or similar findings. Hence, a thorough design of qualitative research enhances both aspects.

To enhance confirmability (objectivity) Patton (1990) recommended application of instruments 'that are not dependent on human skill and perception' (Shenton, 2004, p. 72). As it can be argued that all qualitative methods are affected by humans, it is important to reduce potentially influencing factors like researchers' agenda or bias of participants. However, it needs to be considered that high quality case researchers are not only aware of the four criteria, but 'also demonstrate that they are aware of the relationships among them' (Gibbert et al., 2008, p. 1472). Thus, especially methodological triangulation and mixed methods application within case research can be seen as prerequisites for a rigor research process.

Addressing the quality of theory building from case research it may be summarized that theory building needs to consider careful justification and theoretical sampling of selected cases, as well as a thorough presentation of gathered data. Overall, these steps should lead to clear theoretical arguments, which are based upon profound evidence and contextual richness. As outlined before, the selected research process

design to develop a new model is inductive-deductive-inductive. Thus, this thesis seeks to incorporate above approaches to systematically enhance the validity of applied theory building, as well as application processes within the case research.

5.4.1.3 Case selection

As case studies should build referencing systems in this thesis, it is necessary that they fulfil certain criteria. First, the organizations need to be pure service companies with no or only little product focus. Second, companies with relative simple value co-creation processes should be identified. This is to reduce complexity for both, participants and the researcher. A complex service design would significantly extend time, as well as the complexity of thoroughly analyzing causes and effects on performance. There is a danger that a high degree of complexity may distort identification of underlying mechanisms.

The developed lean service model addresses service operations in general. Thus, industry is seen as irrelevant in this context. Instead, other relevant aspects should be focused. Therefore, it can be seen as necessary that the companies share some relevant similarities, though they represent different industries. For instance, a similarity in service operations may be the same number of customer interaction points with similar purposes.

In favour of a more comprehensive theory, Meredith (1998) recommended that different subjects and populations should be considered. For multiple-case research the author suggested to consider 'polar types or extremes in multiple case studies [...] when [...] the researcher suspects that industry type is irrelevant for this phenomenon' (Meredith, 1998, p. 451). The author further argued that the 'researcher should study the first two populations and leave the bewildering one for follow-on studies' (Meredith, 1998, p. 451). But would two populations be sufficient for building a new theory? Eisenhardt (1989) argued that theory building from case studies should be based upon four to ten different cases. Addressing this perspective, Meredith (1998) emphasized that two cases are sufficient and that it depends on case research purpose and design, not on the number of cases. Other authors like Dooley (2002), Lynham

(2002) and Dyer and Wilkins (1991) even argued that theory building from a single-case design should be preferred, as it contains richer data. In contrast to her clear statement on the importance of number of cases in 1989, Eisenhardt (1991) reconsidered that 'a debate about numbers obscure an essential point [...] [as] the appropriate number of cases depends on how much is known and how much new information is likely to be learned from incremental cases' (Eisenhardt, 1991, p. 622).

However, all mentioned authors predominantly addressed theory building only from case studies. They did not consider additional and independent qualitative or quantitative methods in a mixed method approach. In this context, Yin (2009) described each case as a distinct experiment, whereas multiple-cases may be seen as a series of (laboratory) experiments. This leads to the question if experiments could enhance case research and vice-versa? Without debating strengths and weaknesses of experiments in detail, it can be noticed that experiments can 'provide us with unambiguous evidence about causation' (McDermott, 2002, p. 38). Case studies usually provide less transparency on causes and effects. Furthermore, experiments provide the opportunity to include additional populations with less effort to enhance overall understanding. However, experiments are limited in terms of representing reality as they are conducted in a sort of 'clinical' environment. In turn, this disadvantage may be reduced through the case studies.

Following Meredith (1998) and Carlile and Christensen (2004), this thesis applies two pole case studies from different industries. This is also in line with the recommendations of retroductive research design, discussed earlier. In the following, two pole types of case companies are selected and, if necessary, complemented with experiments. As the degree of customer contribution in service creation plays a significant role in the lean service model, this is selected as the major pole. Thus, one company should provide a service with very limited, whereas the other one needs to be of high customer contribution. As mentioned before, service design, the number and purpose of CIPs, as well as the location and size of the enterprises should be similar.

Amongst other authors, Wainwright (1997) and Barbour (2003) criticized that case study selection, in many cases, is rather based upon personal convenience of the

researcher than supporting purpose and relevance of a study. The authors explained this by the fact that researchers either prefer companies where they already have access to, or firms that hold a good reputation. To avoid these potential pitfalls, case selection has to be thoroughly justified and a systematic selection approach should be chosen (Diefenbach, 2009).

Therefore, in this thesis an outside-in approach is applied. This means that according to the defined poles of customer contribution and pure service environment, appropriate industries are identified. Afterwards, similarities are ensured in terms of location and size. In the end, the researcher familiarized himself with several companies. Finally, one company of each industry is selected. However, also the firms have to be willing to attend the case research.

As described in *chapter 4*, after pre-analysis of potential industries and different service designs, considering the NACE list, the hairdressing and other beauty treatment (limited customer contribution), as well as the fitness and health industries (high customer contribution) have been selected. Word-of-mouth and internet research have been applied to identify potential companies. Afterwards, services of four different companies per industry have been used. The companies themselves have been selected after familiarization with the organizations in terms of culture, as well as their provided services. Both selected companies have an open minded executive management and positive working climate, which is beneficial for change and lean implementations (Bate, Khan, & Pyle, 2000; Brophy, 2013).

The contact to the management has been initiated through personal appointments, where the project and purpose of the study have been introduced. A leaflet with brief information about the project has been provided to the managers. A telephone call has been arranged two days later to discuss open questions and agree or decline the collaboration. The selected companies share relevant similarities. Both contain four CIPs, they are located in the same urban area and are of similar size with four to five full time equivalents (FTE). Furthermore, both companies are family owned and founded in 2012. There has been no personal or business relationship between the researcher and the case companies before the study selection process was initiated.

A branch of a large fitness centre company also agreed to participate in a case study. However, in the introduction interview the manager stated that the ability of improving and redesigning processes would be limited, as all processes were defined and controlled by the headquarters. This fact would have had strong impact on the research approach in terms of complexity and the ability to actually implement changes. Thus, conducting the case study within this company has been rejected due to mentioned barriers.

5.4.1.4 Multiple-Case Research Process

The same research process is applied to all case studies equally to enhance validity of findings. Similar to the overall research process qualitative and quantitative methods are applied sequentially (*Figure 15*). The process contains semi-structured interviews to identify value propositions, process observations, document analysis and Monte Carlo Simulation (MCS). In the end, customer workshops are conducted and regular debriefings enable reflecting on results.



Figure 15 Process of applied mixed methods in case studies

However, this is not a sole straightforward process. All steps may lead to findings that question former insights, which have to be reconsidered afterwards. This means that if e.g. process observations reveal behaviour of staff that seems to be in conflict with semi-structured interviews, this is reflected and discussed again with the former interviewee. Thus, a process of matching and refining findings is implemented. This should ensure valuable insights of case research (Dubois & Gadde, 2002). This approach of internal validation throughout the case research process further reduces risks that case research leads to meaningless event descriptions or data that ‘appear to

provide, at best, partial support of particular theories or frameworks' (Easton, 1995, p. 379).

5.4.1.5 Conducting the case research

It is recommended to reference the data gathering process in case research to a relevant framework (Diefenbach, 2009; Yin, 2009). As a referencing framework this thesis applies the process of the lean service model. Each process step should be addressed by at least three different methods, in order to ensure triangulation and enhance internal validity of the data. This framework of data gathering is illustrated in *Figure 16*.

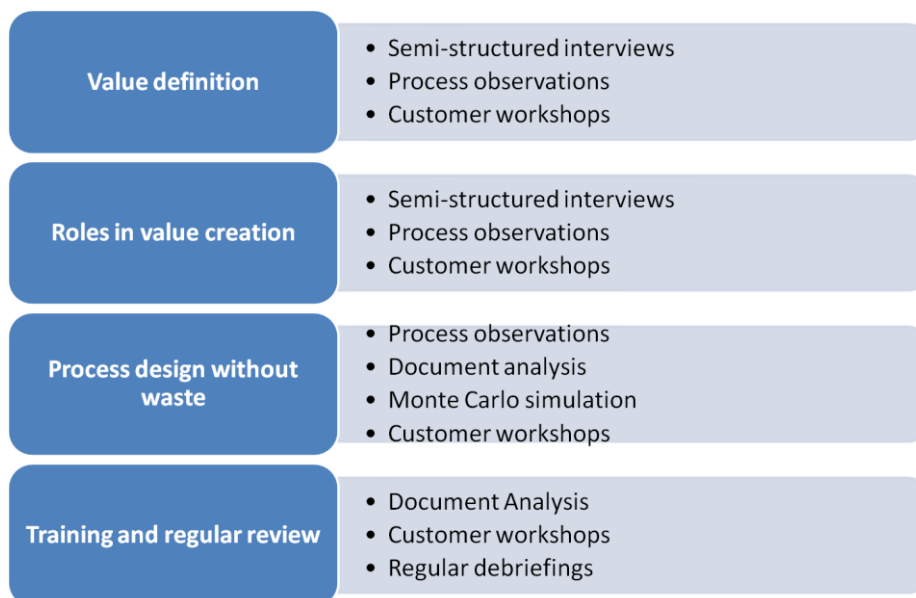


Figure 16 Framework of data gathering

The initial step is to conduct semi-structured interviews with the executive managers. The interviews are twofold. First, general questions about history and general aspects of the company like size and turnover are addressed. Second, the interviewer focuses value propositions and value creation. The interview protocol is designed with open ended questions, which should provide space for the participants to mention aspects that they perceive as relevant. Dilley (2000) argued that the interview 'questions should lead the respondent on a journey, to a frame of mind from which she will understand our "big" questions' (Dilley, 2000, p. 133). Therefore, the author

recommended six core questions for any interview, addressing the 'who', 'what', 'when', 'where', 'why' and 'how'. As the interviews should contribute to definition of value and of roles in value creation, the six core questions are formulated accordingly. Hence, the interview protocol considers the 'why', in terms of the company's history and current structure (1). The 'what' is addressed through company's philosophy and value propositions (2), whereas the 'how', 'where' and 'when' are considered in the questions about the service product portfolio (3), as well as in management's self assessment for their company (5). The 'who' is addressed in terms of target groups and customer relationships (4). Overall, the predefined protocol sections ensure a structured interview process covering the required topics. The blank protocol translated into English is available in *Annex IV*.

Afterwards, process observations are conducted where the researcher observes customer related processes and actors' behaviour (customer and staff). Process observations and experience actual daily business is a core element of lean philosophy. Lean scholars and practitioners seek to thoroughly understand what is really happening and thus, prefer direct over indirect sources of information figures (Brophy, 2013; Ohno, 1988; Seddon & O'Donovan, 2010). Hence, observations and structured assessment of relevant processes can be seen as key in lean methods. Though this method in isolation could not provide a holistic picture, it contributes to learning and understanding value creation processes and performance. This method aims at observing actual without causing unusual behaviour. Hence, the observations are done from the background. However, all participants like customers and staff are informed about the case study and the observations. Therefore, the observations are conducted over several days in each company. This increases probability that observed does not vary significantly from actual behaviour.

The observations are noted on sheets with different columns namely value, roles and process design. Sheets are created for each CIP, considering process steps, cycle times and value adding (Arbós, 2002; Brophy, 2013; Leyer & Moormann, 2012). An example is available in *Table 6*.

Process observation sheet

Case company: A

Customer interaction point: Check-in

Date: 11.08.14

Observer: D. Arfmann

#	Task	Description	Actors	Split	CT	PCT	PCR	CCT	CCR	Est. VA	Observation notes
1	Welcome	Reception of the customer	Receptionist Customer	100%	0:10	0:10	100%	0:05	50%	medium	<ul style="list-style-type: none"> No standardized welcome phrase Initiator of welcome varies (sometimes receptionist, sometimes customer) Customer feel comfortable with friendly reception When reception disengaged, customers uncertain Few customers are welcomed with their names
2	Account card	Hand over account card	Customer Receptionist	100%	0:05	0:02	40%	0:04	80%	low	<ul style="list-style-type: none"> No recognition of names (displayed on cards) Often no communication while handing over Seems mechanical
3	System Check-In	Check-in customer in system and check account details	Receptionist	100%	0:10	0:10	100%	0:00	0%	high	<ul style="list-style-type: none"> Quick overview of customer data (e.g. date of birth) and open items provided in the system
4	Open items	Discuss and resolve / pay open items	Receptionist Customer	3%	3:00 (0:05)	3:00 (0:05)	100%	2:25 (0:04)	80%	low	<ul style="list-style-type: none"> Uncertainty of staff Customers often demand to talk to the manager
5	Locker key	Hand out key for wardrobes in locker room	Receptionist Customer	100%	0:08	0:08	100%	0:02	25%	medium	<ul style="list-style-type: none"> No question of what locker is preferred Quick hand out of keys due to organized key box
6	Good training	Wish good training	Receptionist	100%	0:02	0:02	100%	0:00	0%	low	<ul style="list-style-type: none"> Customer seem to recognize positively a wish on good training Staff very seldom wishes good training Nearly no additional value adding beside these steps (e.g. referring to gastronomic offers) Additional value adding strongly depends on concrete actors (manager = high, temp. staff = medium to low)
TOTAL				-	0:40	0:37	93%	0:15	38%	42%	

Table 6 Example for applied process observation sheet

Throughout the observations, the degree of customer and provider contribution to the value creation is identified. Furthermore, the value adding of each process step is estimated in regards to formulated value propositions and rated with low, medium or high. Comments are made to express impressions, to justify the rating or to identify areas of improvement.

Though process observations are done by the researcher, all findings and ratings are prepared in co-operation with responsible managers and reflected with staff in debriefing sessions to consider consistency.

Next, document analysis is conducted addressing process design and operations in general. Initially, promotion material, internal training documents, as well as job instructions are screened. This is useful to validate and check interview data, e.g. value propositions. Afterwards, IT system data is extracted to better understand the business and value creation. Both companies operate IT systems that offer creation of standard reports and statistics about demand over time, length of customer visits, turnover and other relevant figures. Furthermore, the duration of the relevant process steps are measured manually to set up the VCM. A major contribution of document analysis is to enable consideration of explicit knowledge like training documents. These can be seen as a core tool in job training and staff development in terms of knowledge creation (Smith, 2009).

The extracted IT system data is applied to Monte Carlo Simulation (MCS). This step aims at ensuring that e.g. time measurements are appropriate and that the VCM reflects reality. Especially for such purposes, simulations can be seen as a valuable tool (Richman & Coleman, 1981). As the measured cycle times in process observations only reflect a small portion of all service encounters and activities that occur over time, this gap needs to be filled. Therefore, MCS is conducted ‘to use various distributions of random numbers, each distribution reflecting a particular process in a sequence of processes, [...] to calculate samples that approximate the real diffusion history’ (Anderson, 1986, p. 96). IT system data and documents constitute the necessary boundaries for MCS. These are set for each CIP and transferred to a simulation model in MS Excel. Afterwards, an MCS with 1,000 random occasions is undertaken 150 times and analyzed. An example for machine training is displayed below (Figure 17). X-axis shows the occasion number and Y-axis the random value for duration (minutes).

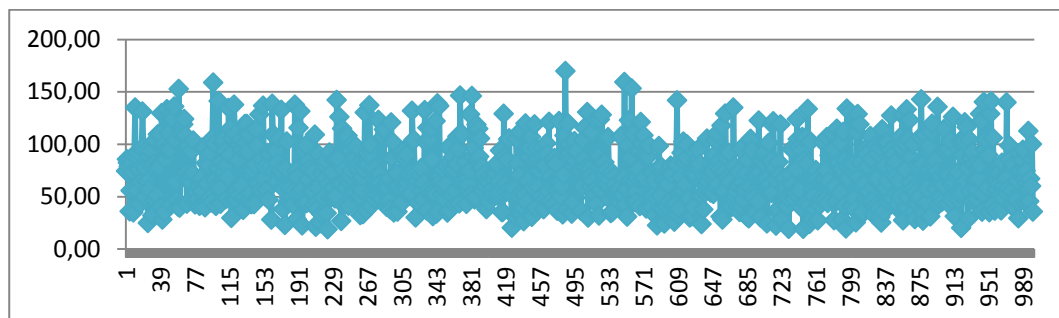


Figure 17 Data of 1,000 occasions of MCS for machine training

The results are double-checked with former measurements and validated with the management. The observed and measured times are assessed against the derived IT data. This enables the researcher to adjust and refine the VCM and ensure accuracy of cycle times. For instance, in case company A the duration of training floor activities has been identified through interviews and observations. Afterwards, the training schedules of all customers, as well as system data has been analyzed to set the boundaries for machine and cardio training. An example outline of the applied tool is provided in *Annex II*. MCS is applied in combination with other methods to enhance internal validity of the gathered data. Though the input data is derived from several sources, the simulation cannot fully reflect reality (Wei-Chang, Yi-Cheng, & Yuk Ying,

2009). However, MCS at least validates former findings and provides further information on daily operations.

Within the customer workshops, customers are directly integrated into the process for the first time. The reasons for conducting customer workshops is that it is identified as most beneficial for successfully integrating customers (Fredberg & Piller, 2011; Füller, 2010; Mota Pedrosa, 2012; Tossavainen, 2013). This approach could be labelled as the 'direct way' for customer integration. However, also through application of an 'indirect way' like questionnaires it would be possible to gather the needed data. Nevertheless, it would mean to prevent beneficial interaction between customers and providers.

The workshop participants are selected by the manager and critically reviewed by the researcher against lead user characteristics. A list with lead user characteristics is provided to the manager in advance to the selection process. Afterwards, the manager should explain the reasons for selecting certain participants. As one main aspect of lead users is intrinsic motivation (Ernst et al., 2012), no incentives for participation are announced in advance. The number of total participants is limited to ten people as recommended by Williams and Saunders (2006). At least 50 percent of participants should be customers. The duration of the workshops is set between two and three hours. This duration considers managers' concern that customers would refuse to attend longer workshops, whereas shorter workshops would probably not be able to provide relevant results. Due to a thorough workshop preparation based upon former findings, the duration is expected to be sufficient to provide valuable results and keep participants' motivation high. All participants receive brief information about workshop's purpose and duration in advance, as well as that participation is voluntary. They should also sign a document with information about the project and purpose, which they receive prior to the workshop.

In general, all workshops follow the same agenda. First, participants are briefed about purpose, circumstances and process. Afterwards, participants are asked to set a marker to the 'mood barometer', in order to indicate their mood. They are also asked to express what they expect from the workshop. Afterwards, value propositions are captured and categorized in emotional and functional value. The next step is to identify

and assess CIPs. This evaluates the quality of customer and provider contribution to value creation at each CIP. Finally, ideas for improvements are generated through brainstorming technique (Kuo et al., 2011) and rated. Afterwards, participants rank improvements and agree on implementation of these improvements. At the end, all participants are asked to provide feedback on the workshop and to indicate once again their mood on the 'mood barometer'. All participants receive a protocol of the workshop two weeks after the workshop. This is done to ensure that results have been summarized correctly.

Enduring the overall case study process, regular debriefings take place. The debriefings last about 15 to 30 minutes, where the researcher presents results to the participants that need to be reviewed. This includes interview and workshop protocols, observations and document analysis data. If necessary and reasonable, the data is double-checked and adjusted as recommended by various authors (Diefenbach, 2009; Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Voss, 2009). Furthermore, the debriefing sessions are designed to develop, discuss and decide on (process) improvements that should be implemented.

5.4.1.6 Data analysis

The process of data analysis refers to the seven propositions. It is a deductive approach testing the propositions in the case company. First, interview data is screened and codified addressing 'value definition' and 'roles in value creation'. However, if items occur that cannot be clearly allocated to a given column, a new column is created. The results are visualized into a table, validated and matched with subsequent process observations. Necessary adjustments are made through meta-synthesis of the qualitative data. At the same time, initial VCM is created based upon process observation charts. The results are validated afterwards through simulation via MCS. Additionally, the simulation provides quantitative insights about status and trends of the organizational performance related to CIPs. The analyzed figures are utilization of resources, demand over time (year, month, and day), as well as turnover (per period and per service encounter). Then, VCM is going to be revised and adjusted. Finally, the

customer workshop results are analyzed and codified in the same way like the interviews.

Afterwards, the results of each data collection method are referred to the propositions.

The following criteria are considered for evaluation:

1. Does the method provide information on the proposition?
2. Is the information relevant for proposition validation?
3. Do the relevant information support the proposition or not?

In the end, a table is prepared for each case company, providing results of the analysis. All steps of the analysis are considered through debriefing sessions with the involved parties. The reason for this is not only to ensure validity of data, but also ensure validity of analysis and synthesis.

5.5 Experiments

Experiments can be seen as a valuable method to test and improve new approaches. It allows researchers to clearly identifying causes and effects, as well as facilitating measurement and providing the ability to explore details. Furthermore, it is less time consuming and less costly than e.g. case studies (McDermott, 2002). Though there are some disadvantages like questionable external validity or the use of an artificial environment, 'experiments are a major method [...] use[d] in BOM [Behavioral Operations Management]' (Katok, 2011, p. 2). The experiment method is applied to explore a specific aspect of the overall concept more in detail. This enables the researcher to thoroughly identify causes and effects, as well as developing approaches for overcoming these anomalies. This may lead to improvements of propositions or of the model respectively.

When anomalies occur within the case studies, these are further explored and potential solutions are provided through experiments. There are three main reasons why solutions development for anomalies and testing of these is not done within the case studies. First, causes and effects should be thoroughly identifiable. That means that through isolating the phenomena, interferences are minimized. Second, testing different solutions is time consuming and errors might negatively impact the business

of the case companies. And third, various populations could be considered in experiments in a shorter period of time. This can be seen as enhancing generalizability and overall validity of findings.

In the following sections, the specific experiment that has been conducted is explained more in detail.

5.5.1 Experiment on customer perceptions

This experiment addresses proposition 3 (customers need to be perceived as value co-creators). The experiment is necessary as results from case company A do not support the proposition sufficiently. Some observations throughout the case study are mentioned in the following to better understand the problem.

Though customer contribution has not been perceived as perfect within the customer workshop, no ideas improvements have been addressed. Interestingly, the participants have rated customer contribution higher after implementation of improvements, albeit these have only been made on provider's side. This leads to the hypothesis that in contrast to the concept of Vargo et al. (2008), customers do not perceive themselves as value creators in service circumstances. This could be called 'serve me mentality'. Thus, proposition 3 cannot be approved without further investigations.

Taking into consideration that Büttgen (2007) highlighted awareness as one major factor for value (co-) creation perception, the perception could potentially be increased through increasing awareness. To learn more about customer perceptions it is recommendable to address a broader range of subjects. At the same time, there is a need for thoroughly isolating causes and effects under controlled conditions. Furthermore, it could be seen as beneficial to address changes through manipulating participants' awareness on the role of customers in value creation processes (Steckler, McLeroy, Goodman, Bird, & McCormick, 1992).

The goals of this experiment may be summarized as twofold. First, it needs to be validated and further explored if customers are perceived as value (co-)creators or not.

Second, it is of interest how this perception could be enhanced. Experiments can be seen as appropriate to achieve these goals (Katok, 2011; List, Sadoff, & Wagner, 2011).

5.5.2 Hypothesis formulation and experiment validity

When running experiments, it is necessary to define hypotheses. Usually two contrary hypotheses are formulated. First, a NULL-hypothesis (h_0) is defined that should be tested to be true or false. The second hypothesis (h_1) is usually defined as the opposite of h_0 (List et al., 2011). As proposition 3 is tested, it has to be transformed into hypothesis statements. As beside hypotheses testing also potential solutions should be considered, the solution is going to be integrated a priori. It can be presumed from the case study that, according to Büttgen (2007), insufficient knowledge about concrete contribution tasks leads to uncertainty and underestimation of customer contribution. Hence, it should be tested whether explaining necessary customer tasks has effects on participants' perceptions. It is common that the NULL-hypothesis is chosen as the one which is likely to be true (Kirk, 2012). However, for testing the hypothesis expected means (μ) need to be defined. It is easier to estimate no effect, as the difference will be equal to 0. Hence, the hypotheses are designed as follows:

- h_0 : The explanation of customer tasks in service value creation has no influence on perception of degree of customer contribution ($\mu_0 = \mu_1$).
- h_1 : The explanation of customer tasks in service value creation changes the perception of degree of customer contribution ($\mu_0 \neq \mu_1$)

The experimental design should approve or disprove potential enhancement of perception through explanation. Furthermore, it should provide insights on how people perceive customer contribution in service circumstances to test proposition 3. Therefore, an interval scale of perceived degree of contribution is designed for provider pole (-10), customer pole (10) and in between (0). To measure changes in perception a pre-test and test after treatment are conducted. In the pre-test, participants are asked to indicate the degree of customer contribution in seven common services, e.g. public transport (*Figure 18*). The participants receive a picture and the name of the service without further explanations of tasks. Afterwards, the 'manipulated' treatment 1

includes an explanation of underlying tasks and responsibilities of the same services. Participants should then indicate once again how they perceive the degrees of contribution. This design addresses both, the perceived degree of contribution without and with specific information.



Public transport

Degree of contribution to value creation

Provider					Both						Customer									
10	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	10



Figure 18 Experiment: Pre-test example for public transports (translated into English)

Similar to the case studies, internal and external validity need consideration. There are some common measures to enhance validity. First, experimental design has to ensure that any interferences or implications that have nothing to do with the experiment have to be avoided (Katok, 2011). Furthermore, participants may learn from test to test what it is about and hence, would perform differently even without treatment. In consequence, this could lead to falsely accepting or rejecting the hypothesis. Thus, it is useful to keep the time between pre-test and treatment as low as possible (Kirk, 2012). The author further recommended reducing bias of either participants or researcher through single- or double-blind procedures. These procedures aim at avoiding potential manipulations by any party. A single-blind procedure is useful in this study, as it is not necessary to inform participants in advance about procedures until the experiment begins. However, the purpose of the experiment is not provided. This might influence participants in a way that they behave in an unnatural manner. Though the double-blind method may also enhance internal validity, another approach is applied in this study to reduce researcher's influence on participants. The treatment is provided in

written statements, so that each participant in all groups receives the same information without any implicitly or explicitly made influences by the researcher. Furthermore, the distribution of participants to groups is going to be done via randomization to eliminate the risk of biased distribution (Katok, 2011).

Second, it is important to consider external validity, in order to create a sufficient experimental design to successfully accept or reject the hypotheses. A common method is the replication of experiments several times, in order to ensure that the phenomenon can also be captured in other circumstances (Katok, 2011). Additionally, untreated control groups are applied as a reference to the treated ones (Voss, 2009).

Experiments may create two different sorts of errors. A true hypothesis could be falsely rejected, which is called 'Type I' error. But also a false hypothesis could be falsely accepted, 'Type II' error. The probability to achieve Type I error is statistically expressed through a significance level of α , whereas Type II error through a β -level (List et al., 2011). Hence, the determination of both levels extensively influences external validity of findings. High significance levels provide a higher probability that findings reflect reality. In literature, an α -level of 0.05 and a β -level of 0.20 (representing power of 80%) or higher are accepted to be statistically relevant (Kirk, 2012). Through the application of factor estimations, it is also possible to calculate in advance the needed number of total participants in order to achieve a certain value of significance. This can be done through *Formula 1*, where N^* is the total number of participants, t_α and t_β are taken from normal distribution table, σ is the standard deviation, δ determines the change of σ to be detected, while π represents the weighted values of σ (List et al., 2011). The variances are estimated to be different, as the control group does not receive any treatment, whereas the other group does. The values of α and β can be chosen by the researcher, reflecting the degree of significance. The same is valid for δ . However, the value σ cannot be simply set, as this strongly depends on specific experimental design.

$$N^* = \left(\frac{t_{\alpha/2} + t_{\beta}}{\delta} \right)^2 \left(\frac{\sigma_0^2}{\pi_0^*} + \frac{\sigma_1^2}{\pi_1^*} \right)$$

$$\pi_0^* = \frac{\sigma_0}{\sigma_0 + \sigma_1}, \quad \pi_1^* = \frac{\sigma_1}{\sigma_0 + \sigma_1}$$

Formula 1 Calculation of number of participants with different variances adapted from List et al. (2011)

Applying the above formula to the given experiment, α is set to 0.05 significance level, representing 95%, β is set to 0.20, meaning that power is 80%. The resulting values of 1.96 for t_{α} and 0.84 for t_{β} are drawn from normal distribution table, assuming a normal distribution of results in the overall population. The values for standard deviation can be guessed, retrieved from previous studies of the same population, or estimated through pilot studies (Kirk, 2012). In the absence of former studies, a pilot test with 5 participants for control group and treatment has been conducted. The test indicated a σ_0 of 2.07 and a σ_1 of 0.73. For this study, the level of δ is set to 0.60. Applying these figures to the formula, a minimum value of 90 participants is retrieved. This value probably does not represent the exact figure of needed participants, as standard deviations probably will change. But it at least provides an idea how many participants should be included in order to make results statistically relevant.

5.5.3 Experiment design for propositions testing

Participants are told that they have to fill a questionnaire with two sections. In the first section the services are only named and illustrated with pictures. Section two includes the same information, but also provides additional information on tasks for the treatment group. The control group does not receive additional information, but has to fill in the second part also.

Six different group experiments are conducted, where between five and fifteen participants will be involved in each experiment for this research. The groups are selected randomly and the distribution of treatment and control participants is also done randomly with 4:1 ratio. Each group receives the same questionnaire for pre-test purpose. Questionnaires contain questions and pictures of seven different services, where participants should indicate the contribution level of providers and participants. For example, a picture of public transport is shown. Then, the participants indicate their perceptions on the interval scale. Afterwards, participants are asked to do the same thing again, but additional explanations about customer tasks within the specific services are provided. The control group does not receive this and has to do the exercise again without additional information. This is done to compare the difference in values. As the overall perception of contribution level might vary significantly between the participants, the difference of pre-test and dependant value after treatment is focused. NULL-Hypothesis supposes that there is no impact on mean value through the treatment. Hence, the estimated difference for both groups is 0. *Figure 19* shows the experimental design, containing six different groups with each between five and fifteen participants each and a randomized distribution of participants to treatment and control groups of 4:1. This means that one out of five participants is randomly allocated to the control group. In this experiment there are no ethical threats for distribution. Thus, the random allocation can be seen as applicable and beneficial (Kirk, 2012).

Boundaries for participant selection are predominantly to access. As all German people using pure services are of interest, the total population can be estimated with >80 million subjects. Hence, the sample could be retrieved from any randomized group of individuals in Germany. However, the

	Dep. Var.	Treat. Level	Dep. Var.
Group 1	Participant ₁	a_1	Y_{12}
	Participant ₂	a_1	Y_{22}
	Participant ₃	a_1	Y_{32}
	⋮	⋮	⋮
	Participant _n	a_1	Y_{n1}
	$\bar{Y}_{.1}$		$\bar{Y}_{.2}$
Group 2	Participant ₁	a_1	Y_{12}
	Participant ₂	a_1	Y_{22}
	Participant ₃	a_1	Y_{32}
	⋮	⋮	⋮
	Participant _n	a_1	Y_{n1}
	$\bar{Y}_{.1}$		$\bar{Y}_{.2}$
Group ...	Participant ₁	a_1	Y_{12}
	Participant ₂	a_1	Y_{22}
	Participant ₃	a_1	Y_{32}
	⋮	⋮	⋮
	Participant _n	a_1	Y_{n1}
	$\bar{Y}_{.1}$		$\bar{Y}_{.2}$
Group 6	Participant ₁	a_1	Y_{12}
	Participant ₂	a_1	Y_{22}
	Participant ₃	a_1	Y_{32}
	⋮	⋮	⋮
	Participant _n	a_1	Y_{n1}
	$\bar{Y}_{.1}$		$\bar{Y}_{.2}$

Figure 19 Experimental design with 6 groups and N = ~90 participants randomly assigned in 4:1 ratio to treatment and control groups adapted from Kirk (2012)

aspect of access and costs can be seen as limiting factors (Katok, 2011). This study seeks to include not only one sort of participants, e.g. business administration students, but also other groups to receive a broader picture. Hence, different sorts of institutions are contacted to get access to a larger amount of people that can be applied to this project. Thus, adult education centres offering cooking or sewing courses, sports clubs, as well as universities are contacted. This is done in the area of Central Germany, in order to limit effort and make experiment conduction manageable for the researcher.

5.5.4 Data analysis

There are various statistical methods available to test experiment data with two independent samples like the Student's t-test, Welch-test or Gauß-test (Wang, 1971; Weigand, 2006). Though the given design should come up with data of two independent samples, treated and control (untreated), it cannot be ruled out that there will occur more than these two independent samples. For instance, if factors like age, education or suchlike would influence the results. Therefore, a method should be applied that is able to cope with variances between, but also within groups. The analysis of variances (ANOVA), which is similar to the t-statistics approaches, enable researchers to cope with these threats (Miller, 1997).

ANOVA first determines the sum of squares in total, within each group and between groups. Afterwards an F-ratio, depending on the degrees of freedom, is calculated to accept a hypothesis or reject it (Kirk, 2012). The data preparation and analysis for this thesis is done in MS Excel and applies its standard calculation formulas and reports for ANOVA analysis. The analysis considers the stated experimental design factors for α and β , as well as of the estimated μ of 0.

5.6 Research Design Limitations

In this section, several limitations are discussed that may affect the overall research findings. These could be of methodological nature, researcher bias or even occur due

to inappropriate translations as this study is conducted in German, but presented in English language. These three categories are definitely not exhaustive in terms of potential limitations. However, various authors predominantly addressed issues in research methodology, external and internal validation, as well as bias in regards to research limitations (Creswell, 2009; Price & Murnan, 2004; Yin, 2014). This study additionally considers the translation dilemma as recommended in various articles, e.g. by Temple and Young (2004) or Roth (2013).

5.6.1 Methodological limitations

There are several methodological limitations that need to be considered in this thesis. Some limitations lie in the overall research design. As this thesis is conducted in social science, formulation of propositions could be insufficient. The propositions aiming at categorizing the circumstances in which the model is valid. However, it could be that either too many or too less have been formulated (Carlile & Christensen, 2004). Applying too less propositions may mean that circumstances are too vague, whereas too many may lead to a too narrow framework or reflecting insignificant factors. Both aspects could cause false identifications of correlations that actually do not exist (Dooley, 2002). This thesis seeks to reduce this risk through the application of already proven models and methods in the SLR. This aims to enhance the overall quality of meta-synthesis and also supports the formulation of relevant propositions.

Further potential limitations are caused by the applied strategy of enquiry and methods. Though the purpose of Action Research could be seen as providing 'many ways in which social science researchers can [...] overcome the limitations of traditional methodologies' (Somekh, 2005, p. 1), the application of AR also contains several limitations. As AR researchers play an active role throughout the research process, findings are strongly affected by them. Hence, it can be seen as critical to thoroughly reflect on researcher's bias and to avoid constructed findings. To reduce potential risks of 'producing' data, Baum et al. (2006) recommended application of regular reflection cycles among participants. Beside reflection, Mackenzie et al. (2012) placed high value

on defining clear roles and responsibilities for the research project and thoroughly considering relationships between researchers and participants.

Case research contains the already in section 5.4.1.2 discussed issues of generalizability, transferability, reliability and confirmability. To enhance the quality, mixed methods are applied within the cases and pole cases are identified and selected. However, as only small pure service companies are selected, the transferability is limited to these specific circumstances. Even if it could reasonably be argued that similar effects can be presumed for other circumstances, e.g. larger companies, subsequent studies would have to further investigate these aspects (Meredith, 1998). Nevertheless, the application of small companies in this study reasonably makes sense. It reduces complexity and thus enables to investigate interlinked causes and effects in value (co-) creation throughout all CIPs. The limited complexity of each case further supports a better understanding of underlying mechanisms (Meyer & Lunnay, 2013). The issue of objectivity, referring to confirmability of the study, is also affected by researcher bias. This aspect is discussed more in detail in section 5.6.2.

Limitations of experiments lie predominantly in the experimental design. A sufficient number of participants can be seen as crucial to be statistically relevant. However, it would be 'waste' to conducting additional experiments when relevance of results is already given. Hence, a constant review of results after each treatment is beneficial (Kirk, 2012). Further sources of limitations could be confounding variables. This is the case if other factors than treatment factors influence dependent variables, as well as selection bias (Buckless & Ravenscroft, 1990). In particular, it can be presumed that the longer the time between pre-test and post-test in an experiment, the more likely it is that confounding variables may occur (Kirk, 2012). As the given experimental design reduces the time between pre- and post-test to a minimum and participant selection is done by diverse external institutions, selection bias can be seen as limited. A rather statistical problem for data analysis occurs through the application of ANOVA. This method detects significant differences in cell means, but it does not indicate functional form of relationships among cell means (Buckless and Ravenscroft 1990). This means that ANOVA can approve or disprove hypotheses, but is not able to provide insights to

the 'why'. Though this fact can be seen as common in deductive research methods, it has to be considered in data analysis and discussion (Meyer & Lunnay, 2013).

5.6.2 Researcher Bias

A significant aspect in any AR approach is researcher bias. Researchers may deal with this potential limitation especially through effective reflection practice. This practice is not limited to self-assessment and researcher's own perceptions, it is rather an underlying rule of conducting AR, and should be considered at all stages of the research process (Argyris et al., 1985; Bradbury & Reason, 2001).

There are several methods recommended by scholars to reduce risk of researcher bias affecting research findings in AR. Pain, Harwood, and Mullen (2012) pointed that the researcher needs to be aware that his actions may facilitate but also impede change. Thus, reflecting on actions and behaviour is important. This study seeks to facilitate reflection through debriefing sessions, as well as reflective commentary chapter, which aims at reflecting on research process and findings, as well as researcher's role. Furthermore, a trustful relationship between the participants and the researcher is highly relevant in change processes (Koshy et al., 2010; Mackenzie et al., 2012). In this study, the researcher takes the role of a lean expert to facilitate application of the model. Thus, throughout the case studies the researcher needs to 'building a platform of understanding', 'creating a shared vision' or 'learning from experience' (Mullins & Christy, 2010, p. 319).

However, AR is not a researcher centred approach. It is much more a participatory approach that integrates all participants and seeks to initiate a process of change to the better (Pain et al., 2012). Nevertheless, Voss, Tsikriktsis, and Frohlich (2002) strongly recommended to consider researcher's bias associated with a high interest in the field of study. It is likely that the author of this thesis is highly interest in lean service. This could be seen as encouraging to providing valuable research results. But this could also lead to constructing findings, if the researcher tries to simply prove his assumptions. Hence, a thorough reflection process considering diverse sources of information is

indispensable. Main sources for reflection are gathered data within the study, discussions with participants and peers, as well as the researcher's diary.

In summary, the selected mixed-method research design should contribute to reducing potential bias. Furthermore, complete transparency of the data collection and analysis process, as well as reflective commentary practice should also increase reliability.

5.6.3 Translation dilemma

An important, although often disregarded, topic in research design and process is the dilemma of translation (Temple & Young, 2004). But what does translation mean? Is it about transferring a word of original language into target language? Does it always find equivalent expressions? Would all translators use the same words for translation? These questions provide a brief idea of dilemma's complexity.

Having a closer look upon the meaning of 'translation' a web dictionary provides three results. This is first, to 'change words from one language into another language', second 'to explain something in a way that is easier to understand', and third, 'to have the same meaning' (source: Merriam-Webster Website). The Oxford Dictionary defines 'to translate' as 'express the sense of (words or text) in another language'. Against the background of these diverse definitions, it is questionable if only a translation of words from one language into another should be considered. Roth (2013) argued that translation happens every day, even within the same language. He pointed that people tend to say the same in other words until it is understood by their audience. Referring to an Italian saying, the author further mentioned that 'to translate is to commit treason' (Roth, 2013, p. 8). It may be argued that analysis and interpretation of any research data can be seen as a form of translation. It is about transferring meaning from investigated subjects to their findings and conclusions. Thus, the translation dilemma is not only relevant to researchers applying two or more languages within a study, but to all others as well.

Exploratory investigations did not identify significant differences of research results through translations, but identified certain issues to be considered by the researcher

(Twinn, 1997). These issues are that native speakers' interpretations could vary from the original meaning, as well as that for some words there might be no equivalent expression in the target language. Furthermore, the 'Dross rates', which are applied to indicate meaningless content in qualitative interviews, could be misleading (Twinn, 1997). The author recommended overcoming these barriers through the application of only one translator for all data. This should ensure coherence. But problems do not only occur on methodological methods.

Temple and Young (2004) highlighted the importance of researcher's epistemology in treating the dilemma. When the researcher holds a positivistic worldview, objectivity is of special interest, whereas constructivists would also consider the influence of their bias in translating data into meaning. Furthermore, it is of great interest 'when' the translation is done in the research process and 'who' is going to translate. Does the researcher act as the translator or does an external person do the translations? These decisions clearly affect data validity and reliability (Temple & Young, 2004).

This thesis is written in English language, but conducted in Germany, in German language, with German participants, by a German native researcher and hence, fully 'biased' in terms of German cultural aspects. However, as the research design is based on both, quantitative figures, as well as qualitative data, the risk of significant misinterpretations could be reduced through a sequential review and comparison of data. This is already considered in research design. Also the implications of researcher bias on giving a different 'meaning' to data, has been previously discussed. It also needs to be considered 'when' the translation takes place and 'who' is going to act as translator. Following the idea of Twinn (1997), it is recommendable to only apply one translator. The research topic contains a significant complexity and topic specific expressions like cycle-time, waste, or customer-interaction-points. Thus, translator should be aware of these expressions and their specific meaning. Hence, it can be seen as beneficial that the researcher also acts as the translator for data gathering and analysis in this thesis. Furthermore, it can be seen as beneficial to delay the translation after data analysis as the 'early "domestication" of research into written English may mean that the ties between language and identity/culture are cut to the disadvantage of non-English speakers' (Temple & Young, 2004, p. 174).

As case study participants speak, work and think in German language, it is useful to keep data in their language, e.g. for debriefings, and to translate after completion of the case study. This also reduces the risk of mistranslations and change of meaning caused through re-translations (Roth, 2013). However, it needs to be considered by the researcher that translation is done appropriately and that the content reflects the same meaning afterwards. This could be achieved through discussions and presentations of results with native speakers, e.g. the supervisors.

5.7 Ethical considerations

The University of Gloucestershire's Handbook of Research Ethics is adhered to during all participant selection, data gathering, analysis and interpretation processes. This means that participation of customers, case companies and students is always voluntary and all data is kept anonymously and confidential as long as disclosure is not explicitly allowed by participants or the case companies. Gathered primary data, which will not be included in this thesis or annex, will be destructed completely after final approval of the thesis, considering data security.

This means in particular that throughout all participant selection processes any discrimination due to age, nationality or similar needs to be avoided. Therefore, case company selection process has been guided by clear criteria. Furthermore, the process and concrete measures within the study have been made transparent to all case companies and participants in advance. This has been done either through leaflets, personal conversations or group information sessions. Transparency has also been enhanced through regular debriefing sessions, as well as through immediate presentation of data gathering results and conclusions.

The researcher has always emphasized the voluntary character of any undertaken activity like interviews, workshops, document analyses or suchlike. The interviews have been designed and conducted in a way that participants should feel comfortable with. The meetings have been scheduled in best time prior to the scheduled date. Furthermore, it has been considered that questions can be answered appropriately, e.g. due to position and knowledge of the interviewees, in order not to overburden

them in any way. The ‘mood barometer’ that has been applied in the customer workshops should also contribute to an open-minded and well-being oriented atmosphere.

Overall, the ethical considerations within this thesis may have enhanced a positive working climate throughout the research process and data interpretation.

5.8 Methodology summary

In order to provide an overview on the research strategy and methods, a framework of Creswell (2009) is applied. The framework considers the chosen paradigm, research strategy, methods and the overall research process.

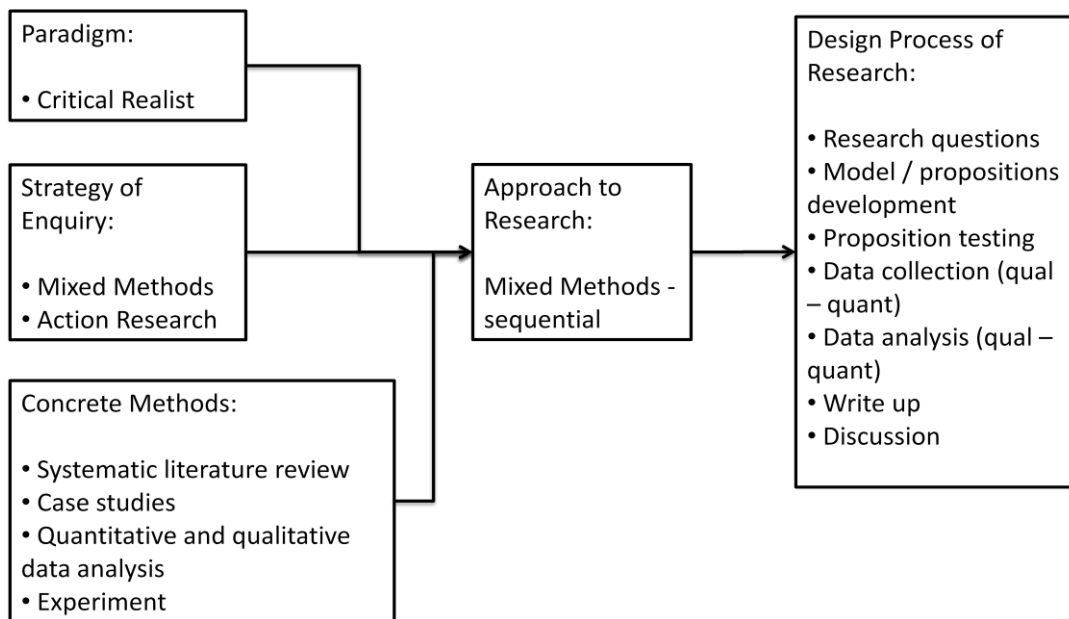


Figure 20 Research design framework adapted from Creswell (2009)

It may reasonably be argued that the chosen research design is in line with the overall lean philosophy. Especially the AR approach seems to be closely linked to common lean implementation process and core challenges. Furthermore, the mixed methods enquiry strategy considers and combines different sorts and sources of data. SLR represents an inductive approach for model development, whereas case studies and experiments represent deductive theory testing, but also inductive theory improvement. The mixed methods approach and methodological triangulation are applied to cope with qualitative and quantitative aspects of model implementation. It seeks to consider

various perspectives in order to gain an in-depth understanding of the phenomenon. The application of pole case studies and a high degree of internal validity contribute positively to reasonably generalize the findings to a certain extent.

Thus, the selected research design fulfils the four relevant criteria to successfully answer the research questions that have been outlined in *section 5*.

6 Findings

This chapter presents the findings of applied methods. According to Yin (2003) the case study findings are reported and referred in return to the formulated propositions. Each pole case is reported separately in this way. Next, a cross-case analysis is conducted to consider the propositions as valid, invalid, or to decide that further investigations are needed. The experimental findings are addressing further investigations and are presented afterwards.

6.1 Case study findings

In the following, the findings of each case study are presented referring to the propositions. An overview on applied methods and their influence on each proposition are provided in a table for each case study. The methods are assessed against three criteria. First, does the method provide any information about propositions (row information)? Second, is this information relevant for proposition validation (row relevant)? And third, do the findings support validity of the proposition (row support)? Afterwards, findings are presented more in detail referring to relevant information and validation. In the end, a summary of case study findings is presented that outlines accepted and rejected propositions, as well as necessary further investigations through experiments.

6.1.1 Case company A

The findings of case company A and their relevance to propositions validation is shown in *Table 7*. Excepting proposition 4, the table shows that at least three methods provided relevant information for each proposition, which can be seen as significant for ensuring methodological triangulation. This enhances internal validity of the findings.

The findings of case company A support propositions #1, 2, 5, 6 and 7. Proposition #3 is only partially supported by one method, whereas no method supports proposition #4. A detailed report of the findings is presented in the following. Therefore, each

proposition is analyzed in detail whether applied methods have provided relevant information and supported the proposition or not.

PROPOSITION 1 (match value propositions)	Initial semi-structured interviews	Process observations	Customer workshops	Document analysis	MonteCarlo simulation	Regular debriefings
Information	yes	yes	yes	no	no	yes
Relevant	yes	yes	yes	-	-	no
Support	yes	yes	yes	-	-	-

PROPOSITION 2 (roles in value creation)	Initial semi-structured interviews	Process observations	Customer workshops	Document analysis	MonteCarlo simulation	Regular debriefings
Information	yes	yes	yes	no	no	yes
Relevant	yes	yes	yes	-	-	yes
Support	yes	yes	yes	-	-	yes

PROPOSITION 3 (perceive as value creators)	Initial semi-structured interviews	Process observations	Customer workshops	Document analysis	MonteCarlo simulation	Regular debriefings
Information	yes	yes	yes	no	no	yes
Relevant	yes	yes	yes	-	-	yes
Support	yes	no	no	-	-	no

PROPOSITION 4 (customer sphere)	Initial semi-structured interviews	Process observations	Customer workshops	Document analysis	MonteCarlo simulation	Regular debriefings
Information	yes	no	no	no	no	yes
Relevant	no	-	-	-	-	yes
Support	-	-	-	-	-	no

PROPOSITION 5 (positive training effects)	Initial semi-structured interviews	Process observations	Customer workshops	Document analysis	MonteCarlo simulation	Regular debriefings
Information	No	yes	yes	yes	No	yes
Relevant	-	yes	yes	no	-	yes
Support	-	yes	yes	-	-	yes

PROPOSITION 6 (waste into value)	Initial semi-structured interviews	Process observations	Customer workshops	Document analysis	MonteCarlo simulation	Regular debriefings
Information	No	yes	yes	yes	yes	yes
Relevant	-	yes	yes	no	yes	yes
Support	-	yes	yes	-	yes	yes

PROPOSITION 7 (performance + VA effects)	Initial semi-structured interviews	Process observations	Customer workshops	Document analysis	MonteCarlo simulation	Regular debriefings
Information	yes	yes	yes	yes	yes	yes
Relevant	No	yes	yes	no	yes	yes
Support	-	yes	yes	-	yes	yes

Table 7 Case company A – overview of methods to propositions

6.1.1.1 P1 – Matching value propositions of customers and provider

Three methods identified a match between customers' and provider's value propositions:

1. Semi-structured interview
2. Process observations
3. Customer workshop

The semi-structured interview revealed six provider's propositions of either emotional or functional nature. These are:

1. Functional
 - a. Lots of inclusive services in monthly fee (e.g. sauna, 11 professionally guided courses like 'spinning' several times a week, free parking, basic nutritional consulting, mineral drinks, etc.)
 - b. Lots of inexpensive additional services (e.g. advanced nutritional training at home, Sunday breakfast, physiotherapy)
 - c. Qualified training supervision (trainers and physical therapist)
2. Emotional
 - a. Providing a positive, overall well-being location to customers
 - b. Knowing customers and address them personally
 - c. Promoting social contacts

The customers' propositions were elaborated in the customer workshop as follows:

1. Functional
 - a. Mineral drinks, good motto courses, sauna (inclusive services)
 - b. Good training machines and trainers
 - c. Clean and tidy accommodations
 - d. Pricing and location
2. Emotional
 - a. Overall well-being atmosphere (music, fresh air)
 - b. Convenient clientele (no pure body building atmosphere)
 - c. Friends and family also members

It can reasonably be argued that both groups perceive similar aspects as value. This is also reflected by process observation notes. For instance, at CIP 'Check-in' where the observer noted positively that 'customers feel comfortable with friendly reception', but also negatively that 'customers seem to recognize positively a wish on good training' but 'staff very seldom wishes good training'. However, this stresses the importance of well-being aspects for customers. It further identifies areas of improvements that could enhance value perceptions. Also in debriefing sessions value propositions were discussed, but no relevant information occurred that have not been stated before.

In summary, the proposition is supported by three methods and thus, triangulation is fulfilled. In case A, a matching of customer and provider value propositions is given.

6.1.1.2 P2 – Roles in value creation can be identified

Overall, different roles in value creation are a complex topic with various facets. This is reasoned in the fact that a role can be seen as something general, e.g. customer and provider, or that it can be something very precise on a process step level. However, applied methods enabled to clearly identify roles on all levels. This proposition is supported by four different methods:

1. Semi-structured interview
2. Process observations
3. Customer workshop
4. Regular debriefings

In the interview, the manager mentioned on the one hand that customers should feel well and that the provider is responsible for their well-being and professional training. But, at the same time, he also encouraged his customers to 'support a positive training atmosphere'. The manager also stated that the company thoroughly assesses potential new customers, whether they fit to other customers and the overall philosophy. Customers that do not seem to fit are not going to be accepted. This shows that roles are clearly considered even on a strategic level.

Process observations provided insights on contribution level of each party on a process step level. For instance CIP 'Check-out' has a mean total cycle time of 31 seconds. The provider contributes 27 seconds (87%), whereas the customer contributes 7 seconds to this process (23%). The total time is the sum of each process step where the actual actors and their level of contribution are considered (see *Table 8*). The column 'Split' represents the percentage of how often this process step is engaged. 100% means that it is always done, whereas 5% means that every twentieth occasion contains this step. The times in brackets show the value that is considered for calculation of total times. The analysis of contribution times could easily be done for all process steps.

#	Task	Description	Actors	Split	CT	PCT	PCR	CCT	CCR
1	Locker key receipt	Receive locker key from customer	Receptionist Customer	100%	0:08	0:04	50%	0:04	50%
2	System Check-out	Check-out customer in system and check account details	Receptionist	100%	0:10	0:10	100%	0:00	0%
3	Open items	Discuss and resolve / pay open items	Receptionist Customer	5%	1:00 (0:01)	1:00 (0:01)	100%	0:45 (0:01)	75%
4	Account card	Hand over account card	Customer Receptionist	100%	0:10	0:10	100%	0:02	20%
5	Goodbye	Say goodbye	Receptionist	100%	0:02	0:02	100%	0:00	0%
TOTAL				-	0:31	0:27	87%	0:07	23%

Table 8 Cycle time calculation for CIP 'Check-out'

Also within the customer workshop the different roles were discussed and assessed. The quality of contribution of each party was assessed for each CIP. The results show a thorough understanding and clear perception of all participants regarding the roles in value creation.

Furthermore, the debriefing sessions provided insights on value creation roles. Several improvements were initiated addressing the value creation topic. For instance, in the past customers were responsible to arrange a check-up every 6 weeks to assess their training progress with a trainer and eventually adjust the training schedule. IT system data showed that less than 2 percent of the customers administered this important

part. This was also approved by the manager. As a countermeasure, the responsibility for arrangement was switched from customers to service staff at the 'Check-out' CIP. Two weeks later the updated IT system data revealed that the figure increased to 11 percent within this period of time. The manager reported in a debriefing session that customers appreciated this active reminder for check-ups.

As this proposition is supported by four different methods, triangulation is fulfilled.

6.1.1.3 P3 – Perceive customers as value (co-)creators

Though four different methods provided relevant information in regards to perceiving customers as value (co-) creators, only one method supported this proposition:

- Semi-structured interviews

The mentioned example of check-up also shows the promiscuous situation in perceiving customers as value (co-)creators. Though customers benefit from regular check-ups, they do not intrinsically contribute to this value creation. However, when provider staff takes care of regular check-ups, they appreciate this. Similar to this example, also customer workshop results show irritating aspects. On the one hand, all parties considered and rated customer contribution in terms of quality for each CIP. But on the other hand all recommended ideas for relevant improvements were addressed to provider's side. For instance, participants claimed to establish additional courses, improve trainer presence on the training area, or enlarge food and beverages offer in the service area.

Though the manager stated in the interview the importance of customer contribution, e.g. to a positive atmosphere, it seems that on an operational level this aspect disappears. Thus, process observations, customer workshops, as well as the regular debriefing sessions addressed (co-)creation but solely considered necessary actions on provider's side.

In summary, only one method supports that customers are perceived as value (co-) creators in case company A. Hence, triangulation is not fulfilled.

6.1.1.4 P4 – Customer sphere is relevant in pure service environment

Though diverse quantitative and qualitative methods were applied, no relevant information could be retrieved from case company A regarding proposition 4, which addresses the relevance of customer sphere in pure service environment operations.

Only one marginal aspect was mentioned in the initial management interview, where the manager referred to 'nutritional consulting' as a service that is offered to all customers. The basic version of this consulting is done in the fitness centre (provider sphere), but an advanced stage is offered that should guide and teach customers in cooking at their homes. However, the basic product is frequently used by customers, whereas the advanced stage had never been requested. Hence, this information touches the customer sphere, but it seems not to be relevant to some extent.

All other methods did not provide any further information and support for a relevance of this topic. This fact was reflected with the manager in one debriefing session. In this session the manager stated that despite the fact that fitness training is beneficial to customers' physical condition, the customer sphere does not play a significant role in designing and performing the training.

As no applied method provides support for a relevance of customer sphere in case company A, triangulation is not fulfilled.

6.1.1.5 P5 – Turn portion of waste into value

Several methods indicated the possibility to turn former waste into value. These are:

1. Process observations
2. Customer workshop
3. Monte Carlo Simulation
4. Regular debriefings

For instance, the adjustment of machine quantity as underutilization is one type of waste according to the lean principles. The additional earnings that were generated

through selling unneeded equipment meant value to the company. This is further addressed in 6.1.1.7. Furthermore, allocating additional tasks to service staff can be considered as turning waste into value. Service staff ('Check-in' and 'Check-out') had a high portion of waiting times throughout their working day. The reception should be engaged all the time, but the employees were only utilized at about 50%. First, the change in responsibility for regular check-ups increased their utilization and mean value to the customers. Second, expanding catering services and re-arrangement of catering area tripled the catering turnover, from € 0.31 to € 0.96 per customer visit. This can be seen as a significant contribution to value increase for both, the provider in terms of earnings, as well as customers in terms of an enhanced offer.

Four methods support the proposition that a portion of waste can be turned into value. Hence, triangulation is fulfilled in this case.

6.1.1.6 P6 – Training of all parties enhances value creation

Proposition #6 is supported by three different methods:

1. Process observations
2. Customer workshop
3. Regular debriefings

Though document analysis revealed that various training documents for staff existed, their application was poor. Staff argued in debriefing sessions that these documents were not useful, as they often need quick information, but given documents were too complex. Especially in the catering area, this was considered as a problem. Thus, in debriefing sessions a new quick-guide was developed for CIP 'Check-in' and 'Check-out' that enables employees to quickly grasp relevant steps in certain occasions. The guide is designed like a mind map and indicates with traffic lights what to do when utilization is low or in peak hours (*Figure 36*). Further standardized brief product descriptions for e.g. protein shakes were worked out and made available by staff.

But not only training on provider's side could be identified as beneficial. In the customer workshop a problem with the locker keys was discussed. It was mentioned

that sometimes customers would have preferred a lower locker but received a higher one. Staff argued that customers do not express their wish and that this sometimes causes waiting times, especially in peak hours. Hence, it was made transparent in the 'Check-in' area which key number leads to what kind of locker and customers were regularly asked what locker they prefer. This regular question trained the participants and, after a while, they clearly expressed their preferred key number without a prior question. Beside this, customers were also sensitized through tags and direct contact to contribute to keep the facilities tidy and clean. Though it took several weeks, also this measure gained impact, so that the time for cleaning up the facilities at the end of the day could be reduced and well-being for customers was also ensured during the day.

Triangulation in regards to proposition #6 is fulfilled as three different methods support positive effects of training activities on value creation.

6.1.1.7 P7 – Effects of theory application on performance and value creation

Performance effects due to model application are supported by the following methods:

1. Process observations
2. Customer workshop
3. Regular debriefings

In the initial interview, the manager stated that he cannot imagine any efficiency improvements. In terms of quality aspects he mentioned that the company may improve its social media activities, expand course offers, as well as improving the sauna facilities. He further mentioned to expand the training area and to introduce a customer feedback box. Furthermore, strengthen corporate identity through firm logos in the accommodations were also seen as an area of improvement by the manager. However, as this initial assessment did not reflect any effect of model application, it is not considered for validation.

The customer workshops and process observations revealed potential improvements that could increase efficiency, as well as enhance value adding. These improvements were discussed in the debriefing sessions and their implementations were planned and

managed throughout the case study. The following major improvements were implemented:

1. Rearrangement of training areas and reduction of unneeded training machines
2. Training purpose orientated relocation of trainers on training areas
3. Expand training course offers
4. Significantly enhance catering (food and beverages) offers
5. Improve ambience in catering service area
6. Training of service staff in 'Check-in' and 'Check-out' value creation

These measures significantly increased value adding (VA) rating of addressed CIPs. The process observations assessment of all CIPs provided the results 'before' the improvements were implemented. In this assessment, the value propositions were assessed against the actual observed performance. The target value was set on 75% by the management. *Table 9* shows that only 'Courses' show a sufficient level of VA with 86%. The other CIPs were rated between 25% and 42%. Hence, the initiated measures predominantly addressed the 'Check-in', 'Training' and 'Check-out'.

Before Value Propositions	Customer Interaction Points			
	Check-In	Training	Courses	Check-Out
Positive training climate	5	5	10	0
Knowing customers	5	0	5	5
Provide individual solutions	0	5	10	0
Promote social contacts	0	0	10	0
Qualified training supervision	-	0	10	-
Overall well-being for customers	5	0	5	0
Fulfill necessary administration	10	-	-	10
Provide good training tools	-	10	10	-
Value Adding %	42%	29%	86%	25%
Degree of fulfillment	0 low			
	5 medium			
	10 high			

Table 9 Value adding rating of company A 'before' model application

After the previously mentioned improvements have been successfully implemented, the process observation assessment was undergone again. The results are displayed in *Table 10*.

After Value Propositions	Customer Interaction Points			
	Check-In	Training	Courses	Check-Out
Positive training climate	5	10	10	5
Knowing customers	10	5	5	10
Provide individual solutions	5	10	10	5
Promote social contacts	5	5	10	5
Qualified training supervision	-	5	10	-
Overall well-being for customers	5	5	5	10
Fulfill necessary administration	10	-	-	10
Provide good training tools	-	10	10	-
Value Adding %				
	67%	71%	86%	75%
Degree of fulfillment				
	0 low			
	5 medium			
	10 high			

Table 10 Value adding rating of company A 'after' model application

After implementation, the VA level of all three targeted CIPs was significantly increased. This was also confirmed by workshop results, where participants were asked to indicate the quality of CIPs before and after implementation of defined improvements (*Figure 21*).

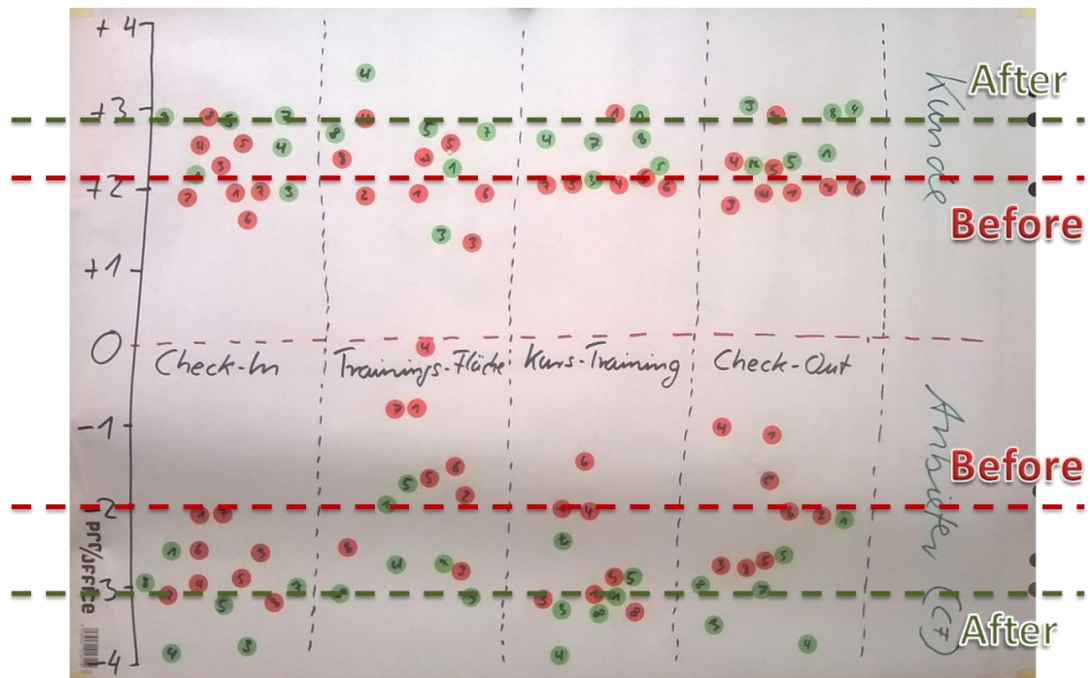


Figure 21 Picture of customer workshop flip chart in company A

Beside VA ratios, also efficiency increased. MCS indicated that utilization of training machines was at only 25% even in peak hours. Considering waiting and change times for customers, the maximum utilization was estimated with 80%, which would mean that number customers visiting the fitness centre in peak hours could have been tripled, from 85 to 255 (see chart below).

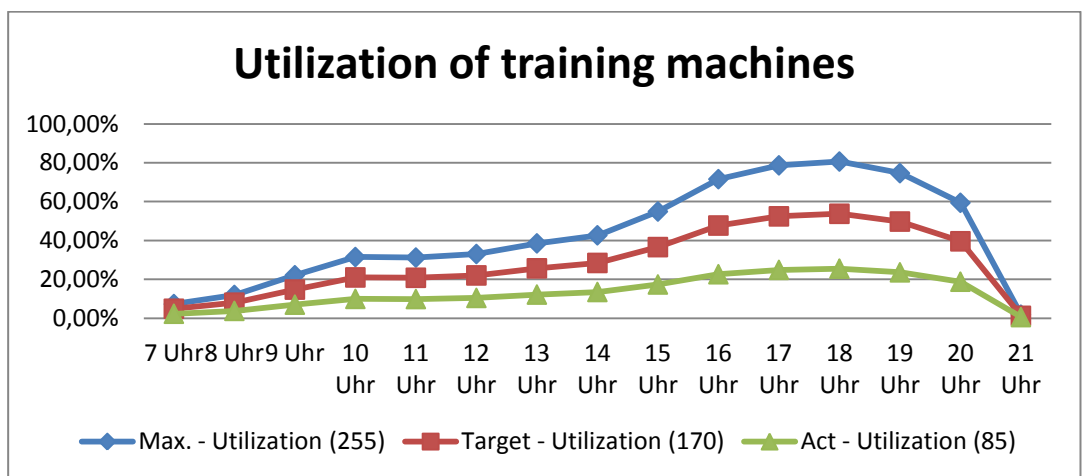


Figure 22 Utilization of training machines (act, max. and target value)

Thus, training machines could be reduced by more than 20%, which is equivalent to a monetary value of more than € 50,000. This is equal to 20% of annual earnings. The machines were sold as used equipment through an online auction for € 10,000. Further

efficiency improvements were made through adjustment of working times considering daily and weekly utilization simulations of MCS.

In summary, proposition #7 is supported through triangulation in case company A.

6.1.2 Case company B

The findings of case company B and their relevance to propositions validation is shown in *Table 11*. Like in case company A, the table shows that at least three methods provided relevant information for proposition 1-3 and 5-7. Though this case study provided more insights on potential relevance of proposition 4, it is only partially addressed by two methods. Hence, triangulation is not fulfilled for proposition 4.

PROPOSITION 1 (match value propositions)	Initial semi-structured interviews	Process observations	Customer workshops	Document analysis	MonteCarlo simulation	Regular debriefings
Information	yes	yes	yes	no	no	yes
Relevant	yes	yes	yes	-	-	yes
Support	yes	yes	yes	-	-	yes

PROPOSITION 2 (roles in value creation)	Initial semi-structured interviews	Process observations	Customer workshops	Document analysis	MonteCarlo simulation	Regular debriefings
Information	no	yes	yes	yes	no	yes
Relevant	-	yes	yes	yes	-	yes
Support	-	yes	yes	yes	-	yes

PROPOSITION 3 (perceive as value creators)	Initial semi-structured interviews	Process observations	Customer workshops	Document analysis	MonteCarlo simulation	Regular debriefings
Information	yes	yes	yes	yes	no	yes
Relevant	yes	yes	yes	yes	-	yes
Support	no	yes	yes	yes	-	yes

PROPOSITION 4 (customer sphere)	Initial semi-structured interviews	Process observations	Customer workshops	Document analysis	MonteCarlo simulation	Regular debriefings
Information	no	yes	yes	no	no	yes
Relevant	-	yes	yes	-	-	yes
Support	-	no	yes	-	-	yes

PROPOSITION 5 (positive training effects)	Initial semi-structured interviews	Process observations	Customer workshops	Document analysis	MonteCarlo simulation	Regular debriefings
Information	no	yes	yes	yes	no	yes
Relevant	-	yes	yes	no	-	yes
Support	-	yes	yes	-	-	yes

PROPOSITION 6 (waste into value)	Initial semi-structured interviews	Process observations	Customer workshops	Document analysis	MonteCarlo simulation	Regular debriefings
Information	no	yes	yes	no	yes	yes
Relevant	-	yes	yes	-	yes	yes
Support	-	yes	yes	-	yes	yes

PROPOSITION 7 (performance + VA effects)	Initial semi-structured interviews	Process observations	Customer workshops	Document analysis	MonteCarlo simulation	Regular debriefings
Information	yes	yes	yes	yes	yes	yes
Relevant	no	yes	yes	no	yes	yes
Support	-	yes	yes	-	yes	yes

Table 11 Case company B – overview of methods to propositions

6.1.2.1 P1 – Matching value propositions of customers and provider

Four applied methods identified a match between customers' and provider's value propositions:

1. Semi-structured interview
2. Process observations
3. Customer workshop
4. Regular debriefings

The semi-structured interview revealed a total number of six provider's propositions of either emotional or functional nature. These are:

1. Functional
 - a. Profound, individual advises for customers on all hairdressing topics
 - b. Sound hairdressing skills of staff (e.g. hair cut, coloring, make-up)
 - c. High and ensured quality of used products (e.g. shampoos, hair tainting lotions)
 - d. Range of hairdressing related and non-related additional services for free (e.g. hair washing, Wi-Fi, tablet computers, hot and cold beverages)
2. Emotional
 - a. Creating personal relationships to customers and customer loyalty
 - b. Knowing customers and address them personally

The customers' propositions were elaborated in the customer workshop as follows:

3. Functional
 - a. Profound individual advises (e.g. for make-up, hair cut, color)
 - b. Advise on and selling professional hair care products for taking home (e.g. shampoos, conditioner)
 - c. Non-related additional services (e.g. beverages, magazines)
 - d. On time service (no waiting times)
4. Emotional
 - a. Consideration and respect of (customer) individuality
 - b. Nice conversations on a personal relationship (e.g. even about sorrows)
 - c. Positive, overall well-being climate and environment

The functional, as well as the emotional aspects match remarkably. It is not only the core services of hairdressing and advices, which is in focus. But also non-related

additional services and especially emotional aspects were considered as important by all parties.

Within the customer workshop one participant mentioned that it is a kind of 'intimate relationship' between the customer and the hairdresser. The process observations also confirmed these aspects as it is noted at CIP 'Reception' that 'customers seem to feel well while they are escorted to their seat'. Or at CIP 'Dressing Zone' notes show that 'customers react positively upon providing magazines to them', e.g. while their hairs were blown dry (see *Annex III*). Though it was observed that not all customers used offered additional services, they seemed to be at least thankful for the offer (CIP 'Reception'). This also stresses the importance of core, but also additional services that contribute to a satisfactory value creation. These aspects and notes were also addressed in the debriefing sessions, where employees considered the mentioned emotional aspects as crucial to the overall service quality.

As four methods support a match between customer and provider propositions in case company B, triangulation is fulfilled.

6.1.2.2 P2 – Roles in value creation can be identified

Proposition #2 is also supported by four different methods:

1. Process observations
2. Customer workshop
3. Document analysis
4. Regular debriefings

The identification of roles in case company B addresses various aspects. It is not only limited to the obvious customer and provider roles, that were observed within the process observations. All actions enduring the service encounter at all CIPs could be identified, described and contribution times were measured as shown in the table below for CIP 'Dressing Zone' (*Table 12*).

#	Task	Description	Actors	Split	CT	PCT	PCR	CCT	CCR
1	Identification of customer request	Ask customer what services (s)he requests	Hairdresser Customer	100%	0:35	0:35	100%	0:04	11%
2	Dressing advices	Professional, individual advices provided by hairdresser	Hairdresser Customer	80%	2:00 (1:36)	1:00 (0:48)	50%	1:00 (0:48)	50%
3	Hair washing	To achieve a better end result, hairs are washed for free	Hairdresser Customer	90%	5:45 (5:11)	5:45 (5:11)	100%	0:20 (0:18)	5%
4	Fulfill requested service	Cutting, coloring, make-up, etc.	Hairdresser	100%	24:00	24:00	100%	1:12	5%
5	Feedback	If necessary, rework according to customer instruction	Hairdresser Customer	30%	1:00 (0:18)	1:00 (0:18)	100%	0:06 (0:02)	10%
6	Styling	Styling and / or drying (sometimes customer self service)	Hairdresser Customer	100%	10:30	10:30	100%	0:10	2%
7	Final feedback	Ask customer for final feedback	Hairdresser Customer	20%	0:30	0:20	66%	0:15	50%
TOTAL				-	42:38	41:42	97%	2:49	7%

Table 12 Cycle time calculation for CIP ‘Dressing Zone’

Beside process observations, customer workshop participants identified, discussed and rated different roles of customers and provider at all CIP stages. In contrast to company A, also document analysis provided insights on different roles. A training document and work instruction for arranging appointments with customers clearly described roles and responsibilities. For example, the employee was advised to decide upon the exact time. Customers should rather be asked for a desired period of time (e.g. afternoon), to keep the flexibility in scheduling appointments higher. Furthermore, debriefing sessions intensively addressed customer’s and provider’s roles.

A major area of improvement occurred throughout turnover analysis (document analysis), as well as in process observations (notes on CIP ‘Dressing Zone’ and ‘Payment’), was the relative low degree of product sales. Provider staff argued that they do not want to push customers to buy products, as they fear that customers might take this amiss. Due to this aspect, they even do not address hair care in the counselling session, albeit this could be beneficial to customers. Customers even requested this from the provider as customer workshop revealed. However, these

examples show that roles can be thoroughly identified, but at the same time, need a thorough analysis and clarification, in order to enhance value in the end.

Triangulation of this proposition is fulfilled due to supporting findings of four independent methods.

6.1.2.3 P3 – Perceive customers as value (co-)creators

Several methods show that customers are perceived as value (co-) creators in this case company:

1. Process observations
2. Customer workshop
3. Document analysis
4. Regular debriefings

As process observations revealed classic aspects of self services (e.g. customers can dry their hairs for themselves in dressing zone), document analysis, as well as debriefing sessions stressed the importance of customer preparation. The work instructions and training documents for the counselling conversation highlighted that customer contribution is crucial for satisfactory value creation.

This was also reflected in debriefing sessions where the manager put emphasize on the fact that 'customers need to know what they want, or at least have a rough idea of it'. This is important to achieve satisfying results and good quality. It was also stated by the manager that a main reason for rework at the end is poor clarification or misunderstanding in the beginning about what the result should be.

In the customer workshop and in debriefing sessions the role of customers in cancelling appointments was addressed. Analysis of system data shows that 4% of all appointments were not kept by customers without any information from customer side. According to debriefing sessions, this was predominantly caused by non-regular customers, representing about 20% of all customers. Considering these figures, nearly 20% of non-regular customers making an appointment did not show up. Hence, it can

be seen as an important issue and that it is crucial for a solid utilization of resources that customers contribute to punctuality and transparency.

Though the initial interview indicated that customers were primarily service receivers, four applied methods support the proposition that customers are perceived as value (co-) creators, or at least as a major contributor to value creation. Thus, triangulation that supports the proposition is fulfilled in case study B.

6.1.2.4 P4 – Customer sphere is relevant in pure service environment

Two out of six applied methods provide relevant information on the relevance of customer sphere in terms of service operations:

1. Customer workshop
2. Regular debriefings

Especially the ‘Appointment Scheduling’ CIP was of great interest in this circumstance. Here, the last step is summarizing the selected services and agreed date and time. Employees in debriefing sessions mentioned that 95% of all scheduled appointments are made on the phone (see *Figure 23*). Related process observation notes stressed that ‘Summary is done but could be improved, e.g. by offering to send a reminder as mail or text message one day prior to appointment’ (see *Annex III*), to enhance punctuality and dependability. Thus, it is of interest in this circumstance that actions within customer sphere play a role in the overall process.

Figure 23 illustrates the principle how appointments are made. It is remarkable that nearly all appointments are made via phone. Only 5% are made personally, e.g. at pay-desk after service provision for regular customers. The major problem of this aspect is illustrated in the box. The flexibility of customers in terms of date is significantly lower on the phone, as these appointments usually are scheduled around two days prior to the desired date. Appointments that are made after service provision are usually several weeks or even months prior to the next visit.

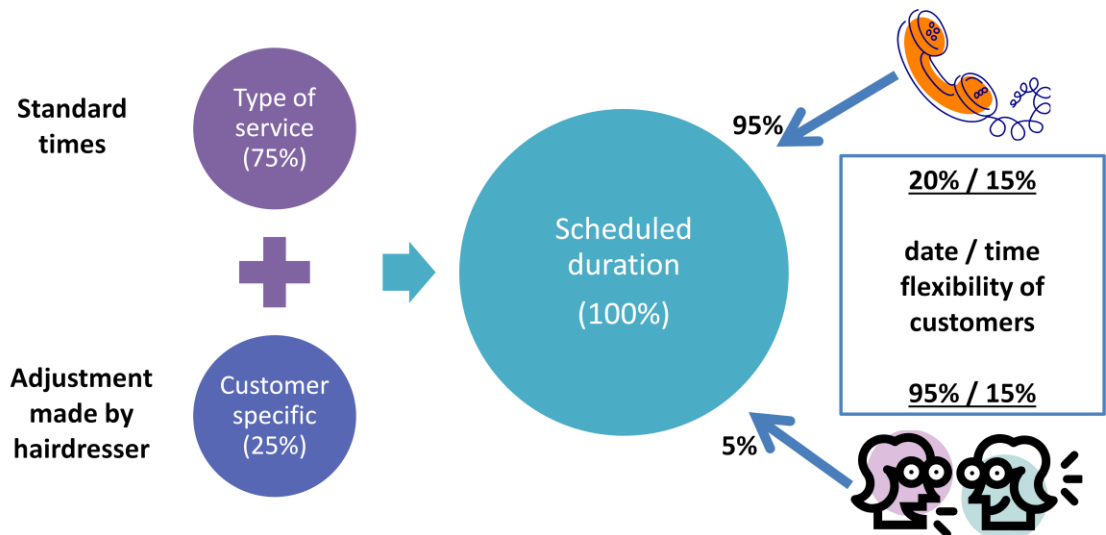


Figure 23 Debriefing elaboration of scheduling principle

System data showed that the average service usage frequency of regular customers is about five weeks. Less flexibility of customers leads to an increasing danger of either disappointing them when the desired time or hairdresser cannot be provided, or to decrease efficiency as customer wishes are traded-off with less efficiency, e.g. gaps in utilization. These gaps or waiting times can be seen as a major type of waste in this pure service business. Thus, it was aimed that customers are actively reminded to schedule a follow-up meeting at the end of service provision (see also process observation sheet CIP 'Payment').

However, the appointment scheduling and dependability problems were the only considerable aspects addressing customer sphere from an operations perspective. Expressed in concrete figures it is about 29 seconds and 32% of customer contribution at CIP 'Appointment Scheduling' (see Annex II). Considering that the overall total average cycle time of this service is 3,054 seconds, it only represents less than 1% of it. Against this background it can be argued that customer sphere is a minor aspect with limited relevance to the overall value creation. Thus, process observations provide relevant information on customer sphere but do not support its significant relevance.

An aspect of higher importance may be seen as providing advice and products for hair care at home, as requested by customer participants in the customer workshop. Improving 'hair care advice and product sales' was ranked as the top measure for improvements in the customer workshop (5 of a total sum of 24 points were allocated

to this out of 15 different measure). This indicates that customers are interested in improving their value-in-use also beyond the provider sphere. This was also agreed by the manager in subsequent debriefing session, but no method provided any further information and support for a relevance of this topic.

In summary, though customer sphere seems to hold a potential to be of greater interest in service operations, triangulation in this case cannot be fulfilled. Hence, proposition has to be rejected according to given assessment criteria.

6.1.2.5 P5 – Turn portion of waste into value

There are three methods supporting proposition #5 in case company B. These are:

1. Process observations
2. Customer workshop
3. Regular debriefings

Overall, a significant portion of waste could be turned into value within this case company. This was achieved through reducing phone calls for follow-up appointments and improving scheduling procedures. These measures improved resource utilization. At the same time waiting times were reduced and turned into additional turnover (value). A detailed outline of the findings is provided in section 6.1.2.7 below.

At this stage it may be summarized that findings support proposition #5.

6.1.2.6 P6 – Training of all parties enhances value creation

The following four independent methods support the proposition #6 that training of all parties enhances value creation:

1. Process observations
2. Customer workshop
3. Monte Carlo Simulation
4. Regular debriefings

'This workshop was very useful, especially for the provider. However, it also became clear that it is beneficial, informative and enlightening to consider both perspectives [customer and provider]' a customer participant said in the feedback session of the customer workshop. Also staff and the manager agreed with this and mentioned in subsequent debriefing sessions that the workshop had a very positive training effect. Especially in regards to product sales, they learned that customers want their expertise and advice how to take care of their hair.

Also the VA rating after implementation supported that the adjusted behaviour of hairdressers generates positive effects. Furthermore, customers needed to learn that it is more likely to achieve their desired date and time for follow-up appointments, when these are made directly at pay-desk. Feedback in debriefing sessions from the manager showed that customers understand this benefit. Thus, they are more willing to make a follow-up appointment at this early stage.

The adjusted work instructions in terms of how to handle appointment scheduling and the visualization of relationships helped staff to improve planning skills. A fishbone diagram was applied in a debriefing session with staff to better understand planning and relevant factors.

Overall, the findings of process observations, customer workshop and debriefing sessions support this proposition. Findings provide evidence that positive training effects in this case company could be generated.

6.1.2.7 P7 – Effects of theory application on performance and value creation

Positive effects of model application on performance and value creation are supported by the following four methods:

1. Process observations
2. Customer workshop
3. Monte Carlo Simulation
4. Regular debriefings

Accordingly to case company A, the initial interview revealed several potential improvements. The manager mentioned that product sales, arranging follow-up appointments, as well as improving scheduling were areas of improvement. Nevertheless, the interview is not considered in proposition validation for the same reasons mentioned earlier.

Based upon document analysis, process observations, customer workshop and debriefing sessions, the following measures were implemented:

1. Rearrange the counselling process at CIP 'Dressing Zone' by also addressing hair care aspects and provide advice on relevant products
2. Request feedback on last time use of service from customers at beginning of 'Dressing Zone' CIP
3. Establish question for follow-up meeting at CIP 'Payment' to reduce phone appointment ratio and upcoming calls
4. Re-adjust standard scheduling times for all potential services

Though further measures were identified, these four are seen as the most important ones. The first two measures address service quality and product turnover aspects. A better counselling should lead to an improved value perception of customers and, at the same time, increase product sales. The request for feedback is important to learn about customer's needs and to further individualize the provided service. Furthermore, it should enhance quality of the overall end result. It may also reduce rework and thus, reduce waste and increase efficiency.

The other measures predominantly address efficiency. As upcoming phone calls cannot be planned in advance, a hairdresser has to interrupt the work in 'Dressing Zone' and to answer phone call. This is seen as disadvantageous for three main reasons. First, customers may perceive this disruption negatively as nice conversations are seen as an asset of emotional value (see also 6.1.2.1). Second, disruptions increase overall cycle time as this causes additional setup times, after the phone call is finished. Third, it is likely that the hairdresser answering the call is not the one that 'owns' this customer. Hence, scheduling can be seen as more uncertain. In debriefing sessions the manager and staff clearly stated that 'it is best to schedule your customers on yourself, because

you know specific relevant things like hair length, punctuality, and similar that significantly influence appointment's duration'. As all appointments were planned in 15 minutes intervals, it is also questionable if this is this sufficiently covers actually needed duration for the service. The manager mentioned in debriefing sessions that she regularly has to reduce planned times as staff tends to schedule appointments longer than necessary. This in turn reduces capacity and subsequently potential turnover.

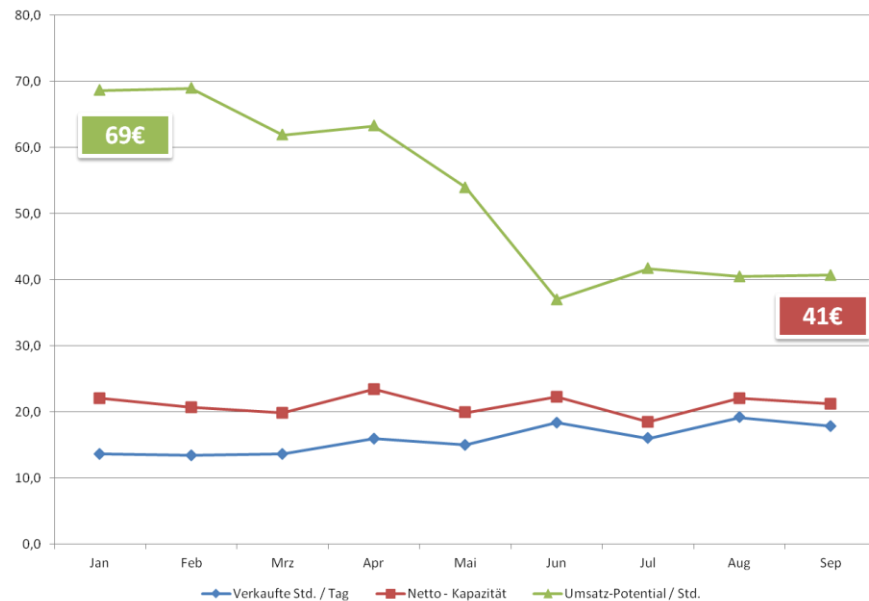


Figure 24 Trend of potential turnover per hour from Jan to Sep 2014 (drawn from system data analysis)

This trend was also reflected in IT system data analysis. The potential turnover per hour constantly decreased from 69€ in January 2014 to only 41€ in September 2014 (Figure 24). The utilization of hairdressers increased from 62% to 84% in the same period, but the turnover per customer, as well as the number of customers per day were kept constant. This leads to a higher utilization but decreases capacity to generate additional turnover through increasing the number of customers per day.

Implementation of the outlined measures significantly increased value adding (VA) rating of addressed CIPs. In this assessment, the value propositions were assessed 'before' and 'after' implementation. The target value for all CIPs was set on 80% by the management. Table 13 shows that prior to the implementation 'Reception' and 'Dressing Zone' showed a sufficient level of VA with 80% and 88% respectively. The other CIPs were rated between 57% and 63%.

Before	Customer Interaction Points			
	Reception	Dressing Zone	Payment	Appointment Scheduling
Value Propositions				
Profound, individual hair cut advices	-	10	-	5
Advices on hair care	-	0	0	-
Sound hairdressing skills	-	10	-	-
High quality of products	-	10	-	-
Add.(non-)related services	10	10	10	-
Personal relationships	5	10	10	-
Knowing customers	5	10	5	5
Follow-up appointments	-	-	0	-
Fulfill necessary administration	10	-	5	5
Overall well-being for customers	10	10	10	10
Value Adding %	80%	88%	57%	63%
Degree of fulfillment	0 low 5 medium 10 high			

Table 13 Value adding rating of company B 'before' model application

After the previously mentioned improvements were successfully implemented, the process observation assessment was undergone again. The results are displayed in *Table 14*.

After Value Propositions	Customer Interaction Points			
	Reception	Dressing Zone	Payment	Appointment Scheduling
Profound, individual hair cut advices	-	10	-	5
Advices on hair care	-	5	5	-
Sound hairdressing skills	-	10	-	-
High quality of products	-	10	-	-
Add.(non-)related services	10	10	10	-
Personal relationships	5	10	10	-
Knowing customers	5	10	10	10
Follow-up appointments	-	-	5	-
Fulfill necessary administration	10	-	10	10
Overall well-being for customers	10	10	10	10
Value Adding %	80%	94%	86%	88%
Degree of fulfillment		0 low 5 medium 10 high		

Table 14 Value adding rating of company B 'after' model application

After implementation, the VA level of three CIPs significantly increased. As no measure addresses CIP 'Reception', there was no change in its rating. This was also confirmed by workshop results, where participants were asked to indicate the actual quality of CIP before and after implementation of defined improvements (*Figure 25*). The before rating was set by participants at around 3 points, which can be seen as a very successful ratio. However, after implementation of measures, customers rate CIP 'Dressing Zone', 'Payment', as well as 'Appointment Scheduling' with 4 points. No adjustments were undertaken at CIP 'Reception' as outlined before.

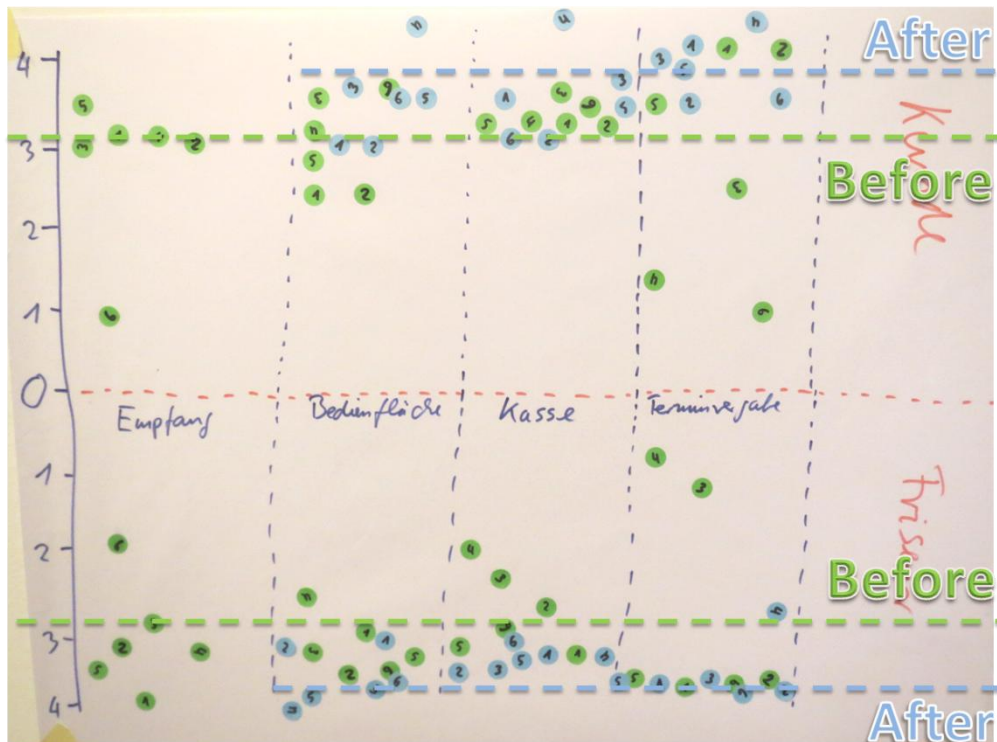


Figure 25 Picture of customer workshop flip chart in company B

Beside VA ratios, also efficiency increased. MCS indicated that utilization of resources may be increased by 17% through adjustment of standardized scheduling times for each service. MCS was based upon system data and revealed that with old scheduling times, 55% of appointments were planned too long, whereas only 38% of appointments were punctual within a +/- 5 minutes time frame. Figure 26 shows this in an example for 30 minutes appointments. The actual duration of 55% of all appointments lasted less than 25 minutes, whereas only 7% took longer than 35 minutes. Applying the +/- 5 minutes time frame was agreed with the management in a debriefing session.

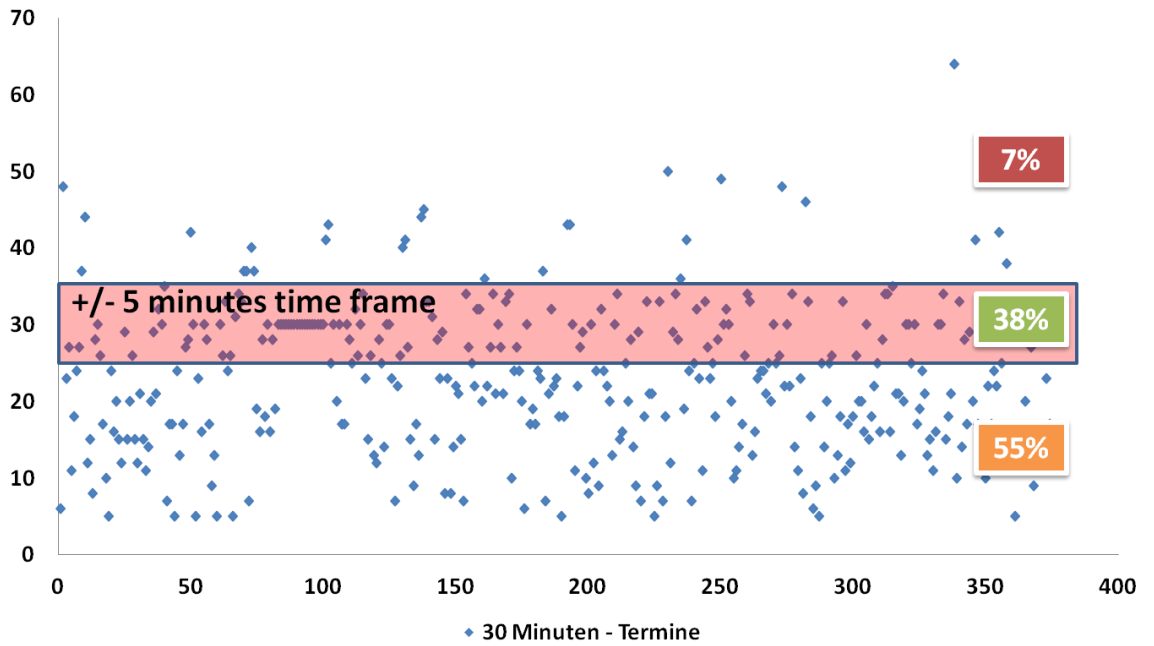


Figure 26 Chart of actual duration and in time ratios of 30 minutes applying old planning

MCS further showed that reducing the standard scheduling time for these services from 30 to 25 minutes, may increase the portion of appointments within the punctual time frame up to 46%. At the same time, portion of too long planned activities can be reduced to 37%, whereas too short planned ones increase to 17% (Figure 27).

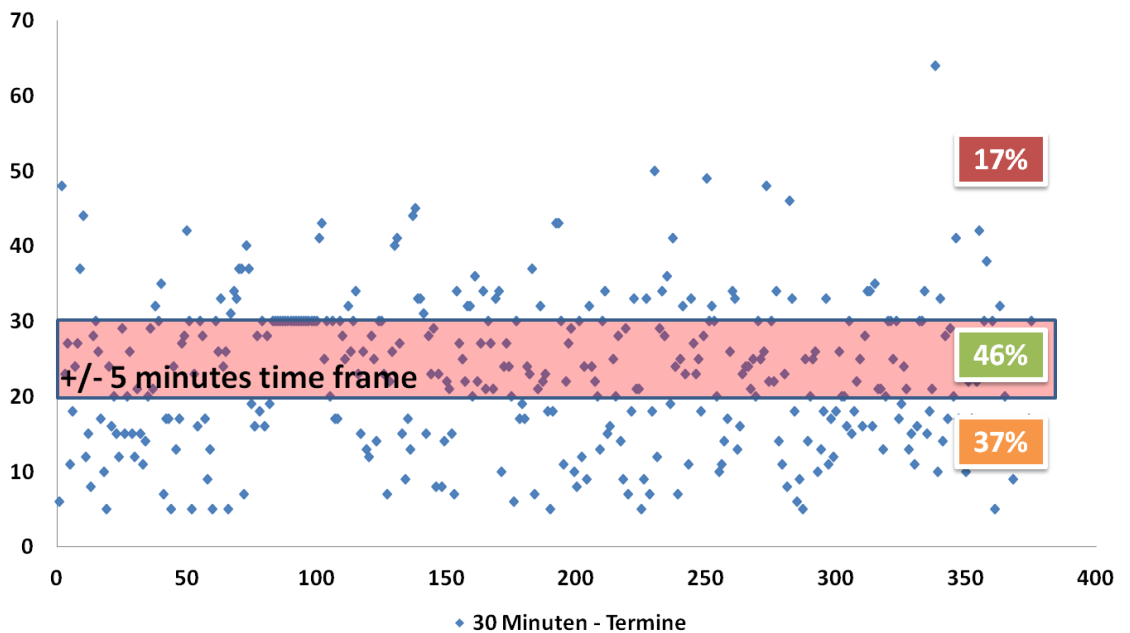


Figure 27 Chart of recommended duration and in time ratios of 25 minutes applying new planning

Though the risk increases that actual duration is longer than scheduled, the overall efficiency of resources may be improved significantly by 17%. This represents 144 minutes per day, which is equal to serving three additional customers per day. Hence, unnecessary waiting times could be reduced and turnover be increased. As MCS only represents a theoretical capability, application in practice is necessary to identify real effects. After implementation in October, the number of customers per day increased from 22 to 24. Also turnover increased by around €60 or 10 percent per day respectively.

Considering the mentioned findings, positive effects on performance through application of the lean service model can be identified by four different methods. Thus, validity of the proposition is supported as necessary triangulation is fulfilled.

6.2 Cross-case propositions validation

All propositions were addressed throughout the case studies. To validate a proposition, triangulation of supporting methods in both pole cases is necessary. If only one case study supports a proposition, this needs to be further addressed in experimental testing. If no case study indicates validity or relevance of this proposition, it is rejected and no experiment is designed to further investigate it.

Proposition	#1	#2	#3	#4	#5	#6	#7
Any relevant findings in case A?	Yes	Yes	Yes	No	Yes	Yes	Yes
Triangulation fulfilled in case A?	Yes	Yes	No	No	Yes	Yes	Yes
Any relevant findings in case B?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Triangulation fulfilled in case B?	Yes	Yes	Yes	No	Yes	Yes	Yes
Proposition accepted / validated?	Yes	Yes	No	No	Yes	Yes	Yes
Further investigations needed?	No	No	Yes	No	No	No	No

Table 15 Summary of propositions validation through case research

Table 15 shows that 5 out of 7 propositions can be validated through the two case studies. Proposition 3 needs further attention in an experiment, whereas proposition 4 is rejected due to the fact that no case study supports its relevance through methodological triangulation. However, it seems to be recommendable that this proposition needs further attention in discussions. There are indicators that support its relevance. These indicators should be further investigated in future studies.

6.3 Experiment findings

The relevance of proposition #3 is supported by experiment findings. Two main things have been revealed. First, customers are generally perceived as at least co-creators of value, though this significantly varies when considering different kinds of services. Second, this perception may be influenced by providing information on customer tasks in value creation process.

The detailed findings of the experiment are presented in two stages. First, ANOVA results of hypothesis testing are presented. Afterwards, relevant complementary findings are displayed, which could also be derived from experiment data. Though the pre-calculation of necessary participants indicated that a total $N = 90$ in at least six groups would be necessary for relevant results, actually $N = 46$ within four groups was found to be sufficient for achieving relevant ANOVA results. This is predominantly reasoned by the fact that the variances of treatment and control group differ more than anticipated based on pre-test results. Thus, the experiment process was abandoned after the fourth group to avoid unneeded additional activities (waste). An overview about the conducted groups and their location is provided in the table below.

Treatment number	Location	Total participants	Treatment	Control	Group type
1	Frankfurt	5	4	1	Bachelor students
2	Kassel	15	12	3	Adult cooking class
3	Hannover 1	15	12	3	Masters students
4	Hannover 2	11	9	2	Bachelor students

Table 16 Overview of experiment groups

6.3.1 Hypothesis testing

The following hypotheses were tested:

- h_0 : The explanation of customer tasks in service value creation has no influence on perception of degree of customer contribution ($\mu_0 = \mu_1$).
- h_1 : The explanation of customer tasks in service value creation changes the perception of degree of customer contribution ($\mu_0 \neq \mu_1$)

As NULL-hypothesis supposed that treatment does not have any effect on customers' perception, ANOVA results clearly show that this hypothesis is false. The F value is with 6.05 significantly higher than the critical F value of 4.06 (see *Table 17*). As the P-value is 0.02, it is 98% sure that random sampling from identical populations would not lead to observed results. There is only a chance of 2% that these results occur in identical groups. Hence, the NULL-hypothesis (h_0) may be rejected. Thus, the alternative hypothesis (h_1) for the tested seven services massage, cash machine, fitness centre, hairdresser, restaurant, public transport and lawyer can be accepted.

Anova: Single Factor

SUMMARY

Groups	Count	Sum	Average	Variance
Treatment	37	117	3.16	8.68
Control	9	6.43	0.71	0.38

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Within Groups	43.38	1	43.38	6.05	0.02	4.06
Between Groups	315.35	44	7.17			
Total	358.73	45				

Table 17 ANOVA analysis results for treatment and control groups

6.3.2 P3 – Perceive customers as value (co-) creators

In regards to the third proposition that customers perceive themselves as value (co-) creators, it is necessary to distinguish between value creation and co-creation in terms of our interval scale. A significant co-contribution of each party to value creation is estimated with at least 10%. This means either -8 as co-creation of customers, or +8 as co-creation of provider. It can be presumed that a score below 0 indicates that value creation is driven by the provider, whereas a score above 0 indicates that customers are perceived as main value creators.

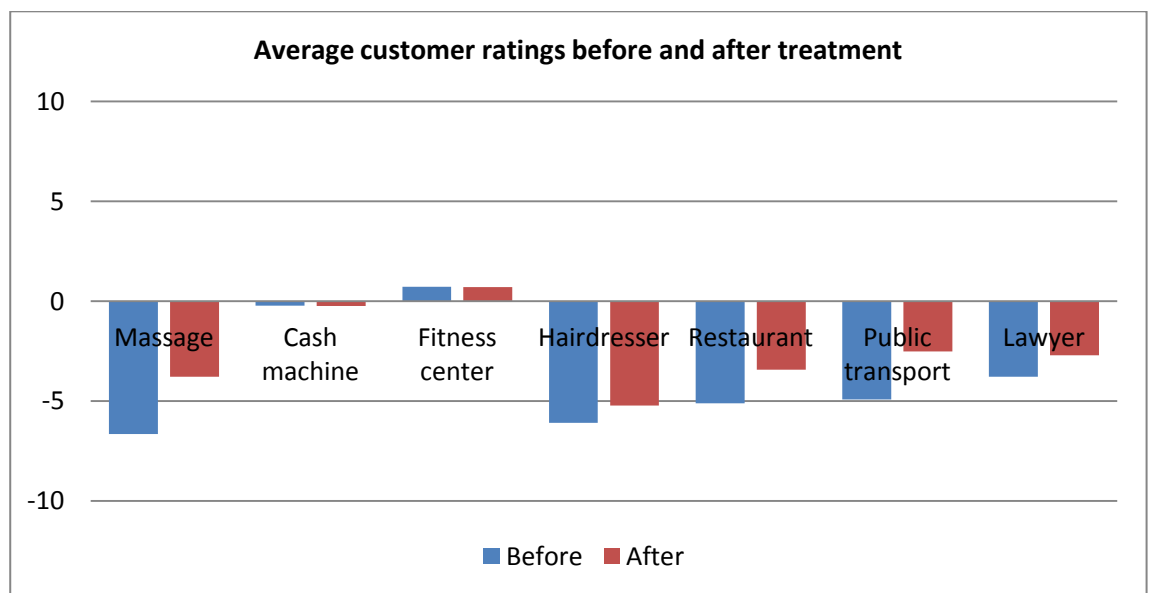


Figure 28 Average customer ratings before and after treatment

Figure 28 shows that the average of scores for each type of service is between -6.6 and +0.7. This is valid for pre-test, as well as treatment results. Interestingly, only the fitness centre was slightly considered as a predominant customer driven service, since

the score is above 0. The remaining services were perceived as provider driven, but with significant customer co-creation.

It can also be recognized that after treatment the poles of selected service types are fitness centre and hairdresser. This supports the assumption for case study selection that fitness centre and hairdressing services can be considered as two poles in customer contribution to value creation.

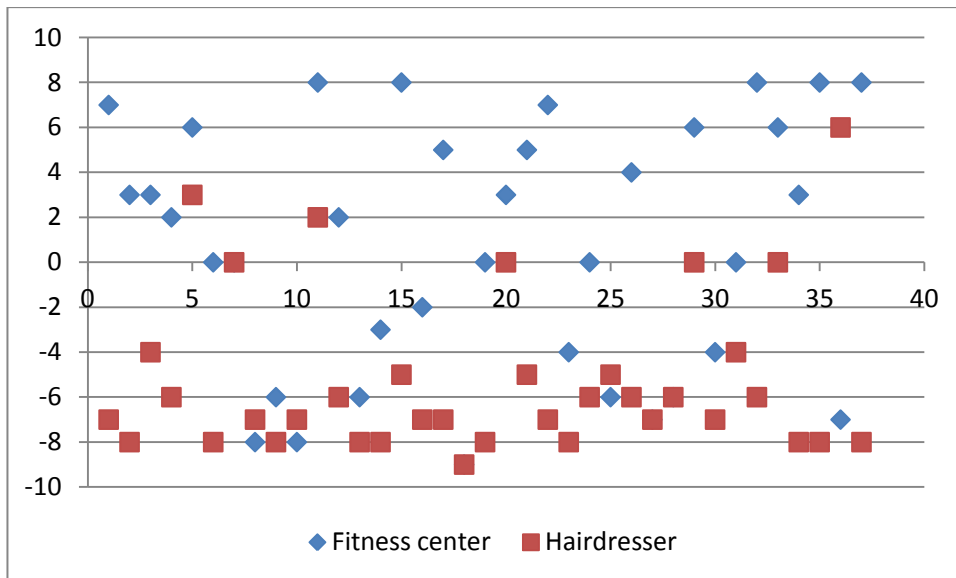


Figure 29 Scores of all participants after treatment for fitness centre and hairdresser

However, having a look upon all scores of fitness centre and hairdresser after the treatment, it is noteworthy that scores range from -9 to +6 at hairdresser and from -8 to +8 at fitness centre. This can be seen as reflecting the wide range of diversity in individual perceptions (Figure 29). The figure also shows that around 30% of hairdresser scores are rated with -8. This means that these participants perceive the provider as value creator with only little customer contribution.

However, results clearly indicate that overall customer (co-) contribution is considered to be valid for all services. In summary, customers are perceived as value (co-) creators, but perceptions are highly individual and strongly depend on the type of service.

6.3.3 Complementary findings

The differences between services can be identified when analyzing treatment group results more in detail (see *Table 18*). When testing whether the different services are from the same population, a P-value of 0.08 occurs. This does not quite fulfil our selected alpha-level of 0.05, but at least indicates that customers' reaction on treatment is not equal for each service. The table shows that average mean alters significantly (from -0.03 to +2.86). However, a major reason for this difference could be that treatment does not only lead to uniform customer reactions. Some participants ranked higher, some lower after treatment. Values of variances reflect this aspect.

Anova: Single Factor

SUMMARY

<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
Massage	37	106	2.86	39.40
Cash machine	37	-1	-0.03	19.25
Fitness centre	37	-1	-0.03	18.14
Hairdresser	37	32	0.86	16.73
Restaurant	37	62	1.68	32.84
Public transport	37	89	2.41	19.86
Lawyer	37	40	1.08	24.35

ANOVA

<i>Source of Variation</i>	<i>SS</i>	<i>Df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Within Groups	279.77	6	46.63	1.91	0.08	2.13
Between Groups	6140.38	252	24.37			
Total	6420.15	258				

Table 18 ANOVA results for different services within treatment group

Furthermore, findings show that the analysis of different groups does not provide significant evidence that location or group type have any influence on treatment results. The mean squares (MS) within and between the groups are quite similar as shown in the table below. The P-value is 0.32 and hence significantly higher than a needed value of 0.05 to reject the hypothesis that all groups are from the identical population.

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Within Groups	31.01	3	10.34	1.21	0.32	2.89
Between Groups	281.32	33	8.52			
Total	312.33	36				

Table 19 ANOVA results for different locations and group types

6.4 Summary of findings

Findings of case research and conducted experiment are that propositions P1, P2, P5, P6, and P7 are validated through case research. Further P3 can be accepted after experiment, as customer contribution is at least considered on a co-creation level for all tested services. Nevertheless, it has to be noted that this perception is quite individual. This is evident when looking at significant variation within the groups. Hence, results validate the proposition, but also indicate a high degree of individual perception.

Due to the fact that neither case study A, nor case study B, provides sufficient support to the relevance of customer sphere in pure service environment operations (P4), it is rejected. An overview of acceptance or rejection of each proposition is provided in Table 20 below.

Proposition	#1	#2	#3	#4	#5	#6	#7
Status	Accepted	Accepted	Accepted	Rejected	Accepted	Accepted	Accepted

Table 20 Overview of propositions' status after findings

7 Discussion

In this chapter, presented findings are discussed more in detail. This includes propositions validation, applied lean tools, as well as linking patterns and differences between traditional lean and new lean service principles. Finally, validity and implications of results are discussed.

7.1 Propositions validation

In order to discuss the validation of propositions, the findings for each proposition are critically reflected in the following.

7.1.1 Matching value propositions

Radnor and Johnston (2013, p. 10) pointed that lean service practices failed to implement 'strong internal processes linked to value, instead costs will be cut and processes made more efficient but not targeted at what the customer really values'. The authors did not only criticize value definition, but also its consideration in operations design and improvement. Though Womack and Jones (1996) placed high value on the need for thoroughly defining value in advance to lean application, it was disregarded in various studies and practice (Suárez-Barraza et al., 2012). But what could be the reasons for this? For instance, the study of Arbós (2002) was aiming at reducing lead times to increase productivity. A goal to improve customer service or value was not defined. Here lies one of the problems with value definition. Practitioners and scholars seem to apply lean tools with a focus on efficiency improvements. This is also valid for other studies like Jodlbauer (2008). Radnor and Johnston (2013) also referred to cost savings targets as a major cause of efficiency focuses in lean implementation. However, the authors pointed that 'in the longer term this process focused approach could be detrimental' (Radnor & Johnston, 2013, p. 10). Thus, it seems to be of high interest to improve value considerations within lean service projects.

The findings provide evidence to the relevance of functional, as well as emotional value in pure service organizations. This is reflected in both case companies. It was e.g. either expressed as 'overall well-being atmosphere' (company A) or 'positive, overall well-being climate and environment' (company B). Both aspects can be seen as beyond functional attributes like 'quality of used products' or 'good training machines'. But they are also vague and can be perceived only individually. However, various marketing scholars found it essential to consider a holistic perspective when talking about value in service businesses (Akaka et al., 2013; Damkuvienė, Tijunaitienė, Petukienė, & Bersenaite, 2012). In particular, dealing with emotional value propositions seems to probably enhance the perspective of lean applications to focus beyond efficiency gains.

Case study findings further show that emotional, as well as functional aspects were mentioned and could be matched. But it is important to consider that these aspects were mentioned by different persons within the workshops or interviews. Thus, it can be seen as a sum of opinions, not as 'the one' opinion. It is also important to prevent oneself from thinking that all customers demand the same type of value. This is quite individual, though workshops provided evidence that there are attributes everybody agrees on, e.g. hair care recommendations in company B. However, it would be a fallacy to expect that everything is equally important for each customer. Andreassen and Olsen (2008) pointed that it even varies when the same customer uses a service several times. This means that variety in value perceptions is unavoidable in service organizations. This is also reflected in experiment findings of diverging participant perceptions on value creation. But could operations handle this variety in a lean way?

To answer this fundamental question it is necessary to refer to the process of designing service operations. There are options to cope with variety. For instance, the provider may apply different operations strategies at a certain CIP. Staff of company A switched from standard services in peak hours to additional services in hours with low demand at 'Check-in' and 'Check-out' CIP. This provided a higher degree of flexibility and enabled staff to manage their CIP according to actual demand.

Overall, matching customer and provider perspectives is considered in the case studies as a valuable starting point with strong impact on all subsequent actions. Matching

value propositions can be seen as key in pure services. The process of matching even exceeds the consideration of customer needs. It also addresses provider's perspective. A mismatch between both perspectives could lead to significant concerns. This is evident when considering that e.g. company A thoroughly assesses if prospective customers fit. Thus, a mismatch between value propositions of the provider and prospective customers was avoided. Furthermore, the 'overall well-being' and 'positive atmosphere' (emotional value) was more important than increasing turnover or cost efficiency.

Additionally, early identifying a mismatch of value propositions could reveal the need to rethink the whole service strategy and portfolio. Against the background of cost efficiency, refining the portfolio and strategy should take place prior to a lean project of improving operations. Thus, it may be summarized that matching value propositions is validated as a core element of this lean service model.

7.1.2 Roles identification in value creation

The findings support the importance of clearly identifying roles in value creation. The process of identification took place on different levels. First, general roles like customer and provider were elaborated on a high level in the initial interviews. Afterwards, a detailed picture of roles in value creation was identified on a CIP level. The in-depth knowledge and assessment of roles led e.g. to switch responsibility for check-up appointments from customers to the provider company A. This insight enabled the manager to adjust responsibility and enhance value. This also shows the success of providing 'regular constructive feedback on performance' (Brophy, 2013, p. 16). Without questioning performance of each actor, the improvements were unlikely to be realized.

However, findings indicate that there is no 'one true role', but a set of activities leading to value creation at different CIP throughout the service encounter. The actual cycle times of service processes differ significantly, e.g. due to customers' gender, or selected service (company B). Hence, cycle and contribution times of the VCMs only represent an average number, not the full range of real occurrences. Nevertheless, the

presented findings show that a consideration of roles, tasks and responsibilities may create valuable insights leading to subsequent improvements. For instance, company B gained higher product sales due to the fact that they adjusted their role in recommending products for hair care.

At this stage it can be summarized that it was valuable for a lean application in both case studies to thoroughly consider roles in value creation on several levels. This contributed positively to the identification of value (co-) creators, enabled re-adjustments of inefficiencies and actions to increase earnings.

7.1.3 Customers as value (co-) creators

A core assumption of the initial lean service model is that 'value creation always requires customer involvement' (Vargo, 2008, p. 212). Though this concept was critically discussed by Gronroos (2011), the author also concluded that 'customers are by definition value creators, but the opportunities to engage with the customers' usage processes make it possible for firms to become [...] co-creators of value' (Gronroos, 2011, p. 296). In contrast to this, the findings revealed that though customer involvement is mandatory in service business, customers were not perceived as the main creators of value. This is evident when looking at presented experiment, as well as case study findings. But why that?

To answer this question, it is worthy to address the aspect of awareness as suggested by Büttgen (2007). Experiment findings validated that increasing awareness, e.g. through information, enhances perception that customer contribution is crucial for value creation. These findings are in line with a recent study investigating 'customer burnout as a consequence of customer integration' (Becker, Ebert, & Semmler, 2014). But even after treatments in the experiment, the provider was perceived as the main value creator in 6 out of 7 services. It can be argued that increasing awareness is a long-term process and that figures will probably change in the future. However, it needs to be considered that, currently, customers predominantly perceive themselves as co-creators. Furthermore, managers of both case companies clearly highlighted their responsibility for the value creation process. Responsibilities were even switched from

customers to provider (regular check-ups in company A), or activities relocated from customer sphere to provider sphere (follow-up appointments in company B).

However, findings also supported the relevance of customer contribution to value creation at all considered CIPs. Without this contribution, no service could be provided. Hence, customers seem to hold a co-creation function within service operations. This function should be guided and constantly improved by the service provider. Case company B findings showed that well prepared customers may facilitate efficient value creation.

Overall, this thesis agrees with Vargo et al. (2008) that customer involvement is mandatory in creating value. But it does not support the conclusion of Gronroos (2011). Though it might be true in nature or on a theoretical level that only customers create value, subjective perceptions of participants in this study provided a different view. From a subjective point of view, customers were rather perceived as co-creators of value. Nevertheless, it seems to be useful to enhance customer awareness in regards to their necessary contributions to value creation processes. This has positive impacts upon efficiency and overall value creation.

7.1.4 Customer sphere

Several studies highlighted the importance of customer sphere (Gronroos & Voima, 2013; Tossavainen, 2013). In contrast to this perspective, case study findings in this thesis do not support a significant role of it in pure service environment operations. One of the problems in regards to relevance of customer sphere may be originated in its definition. Customer sphere is frequently used as a synonym for a 'usage phase'. This could be seen as rather product, than service oriented. Taking into account inseparability of services, the findings provide evidence to the fact that there is rarely a 'usage phase' outside the joint sphere. Nevertheless, findings in company A, as well as in company B, indicate partially relevance of customer sphere. However, instead of value-in-use, other attributes were found to be important like e.g. a preparation phase. Findings in company B highlighted the aspect of customer preparation as outlined

earlier. Nevertheless, even though the fitness centre aims at improving customer's health, customer sphere did not play a significant role.

Due to the fact that no case study provided sufficient evidence to support this proposition, it has to be rejected. However, it may be noticed that this could also have been caused by applied methods. These predominantly addressed the joint sphere or CIPs respectively. Customer sphere was not addressed explicitly. This might have caused an under representation of this aspect within case research. More details on the role and effectiveness of applied methods are provided in section 7.2 and in *Annex VI*.

Some findings indeed indicated at least a subordinate role of customer sphere for the overall value creation process. For instance, in case company B the customer contribution time in customer sphere was identified. Hence, a hidden significance of customer sphere in the case studies might exist and rejecting this proposition would be false. However, it is questionable if customers calling are still located in the customer sphere, or actually entering the joint sphere. Furthermore, the portion of this activity is less than 1% of total average cycle time. Moreover, the criterion of methodological triangulation was selected in order to avoid falsely accepting insignificant findings. Against this background rejection of this proposition is not only logical but also necessary.

Nevertheless, this proposition needs further attention in future research due to two main reasons. First, applied methods potentially did not fully cover this aspect sufficiently. Second, customer workshop of company B highlighted the importance of hair care at home, which is part of customer sphere or 'usage phase' respectively.

7.1.5 Waste into value

Findings in both case companies provide evidence to the fact that a significant portion of waste can be turned into value. It has been found that prior waste could be turned into e.g. increased earnings or utilization. As traditional lean defines wasteful activities as anything that does not add value (Womack & Jones, 1996), it may be argued that not

only functional value, but also emotional value like nice conversations need to be considered as value. This is evident when looking at the fact that through building close relationships to customers, the provider may expect higher earnings in the future (Sichtmann & von Selasinsky, 2010).

As both case studies improved already given processes, it is valid to address if this proposition is also relevant in designing new process. To answer this question it is necessary to consider that new process designs are simulated in advance. This should avoid the risk of failures and inefficiencies (Daoud & Mahmoud, 2008; Goodale, Verma, & Pullman, 2003). However, also new processes need to be continuously improved. Hence, turning unavoidable waste into value is at least relevant after implementation.

7.1.6 Training

Reflecting on training activities, it is important that employees play a significant role in continuous improvement activities (Ohno, 1988). Furthermore, customers and lead users in particular are valuable sources for generating and promoting ideas (Füller et al., 2012). Thus, to train these sources of knowledge seems to be beneficial and self-evident. Presented findings confirm this perspective and highlight the importance of supporting learning for all parties. In the case studies, training enabled significant improvements. For instance, company B trained staff in advanced scheduling, leading to an increase of earnings of about 10%. Furthermore, product sales in company A could be enhanced through improved product descriptions.

But what does training mean in specific? Brophy (2013) defined training as any activity that enables learn → apply → reflect circles. Hence, training can be provided in diverse and individual forms. For instance, regular customer workshops enable learning, application of lessons learned between the workshops and reflection through discussions. However, an important starting point for learning is awareness. As mentioned earlier, training enhances customers' awareness and ability to incorporate in value creation efficiently. This is evident when e.g. looking at findings in case company B. There, customers were 'trained' to arrange follow-up meetings at the end of the service, instead of phone calls.

Overall, both case studies provide strong evidence to the fact that training enhances overall performance in diverse aspects. But it is not only a matter of effects, but also a matter of responsibility. Who is responsible for customers' learning? It can be argued that the provider is responsible as he or she owns the business and is aware of required customer contributions. In the case studies, all training processes were at least initiated by the provider. Interviews, debriefing sessions and also customer workshops showed that managers sought to enhance their operations and support learning activities. These findings are in line with several SLR studies (Fredberg & Piller, 2011; Vaisnora & Petraite, 2011).

However, also customers need to be aware of the fact that they may contribute positively to an overall good value creation. Thus, training and learning can be a source for them to enhance their own service value.

As training can be seen as a longer process that never ends, it seems to be recommendable to strengthen the tie between customers and provider. Some training effort might not provide ad-hoc results. For instance, changing customer behaviour to arrange follow-up appointments in company B was a longer process. Thus, it is necessary to regularly reflect and provide feedback to both, customers and providers. This could either be done in formalized workshops or simply be embedded in conversation enduring the service encounter like the feedback box in company A.

7.1.7 Effects on performance

In order to make reasonable judgments on performance improvements, the given findings need to be referred to what other scholars reported.

Brophy (2013) claimed that 95% of pre-Lean process steps are either non-value-adding (60%) or just value-adding-enabling. Thus, only 5% of overall lead time is value-adding. He further argued that 'even a world-class process would be considered as having a 25-30% [value-adding]' (Brophy, 2013, p. 19). This is equivalent to efficiency improvements of 400% or 500% respectively. To support this argument, the author presented the case of out-patients department (see also 3.1.9.3). In this case an

increase of 400% could be realized in revenues per employee (from £23,000 to £93,333).

But what figures do other scholars report on lean application in service organizations? What can be expected from lean application on service efficiency? Piercy and Rich (2009) reported about 'significant cost savings' in call centres. This was achieved through a reduction of unnecessary calls per day between 23% and 38% over a period of nine months. The authors further pointed that also quality measures were improved by more than 20%. Similar results in call centres were presented by Marr and Neely (2004). The authors outlined 20% savings in operating costs. In public services Radnor (2010) mentioned savings between 21% manpower reduction and 54% reduction of support costs within 5 years. Thus, performance effects from lean application to service companies generally gain more than 20% efficiency increase. However, though all these figures exceed the number of 20%, they significantly differ in meaning. For instance, a decrease of 21% manpower within 5 years is not necessarily equal to a reduction in labour costs. Furthermore, it is at least doubtful if reported reduction also included a decrease of fixed costs like building occupancy expenses or similar. In the case of Brophy (2013), the registration activity was outsourced to an online platform. This caused a significant headcount reduction, but also led to IT costs that were not considered in the example.

Hence, it may be summarized that reported findings predominantly addressed isolated figures and did not reflect all operating costs. Hence, savings have to be seen in an individual company related context.

In both case companies improvements of operational efficiency, as well as value creation were achieved. Regarding efficiency, the number of training machines was decreased by more than 20% in company. This measure had direct implications to profit. Furthermore, catering earnings were tripled, which was equal to an increase of overall earnings of about 7%. Also case company B increased earnings by 10%.

In terms of value creation, the VA ratings significantly increased from 46% to 75% in company A and from 72% to 87% in company B. These significant improvements were also confirmed by customers. Considering that these figures were achieved in less than

3 months, it can be argued that application of the lean model positively impacted overall performance. It is likely that the performance further increases over time, e.g. due to positive training effects. However, it may also remain constant or even decrease, if organizations will not be able to further facilitate lean service thinking and behaviour.

But how could these achievements be explained? 'As one of the main focuses of lean approach is to identify and remove waste in every aspect of organisational processes, the principle can [...] enhance efficiency' (Suárez-Barraza et al., 2012, p. 370). Thus, it may be reasonably presumed that at least efficiency improvements were caused by the application of the model. Also the improvements in terms of value creation were closely related to analysis of value, definition of roles, process design without waste and training activities. Hence, it is unlikely that improvements occurred by accident. IT system data of former periods did not provide any insights that this is the case.

Thus, it can reasonably be argued that reported positive effects were achieved through application of the new lean service model.

7.2 The role of applied lean tools

In order to thoroughly assess the role of applied methods, it is necessary to distinguish between research methods like interviews, MCS and others, and lean application tools. A set of traditional, adjusted and new lean tools were applied within the case research. In both cases, VCM, process observation sheets, VA ratings and customer workshops were conducted. All applied tools contributed either to information or knowledge creation or assessment and (re-)design.

The meaning of lean tools is intensively debated in literature. Originally, Ohno (1988) recommended not to codify TPS tools as improvement is never-ending and he did not want the process to become crystallized. However, the author of the foreword, Norman Bodek, assumed that Ohno rather 'feared Americans would discover this powerful tool and use it against the Japanese' (Ohno, 1988, p. xi). Seddon and O'Donovan (2010) interpreted the former Ohno statement differently and argued that

“Lean tools’ movement is directly in conflict with the beliefs of the architect of the TPS [Ohno]’ (Seddon & O'Donovan, 2010, p. 12). They further argued that original purpose needs to be considered before applying a method. Thus, just applying tools without purpose and pre-assessment probably leads to inappropriate results. Despite this, Harré (2008) put emphasize on the benefits of applying already proven methods.

Applied lean tools in this thesis consider both aspects. First, they were based upon already proven and widely accepted lean tools like VSM or event workshops (Abdi et al., 2006; Brophy, 2013). Furthermore, they were adjusted for better application in service organizations (e.g. VCM). Therefore, effects of service characteristics had been thoroughly considered previously. Thus, adjustments seem to be a main reason that not only efficiency, but also VA rating significantly increased in both case studies.

However, methods contribution throughout the case studies differed in terms of purpose. For instance, the process observation sheets provided valuable insights on efficiency and value creation, whereas VA ratings predominantly addressed assessment of value creation. It can be argued that tools relevance evolved over time and was not fully clear prior to application. This process was enabled and positively facilitated through the AR approach. Overall, it may be considered that lean service tools should be seen as a set of opportunities that may be applied if applicable. Therefore, it is important to consider the purpose of a certain tool in advance.

However, the low amount of information that was provided on customer sphere indicates that applied tools did not address this aspect sufficiently. But what kind of tools would be able to address customer sphere sufficiently? Mota Pedrosa (2012) recommended to observe customers at home in their usage stage. However, SLR did not provide additional approaches to investigate customer sphere. This indicates that the topic in general is still underdeveloped. Hence, for a more detailed investigation of customer sphere, tools need further development.

Beside this tool discussion, it should not be missed that lean tools rather enable knowledge creation, than improve something on their own. It is always up to the people to apply the right tools rightly. Therefore, a thorough understanding of the problem, the goal and potential methods is crucial.

7.3 Linking patterns and differences

Along with differences between traditional lean application and the new lean service model, there are patterns that link both approaches. This can be considered by referring back to the five lean principles *purpose*, *system*, *flow*, *perfection* and *people* (see *section 3.1.2*). All activities that strive to identifying and matching value propositions of customers and providers are closely linked to the principle of *purpose*. These value propositions can be seen as the reason why a company exists and why customers use a specific service. Furthermore, *people* and *perfection* are core parts of mentioned training activities and improvement circles.

However, in regards to the principles *system* and *flow* some important differences between traditional lean and the new lean service model can be identified. These differences are reflected in case research, as well as in experiment findings. Considering that traditional lean is based upon production line approaches, it is noteworthy that value is added sequentially along the manufacturing process. A set of predefined, constantly repeated activities turn raw material into finished goods that are finally delivered to customers (*Figure 30*). Thus, this sort of value adding seems to be quite smooth and ordered along the process. Though customization of products gets more and more important, there are standardized solutions available without changing the underlying principle of flow, e.g. postponement (Choi et al., 2012; Yang & Burns, 2003). It is logical that potential side-effects of any changes within this process flow have to be thoroughly considered, as value adding in any step is closely linked to preceding and succeeding activities (Womack & Jones, 2003).

In contrast to this logical flow, presented findings indicate a different picture of service value creation. First, a high degree of individuality in customer propositions and perceptions was found. Referring to the earlier discussions on value propositions, roles and value (co-) creation, it can be considered that various and diverse attributes impact value adding. Emotional value in particular is highly individual. Thus, emotions play a significant role within value creation in service operations. Considering that 'overall-wellbeing' and 'nice conversations' were elaborated as important aspects from a

customer perspective, it is questionable if these values can be delivered sequentially. Though VA rating and process observation sheets indicated certain contribution level to value creation of single process steps, these were rather subjective. Due to individual customer perceptions, it may be argued that the degree of value adding within each activity highly alters.

This complexity is also reflected in some service quality models, e.g. the GAP model of service quality (Parasuraman et al., 1991; Shahin & Samea, 2010). The findings in this thesis indicate that diverse criteria with constantly varying factors impacting value creation in service operations. Thus, the overall principle could be characterized as highly disordered, or in other words *chaotic*. This is in contrast to an *ordered* and smooth flow in manufacturing.

Hence, in pure service organizations the capability to handle variety is more important than flow. This conclusion is in line with the systems archetype of transactional service systems presented by Seddon and O'Donovan (2010) (see also 3.1.2). *Figure 30* displays that value creation in manufacturing operations predominantly focuses on managing process steps to achieve a pre-defined functional product. Value creation in service operations means to manage diverse, individual and constantly varying value attributes.

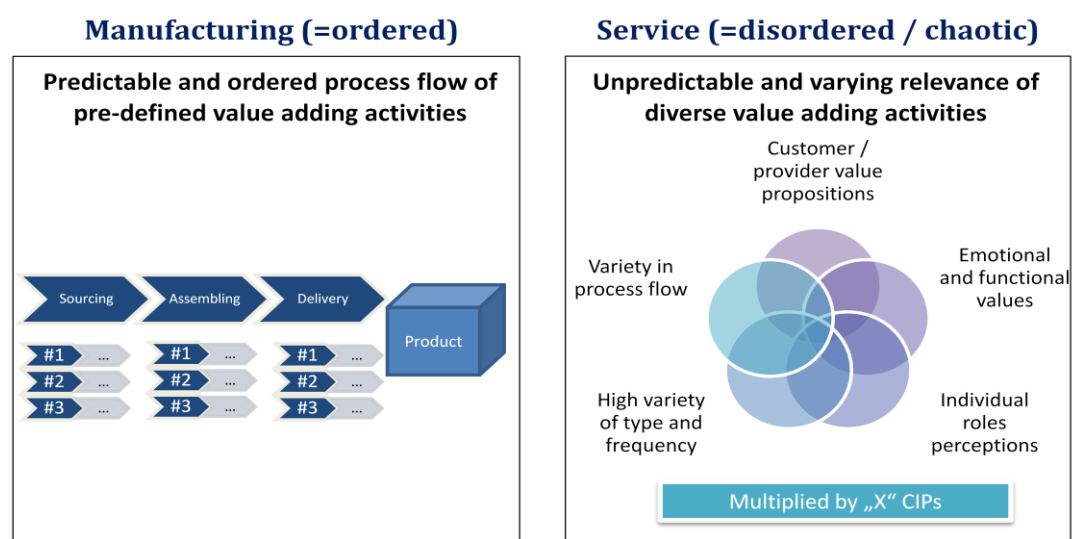


Figure 30 Difference in value creation

As customers are usually not integrated into the manufacturing process (provider sphere), these operations only need to consider functional attributes along the production process. Service operations (joint sphere) need to deal with functional, but also emotional value, e.g. 'overall well-being'. Additionally, experiment findings showed that there are diverse perceptions of service provider's and users' roles in value creation. Furthermore, there is a high degree of variety in terms of individual service requests, like individual haircuts (company B), or individual training plans (company A). Overall, the aspect of co-creation in service operations demands a match of customer and provider perceptions not only on a design level, but also in daily business operations. This is valid for all CIPs. Interestingly, improving a specific CIP could be done quite independently from other CIPs in the case research. In both case studies, only 3 of 4 CIPs were addressed. Though the whole process flow has not been considered in total, significant improvements were achieved without negative impacts on the other ones. This indicates that in contrast to the closely interrelated and dependent production flow, service CIPs seem to be rather independent from each other.

It can be summarized that a major difference between lean manufacturing and lean service operations is the absence of an ordered *flow* in value creation. It is rather a highly individual and disordered process. This fact further leads to a different sort of *system* with different mechanisms as e.g. CIPs could be improved and changed without affecting other CIPs.

7.4 Validity considerations

The external and internal validity of findings are crucial to the overall outcome and conclusions of this thesis. As the problem of validity has already been addressed and explained in previous sections (e.g. 5.4.1.2), adherence of planned methods to enhance validity is focused in the following.

To enhance internal validity of case research, several authors strongly recommended, triangulation, mixed methods approaches, as well as frequent debriefing sessions (Shenton, 2004; Winter, 2000). Thus, selected research design considers 6 different

methods in case research, either of qualitative or quantitative nature. All of these methods contributed to the validation of propositions. Throughout the validation process, defined assessment criteria were rigorously considered. This is valid e.g. through the rejection of proposition 4, as well as through the experiment on proposition 3. As experiment data indicated that the topic is quite individual and strongly depends on personal perceptions, it is comprehensible that case company A findings did not support this proposition, whereas company B did. This logical explanation of causes and effects can be seen as an additional indication of validity, as e.g. Meredith (1998) argued. Furthermore, the regular debriefing sessions and reflections among participants also enhanced internal validity. Therefore, adherence of methods to enhance internal validity can be seen as given in this research process.

In regards to external validity, application of pole cases as recommended by Meredith (1998) turned out as useful. First of all, application of the model provided similar results in different industries. This confirms the initial presumptions that type of industry is irrelevant. However, findings are limited to the shared characteristics of selected companies. Furthermore, the selection of poles also showed that the degree of customer contribution did not play a significant role.

Interestingly, experiment findings considering 7 different common services supported the initial assumption that fitness centre and hairdressing can be seen as two poles. This also validated the selection of these two industries. But could these findings also be transferred to larger companies or even to companies offering a product-service mix? It is not likely that findings can be simply transferred to large scale companies, e.g. due to diverging complexity aspects in processes and management. But referring back to propositions and general adaptation of the lean service theory, it can be reasonably assumed that the general principles may also be successfully applied to larger companies. For instance, the experiment addressed a broader range of different people. Thus, results could be seen as rather general perceptions of people.

It may be summarized that various methods were applied in order to enhance external, as well as internal validity throughout the research design and process. The remaining

limitations, particularly in terms of external validity, predominantly lie in the nature of case research and thus, cannot be avoided completely.

However, the intensive research design sought to understand and reveal causes and effects, as well as exploring the true nature of an object. It seems to be valid that selected methods and subsequent results were able to fulfil this goal.

7.5 Contribution of results

At this stage the findings of this study can be classified into four categories. First, the overall goal to improve value adding, as well as efficiency was achieved in both case studies. Second, except relevance of the customer sphere in pure service operations, all propositions were validated. The intensive research design addressing the meaning of propositions provided valuable insights. Amongst others it pointed necessary things to be considered when trying to improve pure service operations in a lean way. Third, the presented lean service tools provided participants in the case studies with information, as well as design and discussion platforms. Thus, the tools contributed positively to the overall achievements within the case companies. However, findings also showed that tools need to be thoroughly assessed in terms of purpose or necessary adjustments prior to application.

Finally, the findings provided evidence that the five lean principles need to be re-adjusted for pure services as flow and interrelations in the system seem to be less important. Instead, complexity within each CIP needs attention, as well as supporting organization's capability to handle variety.

8 Conclusions

In the following, this chapter provides a summary of the thesis and synthesizes research findings and discussions with the current body of knowledge. Furthermore, research questions are responded and implications on theory and practice are presented. Finally, this chapter addresses research limitations and areas for future research.

8.1 Introduction

According to the title, this thesis aimed at developing '*A new lean service model – The value of customer integration into service operations*'. In order to achieve the overall research goal, the following research questions were derived:

RQ 1: How can customers be integrated into service operations in a lean way?

RQ 2: What effects result from lean service customer integration on customer service and operational performance?

To address the research questions appropriately, an intensive research design was applied. Initially, an SLR was conducted to develop an initial model for lean service customer integration. This model was based upon proven methods provided by 27 studies from the fields of marketing and operations management, which were applied in the SLR. Throughout this synthesis process, the model and specific lean tools were adjusted to be applicable in service organizations. Amongst others, the Value Stream Mapping tool was enhanced through distinguishing between provider and customer contribution. The adjusted tool was labelled as Value Creation Map. At the end of SLR, a model of four stages was presented. Furthermore, seven propositions were formulated in order to test validity of the model in the subsequent research process.

Afterwards, two case companies were selected from different industries. These were 'hairdressing and other beauty treatment', as well as 'fitness and health industry'. It was reasonably argued that industry is irrelevant to the application of the model. But both companies shared several relevant characteristics like family ownership, location in Northern Hessen (Germany), inexperience in lean application and others. The

process of selecting specific companies was undergone outside-in. This means that industries were selected considering high and low degree of customer contribution in pure service businesses.

Then, the process of case study selection started. The case studies were conducted sequentially. This enabled to apply lessons learned, which was in line with the Action Research design. Six different research methods of qualitative and quantitative nature were applied to both companies. Three methods in each case study needed to provide relevant support of a proposition to validate it. Otherwise it was rejected, or further explored in experiments. One experiment was conducted to validate proposition 3. Therefore, a total number of 46 people participated in the experiment in four different groups. Each group was split randomly into a treatment and control subgroup. ANOVA was applied for data analysis.

The research methods provided rich data and relevant insights. In order to deal with the amount of data, it was analyzed and reported in return to the propositions. Based upon research data, 6 out of 7 propositions were validated, whereas one had to be rejected. The subsequent discussions pointed necessary adjustments for the model (RQ1), but also confirmed performance effects of model application (RQ2).

In the following sections, discussions related to research findings are continued. Therefore, relevant aspects are referred to the initial lean service model. A further step is to improve the basic model in response to RQ1. Afterwards, also RQ2 is addressed, as well as research implications and limitations are provided.

8.2 Research contributions

This section scrutinizes research contributions in terms of conceptual and practical aspects addressing research results (section 7.5). Therefore, core issues of former lean service theory and practice are discussed. Furthermore, explanations and potential solutions are provided. Afterwards, these are referred to the lean service model, as well as to its effects on operational performance in the case companies. It is also

considered whether these effects could also be presumed to be similar in different circumstances, e.g. large enterprises.

8.2.1 Adjusting lean service theory and practice

Various problems in lean service projects have already been identified in scholarly debate. These range from rather theoretical problems in defining lean service (Suárez-Barraza et al., 2012) to concrete issues in lean service implementation and application of traditional lean tools in service environments (Radnor, 2010; Radnor & Johnston, 2013). Scholars and practitioners sought to cope with these issues and overcome barriers between manufacturing and services, but significant issues still remained (Arfmann & Topolansky, 2014). Seddon and O'Donovan (2010, p. 1) even argued that ‘lean’ literature has only helped to emphasise the same underlying management assumptions: by managing cost and workers’ activity, organisational performance is expected to improve’.

The topic is considered and scrutinized in the next sections. Based upon research findings and discussions, theoretical and practical implications for successfully applying lean in service organizations are outlined as major insights in the following.

8.2.1.1 Insight 1: Value focus needs to be enhanced in lean service projects

Referring back to the initial value discussion in sections 1.2, 2.3.1.2 and 3.1.7, value was defined as a mix of functional and emotional elements. The findings in this thesis confirm the perspective that perceived value in pure service environments contains always functional and emotional aspects. In particular, the customer workshops highlighted this fact. But the workshop results also revealed that there is not a single value definition and that value perceptions of customers within pure service operations highly vary. It even varies when the same customer uses a service several times and as such, it is unpredictable. Thus, service operations concepts should be enabled to deal with such a high degree of variety. Furthermore, it needs to be considered that value creation and perception in services is intertwined due to inseparability of services. This

means that the provider directly influences the notion of value through interaction. Hence, a value focus in lean service operations projects is crucial.

Beside unresolved issues in defining lean and lean service respectively (Pettersen, 2009; Suárez-Barraza et al., 2012), a major concern in lean service literature pointed at a strong efficiency focus of lean service implementations, sometimes even leading to a lack in customer service quality (Seddon & O'Donovan, 2010).

On a rather philosophical level it may be argued that this phenomenon occurs as lean is originated in a value-in-exchange manufacturing environment. The majority of lean manufacturing studies addressed either efficiency gains or functional value improvements like cycle time reduction or reliability (Pettersen, 2009). This is evident when looking at the leading lean authors like Ohno (1988), Womack et al. (1990) or Spear and Bowen (1999). Their work predominantly addressed efficiency gains through banishing waste, though also some functional value aspects were pointed. Hence, it seems that from a theoretical level it is necessary to go beyond value-in-exchange to value-in-use thinking and to consider value creation sufficiently within lean practices. This new thinking would need to emphasize concepts like value (co-) creation of customers or emotional value. However, this phenomenon may not sufficiently be explained from a philosophical perspective only. In addition, it is important to furthermore consider explanations that were derived from real cases.

Radnor and Johnston (2013) sought to explain this phenomenon with a cost focus of managers when starting a lean project. The authors argued that lean is often applied in overall cost reduction programs, e.g. initiated by the government in public services. From a CR perspective it can be noticed that the focus of a lean project pre-defines the mechanisms that lead to certain outcomes. Thus, a cost focus probably leads to reduction of costs, whereas a value focus leads to increase of value provision.

The findings of this thesis supported this explanation. It may be argued that a clear focus on value creation throughout the case studies supported the improvements that were achieved on quality of value creation. It could not be clarified whether the focus was caused outside-in from the researcher or whether it was an intrinsic motivation by the managers, but both reasons sufficiently explain this effect. However, though the

root cause cannot be clarified, it may be considered that putting emphasize on value creation led to the achieved improvements. Beside the target focus on value, the findings also provided evidence to the fact that adjusted lean tools contributed positively to these improvements. This is valid when looking at the fact that e.g. process observation sheets and VA ratings provided in-depth insights upon value creation. Also defining and matching value propositions enabled reasonable adjustments to improve value creation. For instance, it can be referred in this circumstance to providing hair care advices in company B. These tools contributed positively to the gained effects and supported the underlying mechanism of achieving improvements through informed choices.

Thus, it can be summarized that balancing improvements in value creation and operational efficiency needs to be supported by at least two core elements. First, lean service projects should explicitly aim at enhancing value and increasing cost efficiency at the same time. Second, methods need to be applied that also allow a value creation focus, instead of solely aiming at banishing waste. Process observation sheets and VA ratings can be seen as useful tools to identify potential areas of improvements in terms of value. Furthermore, there is a strong need to challenge potential value-in-exchange state of mind, in order to develop suitable methods and to set the right targets in lean service projects.

8.2.1.2 Insight 2: A revised lean mindset for service operations is mandatory

As Vargo and Lusch (2004a) recommended a shift of dominant logic from products to services in marketing circumstances, this thesis provides evidence to the fact that this is also valid when it comes to lean. The gained improvements in terms of value creation and efficiency that were provided through the application of service specific lean tools highlight the need for a revised lean service mindset. The findings showed that the improvements within both case studies have been achieved through the application of the developed new lean service model. Therefore, it seems to be necessary to adjust the traditional lean mindset. *Table 21* below outlines the mandatory adjustments.

Attributes	Traditional lean mindset (manufacturing)	Revised lean mindset (service)
Meaning of value	Value is defined by customers and captured by price (monetary value)	Emotional and functional value is defined by customers and providers
Role of customers in service operations	Customers are objects of flow	Customers are (co-) creators of value
Principle of value creation	Ordered and flow oriented	Chaotic and highly individual
Handling waste	All types of waste need to be banished	Waste is a potential for creating additional value
Seeking perfection	All organizational resources need to be constantly improved	All value creating resources need to be constantly improved

Table 21 Traditional vs. new lean mindset

The table shows that value in service environments should be defined beyond customer expectations and price. Beside functional, also emotional value needs to be considered to grasp a broader meaning of it and design real value adding operations. Additionally, a matching of provider and customer value propositions is mandatory to align service provision with customer expectations. Therefore, customers need to be perceived as sources of value creation and services need to be designed to enable value creation 'with' customers. Furthermore, the process of creating value should be perceived as highly individual and chaotic to a certain degree. This implies that the lean principle of flow is less relevant in pure service environments, where customers are integrated. Flow orientation may even contradict individual value creation as it strictly seeks to avoid variety. Broadening the value perceptions further enhances the ability to identify potentials in turning waste into something valuable, as shown in the case study findings. Finally, to successfully implement a sustainable lean service project it is necessary to constantly improve all value creating parties, including (internal) organizational resources and (external) customers.

It is important to consider that service operations characteristics may not be sufficiently explained and captured by the traditional lean mindset as reasoned above.

It even contradicts improvements in the joint sphere, as e.g. customer contribution is not considered in traditional lean tools. The application of the traditional lean mindset must lead to disappointing results in improving value creation. This is reasoned in its inability to handle service specific characteristics. This finding is in line with the main arguments of the initial lean critique presented in *chapter 2*. To overcome these issues it can be seen as mandatory to shift the traditional lean mindset into a service specific thinking. This also includes application of service specific lean tools.

In summary, insight 2 can be seen as a pre-requisite for successful lean service operations projects, as it seeks to switch scholars and practitioners perspectives to initiate and facilitate a process towards an in-depth understanding of service operations.

8.2.1.3 Insight 3: lean tools need to be adjusted for application in service

Though it is a common understanding in scholarly debate that applied lean tools should consider service specific characteristics (Bowen & Youngdahl, 1998; Johnston, 2005; Swank, 2003), the practical relevance in regards to adjusting lean tools before application in service operations was underrepresented (Radnor, 2010; Seddon & O'Donovan, 2010).

The presented research findings and discussions highlight a strong need for adjusting traditional lean tools before application in service environments according to service characteristics. All tools should be assessed against their original purpose and the desired outcome of its application within a specific project. This is valid when looking at the fact that the gained achievements in this thesis have only been enabled through the prior adjustment of applied lean tools. Findings reasonably showed that adjusting these tools directly caused the observed and measured effects.

8.2.1.4 Insight 4: lean principles need to be linked to different value spheres

Though above insights seem to demand a switch from lean manufacturing to lean service, it is important to recognize that both philosophies merely compete with each

other. Actually, they rather complement each other. To understand this perspective, it is necessary to think beyond the common service and manufacturing definitions or categories.

Referring to *Figure 3* and *Figure 4* (section 1.2) it can be noticed that also rather pure services like restaurants may contain process steps with and without customer interaction. In other words, there are 'preparing' process steps on the one hand, and 'performing' process steps on the other hand. Nearly all production processes can be seen as 'preparing' something that should provide value to a customer afterwards as value-in-use (Vargo et al., 2008). Within such process steps, traditional lean manufacturing is originated and successfully applied (Womack et al., 1990). These process steps are located in the provider sphere, without customer interaction. Thus, even in service organizations, provider sphere activities may successfully be improved through (traditional) lean manufacturing thinking and tools. But, in regards to processes at CIPs, presented findings stressed the strong need to adapt an approach that enables customer integration and co-creation of value. In contrast to a 'streamline' approach in provider sphere activities, it seems to be important to cope with individual value propositions at CIPs. In other words, instead of 'streamlining' there is a need for 'valuelining' all performing activities in the joint sphere.

In summary, this means that it is recommendable in pure service organizations to:

1. 'Streamline' all preparing activities in the provider sphere, e.g. through applying traditional lean thinking and tools
2. 'Valueline' all performing activities in the joint sphere, e.g. through applying the new lean service model

Thus, a successful model for customer integration into lean service operations needs to cope with individual value propositions at CIPs and handle a high degree of variety.

8.2.2 Lean service model for customer integration into lean service operations

Considering above insights, this study found that it is necessary to consider several levels of integration, in order to support customer integration into service operations in a lean way.

First, customers should contribute to the definition of value through e.g. expressing their needs. This is evident as the matching of value propositions was identified as a major element of the lean service model. Second, customers were identified as co-creators of value. Thus, they should even be integrated at the design stage of operations. Case studies supported this argument e.g. due to the fact that both companies did not pay sufficient attention on catering or hair care products as requested by customers. This could have been avoided if customers were integrated into service design earlier. Third, customers can be seen as important sources in terms of idea development, critical review of performance and as drivers of improvements. Thus, customer contribution to review and improvement cycles should be facilitated by the provider. Finally, an integration of customers on a daily business level while providing a service and creating value is essential. It is the provider's responsibility to guide customers through the process and to train them to support efficient customer contributions. The locker key selection process in company A or appointment scheduling in company B are good examples in this circumstance.

Before the initial lean service model can be improved, validation of value propositions needs further attention. It may be summarized that for integrating customers in a lean way, matching value propositions, identification of roles on different levels, customer co-creation, turning waste into value, as well as training of provider and customers are confirmed as key components. The relevance of customer sphere in pure service environment operations could not be confirmed sufficiently. Due to rejection of proposition 4, customer sphere is not considered in the improved model. The other factors are integrated with the basic model to develop an improved version.

In response to RQ1 the following model is presented as suitable to integrate customers into service operations in a lean way. The basic model consisted of four sequential stages: value definition, roles in value creation, process design without waste, training

and regular review. Overall, these stages were found as suitable throughout the research process with some necessary adjustments to overcome minor issues and avoid misinterpretations. First, the model is heuristic and not representational. That means that though the components may be valid in diverse environments, the process will never be exactly the same. The model should rather be perceived as a guideline what steps need to be considered in order to facilitate value and efficiency improvements within a service company.

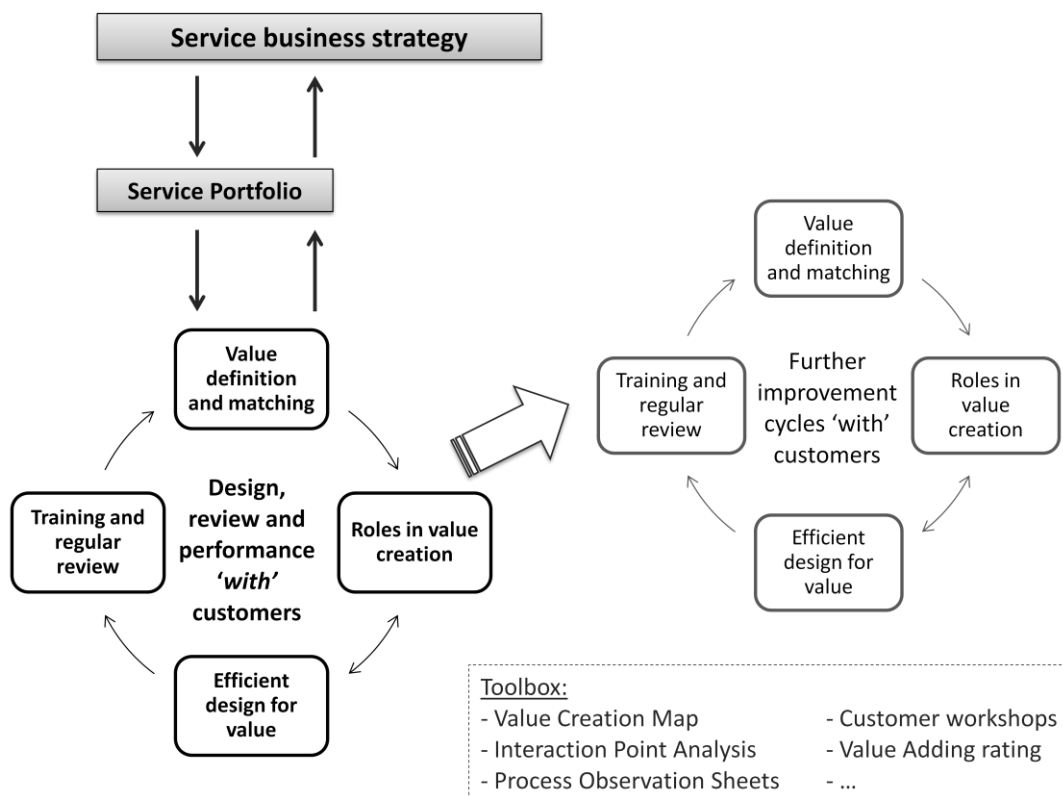


Figure 31 Improved lean service model for customer integration into service operations

Figure 31 illustrates the improved model. It shows that any lean service project should be in line with the overall service value business strategy and the service portfolio. If throughout the matching process of value propositions a major mismatch between value propositions and portfolio or business strategy is identified, these should be remedied prior to the project. However, minor issues could also be adjusted in parallel to the lean project. It is very important that any project aims at improvements in terms of value *and* efficiency. The idea of lean, originated in TPS, highly emphasized interrelations of efficiency and value. Furthermore, it was argued by leading lean

scholars that without value orientated purpose, lean applications would be either insufficient or incomplete (Bowen & Youngdahl, 1998; Womack & Jones, 2003).

Against this background, the model shows the interrelations between service business strategy, service portfolio and the first step of the implementation cycle 'value definition and matching'. It was found important to consider functional, as well as emotional value propositions at this stage. In contrast to the basic model 'matching' has been added to the denotation as any gaps between customers' and provider's perceptions should be avoided. This can also be seen as key in developing an in-depth understanding in terms of roles and processes within the subsequent stages. A thorough analysis of the roles in value creation needs to consider general roles, but also specific tasks on a process level. However, this step has not been adjusted in its denotation or core meaning.

The third stage has turned from 'process design without waste' to 'efficient design for value'. As findings showed that a significant portion of waste could be turned into functional or emotional value, it is logical to focus value first. Afterwards, the process of banishing waste in order to increase efficiency can be initiated. In case company A, underutilization of 'Check-In' and 'Check-Out' staff could also have been solved by an automated system, or through outsourcing this step like Brophy (2013) pointed in his case example. However, this would have also impeded the significant increase in catering earnings that was achieved through focusing on value first. Furthermore, the improved model highlights a bidirectional interrelation between stages two and three. In order to realize an efficient design for value, sometimes roles need to be reconsidered and adjusted, e.g. for check-up appointments in company A. This does not mean that bidirectional interrelations may not occur also among the other stages. But it emphasizes that it is very likely that roles need to be adjusted through designing efficient processes for value creation. Afterwards, training and regular review activities need to be established. This is not only valid for staff, but also for customers. All stages can be supported by the outlined lean service specific toolbox. However, this box is definitely not exhaustive and should be contemplated in the future.

Overall, all stages need to be incorporated *with* customers. This addresses value definition, design of roles and processes, as well as review and training activities. Furthermore, customer integration and contributions are essential in daily business operations. In particular, daily business operations provide a major platform for guiding and training customers to continuously improve value creation, as well as operational efficiency. The model further highlights that multiple cycles of the four stages are needed on the pathway to perfection, albeit the fact that real perfection cannot be reached.

In the following, each stage is addressed and reasoned more in detail to clearly point implications. Furthermore, suggestions are provided what groups of customers should be integrated at what stage of the process. Additionally, useful methods are recommended in regards to the toolbox of lean service tools.

8.2.2.1 Value definition and matching

Seddon and O'Donovan (2010) put high emphasize on the need to understand demand by type and frequency. The authors argued that this is a fundamental prerequisite to deliver value to customers. Furthermore, staff should be trained against high frequency demand and supporting process should be established to support staff in dealing with unexpected demand. This thesis confirms the need for understanding demand, but contemplates this argument by matching value propositions. Matching requires rather an active dialogue between value creating parties than solely transferring customer needs into operational processes. Several studies put high value on the fact that indirect data gathering (mode 1) is insufficient to gain in-depth understanding of customer's value perceptions (Edvardsson et al., 2012; Enkel, Gassmann, & Chesbrough, 2009; Füller et al., 2012). Thus, it can be strongly recommended to apply a matching process 'with' customers (mode 2). It seems logical to consider both perspectives as both parties are significantly involved in value creation. It is consciously recommended to applying a mode 2 approach instead of mode 3. Mode 3 would mean design 'by' customers. Though marketing scholars highlighted the value of a design 'by' customers (Füller et al., 2009; Kohler et al., 2009), it needs to be considered that these

studies addressed product development processes. Whereas value-in-use in terms of products is located in the customer sphere, the value-in-use in services is located in the joint sphere. Thus, it is logical to apply mode 3 in product circumstances, but mode 2 should be preferred in service environments where value is created by both parties within the joint sphere.

Referring to the aspect what customers are likely to be integrated, the usefulness of lead users may be emphasized. Scholars like Belz and Baumbach (2010) or Ernst et al. (2012) highlighted the usefulness of lead user integration. The given findings of the case research also supported this perspective. There are several major benefits in regards to the integration of lead users. First, lead users possess a sound knowledge, are intrinsically motivated, highly critical and have strong impact on other users. This seems to be ideal when aiming at improving value creation and performance. Not only customers but also highly skilled members of staff may be considered as lead users. However, identification of lead users needs thorough attention. Tuunanen et al. (2011) provided several approaches for lead user identification. Second, integration of lead users in a direct way, e.g. in personal workshops or online communities, enables an active dialogue. This is important to clarify queries and enhance the meaning of results. Nevertheless, this data may also be integrated with indirect data, e.g. historical order data. This also contributed to a more holistic understanding of value propositions in the case companies.

8.2.2.2 Roles in value creation

Experiment findings showed that customers predominantly perceive the provider as the creator of value. This is in contrast to premise no. 6 in the concept of Vargo et al. (2008). This premise pointed that firms only may facilitate value creation but never deliver value. Nevertheless, it is a fact that customers' co-contribution is fundamental in value creation. Experiment findings also showed that customers are in general aware of their co-creation role and that this awareness may be enhanced through training and learning. However, it has also been found that perceptions strongly vary due to

individual perspectives. Thus, it is important to consider this diversity in the design of value creation processes at CIPs.

Regarding lean service tools, it may be pointed that the process observation sheets contributed well to an in-depth understanding of the roles within the value creation process. Furthermore, customer workshops were useful to further explore the roles of each party. Depending on the tool, it can be argued that either diverse sorts of customers (process observations) or lead users (customer workshops) were considered within the case studies.

Beside these aspects, this study also revealed that assessing and adjusting roles in value creation can contribute positively to improving functional and emotional value, as well as efficiency. Therefore, a thorough analysis of specific tasks within each CIP is necessary. Furthermore, roles and tasks need to be assessed against value propositions to identify further areas of improvement. However, this needs to be integrated with the subsequent stage of efficient design for value.

8.2.2.3 Efficient design for value

It is important to notice that this study focused customer integration into service operations. Thus, value creation processes at CIPs were considered and administrative processes without customer contribution were disregarded. Findings revealed that within these CIPs value is rather created in a chaotic way due to various service options and diverse customer preferences.

As discussed earlier, this is in contrast to the principle of flow in traditional lean thinking. However, these findings can be seen as confirming the flow critique in service operations by Seddon and O'Donovan (2010). They reflected this in their systems archetype (*Figure 6*) presented in section 3.1.2. They recommended establishing a 'first contact' of highly skilled staff to clarify customer requests or even solve them directly. Afterwards, it can be put 'clean' into flow. Thus, there seems to be something prior to flow. It may reasonably be argued that this 'first contact' could be seen as a CIP. CIP value creation mechanisms do not follow a flow. Furthermore, CIPs are less

interdependent than e.g. manufacturing stages. This means that CIPs may be improved without considering the overall system in detail. However, CIPs are interlinked in terms of information and thus also flow needs to be considered to a certain extent.

Another important aspect is that it was found recommendable to focus value. Each case company identified several opportunities to increase value, e.g. catering earnings or hair care product sales. These opportunities might have been dismissed by only focusing on waste reduction. However, this does not aim at denying the value of banishing waste. But it is reasonable to emphasize the opportunities that may derive from turning waste into functional or emotional value.

In the conducted case studies VCM, process observation sheets and VA ratings, as well as customer workshops were found as valuable to contribute to an efficient design for value. IPA was only partially applied but could be of higher relevance in more complex service organizations. In regards to customer integration it may be argued that the design process may be supported directly through integration of lead users. This could be done e.g. in workshops.

8.2.2.4 Training and regular review

The training and regular review stage is where the developed improvements are actually implemented. Without facilitating training activities, desired improvements may not have been achieved. The traditional lean philosophy emphasizes the role of *people* within any lean transformation process (Brophy, 2013; Ohno, 1988). Though the authors provided a quite general definition of *people*, they predominantly addressed managers and staff. The findings indicate that it is necessary to expand this perspective and to perceive customers as an active part in lean service transformation. Their contribution may be seen as crucial to the overall performance. This is evident when looking at case company B, where e.g. a change in making follow-up appointments had led to avoid waste and increase efficiency.

Against the background of co-creation, it would be a fallacy to exclude customers from lean service projects. Customers in fact should take an active role. Training and review

activities in particular strongly depend on customer involvement. This stage of the model should also address all customers. It is not limited to a certain group, e.g. lead users. Guiding customers within the daily business operations was found as an effective way of training customers. Therefore, members of staff need to be aware of desired outcome and potential ways of addressing it. For instance, staff highlighted the positive effects of arranging follow-up appointments directly after service provision, to convince customers to act accordingly.

Furthermore, a regular review with customers can be seen as beneficial to enable continuous improvement activities. Providers may facilitate this process either actively or passively. Active actions are e.g. establishing regular customer workshops or asking for direct customer feedback within the service encounter (Tossavainen, 2013), whereas customer feedback boxes and analyzing gathered order data can be seen as rather passive approaches (Ryzhkova, 2012).

At this stage it may be summarized that the improved lean service model enables systematic customer integration on different levels and at different stages. It is also important to emphasize that presented tools should support this process. However, also other tools may be applied to achieve the goal of enhancing customer value and increase efficiency. In turn, it should also be highlighted that applying presented tools does not automatically lead to improvements. The model and tools aim at providing a pathway of learning for provider and customers, in order to systematically develop efficient value creation in service organizations.

8.2.3 Effects on performance and value creation

This section responds to the second research question (RQ2). The findings provided evidence to the fact that application of the lean service model causes diverse effects. The considered effects within the case companies were positive throughout. This was not only reflected by participants from provider's side, but also by customers. Overall, it can be argued that the lean service model outlines a pathway to create an in-depth understanding in regards to value creation, as well as roles and responsibilities. As a

result, the case companies were able to implement improvements that were based upon reasoned choices.

Various former lean implementations in service organizations showed a lack of customer value focus (Radnor & Johnston, 2013). The presented model facilitated major increases in this area. At all addressed CIPs, the VA ratings were significantly improved. This was confirmed by customers within the customer workshops, and was also reflected in increasing earnings, e.g. for catering and products. Thus, customer service (value) can be significantly enhanced by applying this model.

Furthermore, also efficiency improvements were achieved. Amongst others, the utilization of training machines was significantly increased by more than 20% and unneeded equipment was sold. Furthermore, utilization of human resources was significantly improved in both case companies as shown in the VCMs (*Annex II*).

In addition, it is noteworthy that administrative processes (provider sphere) within the companies were out of focus. It is argued by various scholars that administrative processes often consist of diverse forms of waste that could be banished (Abdi et al., 2006; Radnor, 2010; Seddon & Caulkin, 2007).

In summary, this study provides evidence to the fact that this lean service model may support a firm in improving both, customer value and operational performance. Also Piercy and Rich (2009) reported in their call centre study about significant improvements in efficiency, as well as in quality. The authors also applied a service specific lean approach, the concept of 'failure demand'. Thus, it may be argued that service specific lean approaches help to overcome the barrier of isolated efficiency gains.

8.2.4 Managerial implications

This thesis contributes to managerial practice in several ways. The lean service model provides guidelines and suggestions how to approach a lean project in pure service environments. However, managers need to be aware of their goals prior to the application of lean tools. Furthermore, the model may enable firms to systematically

interact with customers throughout their lean journey, but also within their daily operations. This is beneficial in particular as customers are co-creators of value and thus significantly impact outcome and efficiency.

Another important aspect in terms of managerial implications can be seen within the concept of CIPs. This allows managers to distinguish between smooth processes of flow in the provider sphere and rather chaotic value creation within CIPs (joint sphere). Enabling staff to cope with variety at CIPs may lead to an enhanced overall performance. Furthermore, this thesis provides lean service specific tools that can be applied in diverse environments, as these are not industry related.

8.2.5 Theoretical implications and future research

From a theoretical perspective the thesis addresses several major aspects in scholarly debate. First, it provides evidence to the fact that customers are predominantly perceived as co-creators of value in pure service businesses. This indicates that the premises of Vargo et al. (2008) and Gronroos (2011) need to be reconsidered. If the premises can be validated through other studies, it needs to be addressed how perceptions of people could be turned.

Second, the thesis pointed an additional explanation why many lean service projects predominantly focused efficiency. Beside the lean project goals set by the management, a strong impact of applied lean tools to this focus was identified. This directly responds to the question posed by Radnor (2010, p. 426) if 'the tools developed for manufacturing to support technical and culture [are] enough or should services be developing some new ones of their own?' Third, this study rejected the relevance of customer sphere in pure service environment operations. Though this concept needs further attention in future studies, customer sphere was of marginal relevance within the case companies in this thesis.

Furthermore, this thesis supports the perspective of Bowen and Youngdahl (1998) that manufacturing concepts can be applied to service operations, but it also emphasizes that adjustments are needed, e.g. in terms of tools or CIPs. This study agrees with the

authors' perspective that 'manufacturing tends to be the locus of performance innovations more so than service' (Bowen & Youngdahl, 1998, p. 207). Thus, this thesis should also encourage both, service operations scholars and practitioners, to work on service specific solutions and to become a driver of innovation.

Future studies may enhance the presented findings in various ways. Further iterations of applying the tool are necessary to improve the model and develop addition service specific lean tools. According to Meredith (1998) it is recommendable to focus on further poles, e.g. larger companies, product-service mixes and others. Furthermore, the relevance of customer sphere needs further attention in different environments. Thus, it would be recommendable to also consider customer sphere when applying the model in other settings.

Another focus area could be seen in exploring the difference between 'chaotic' value creation at CIPs and sequential value adding through flow. An auspicious approach to address this aspect could be seen in the concept of improvisation. John, Grove, and Fisk (2006) transferred lessons from Jazz into service operations. The concept was also applied in training service staff and improving service recovery (Daly, Grove, Dorsch, & Fisk, 2009; e Cunha et al., 2009). It could provide valuable insights to define necessary skills and capabilities that enable service staff to cope with variety at CIPs.

Finally, it seems to be interesting whether the presented findings may have any implications on lean manufacturing. Do quite independent CIPs with a high variety in demand also exist in production lines? And if so, would it be beneficial to treat them differently?

8.3 Research limitations

In regards to external validity, it should be pointed that this study applied two in-depth case studies of different industries. These were combined with an experiment, in order to develop and validate a model for lean service customer integration. However, further iterations of applying the model would enhance the understanding and further improve lean service tools and the overall model. An important insight was provided

due to the fact that industry was found as irrelevant. Thus, successful application in other circumstances is likely. Nevertheless, both case companies share relevant similarities like size, location and type of ownership. Hence, further research is needed whether the model is applicable e.g. in larger enterprises. Though consideration of additional companies within this thesis could have further enhanced generalizability, it would have exceeded the scope of doctoral research.

Addressing internal validity within the case research, e.g. the selection of customers for the workshop, could be seen as a potential limitation. The provider could have chosen people that do not fulfil lead user characteristics, but provide positive feedback throughout. However, the selection process was double-checked with the researcher to enhance objectivity. Furthermore, the results showed that constructive criticism of participants revealed valuable areas of improvement. This example reflects the overall research design to enhance internal validity. In particular, the application of six mixed research methods and regular debriefings within each company reduced the risk of false conclusions based upon insufficient or biased data. Furthermore, regular critical reflections provided lessons learned that were considered within the subsequent research process.

Overall, this thesis put high value on internal and external validity and aimed at enhancing both criteria. Albeit the findings are predominantly limited to family owned SMEs in pure service environments, it may reasonably be argued that similar effects are likely to occur in other circumstances.

8.4 Research summary

This thesis originally contributes to the current body of knowledge, as well as to practitioners undergoing lean service transformations. The contributions are made on diverse theoretical and practical levels. These may be summarized as follows:

1. This thesis provides the first validated model addressing customer integration into lean service operations. The findings showed that application of this lean service model may improve operational performance and customer value

creation in pure service environments. It significantly enhances former lean service approaches, e.g. through the concept of value (co-) creation and service specific lean tools.

2. The value of distinguishing functional and emotional value and related creation processes is highly emphasized. The results showed that through this clear focus a significant portion of waste can be turned into value. This highlights the need for reshaping lean service activities from 'design without waste' to 'design for value'. Therefore, a new credo 'focus value first, then banish waste' needs to be established in theory and practice.
3. Furthermore, this thesis strongly emphasizes the need for service specific lean tools when undergoing lean service transformation projects. Findings revealed that these tools consider customers as co-creators of value in order to achieve significant improvements in terms of efficiency and service quality.
4. Another important insight that is provided through this thesis can be seen in revealing rather 'chaotic' value creation procedures of pure service business at CIPs within the joint sphere. This can be seen as in contrast to the 'flow' oriented lean manufacturing principles. It highly emphasizes the need for considering flow within provider sphere, but, at the same time, enabling diversified value creation within the joint sphere.
5. Though customer sphere is seen as highly relevant in services and products by various scholars, the presented findings indicated that it is less important in service operations circumstances.
6. An overall insight which goes beyond these single aspects is that we need to 'valueline' customer interaction points (CIPs) and to 'streamline' preparing processes that are rather independent from customer interaction.

Former studies' focus on streamlining service processes logically explains insufficient gains in customer service quality. Seddon and O'Donovan (2010) identified a strong need to rethink this practice. The suggested 'valueline' thinking contemplates and enhances their ideas and suggestions. When future scholars and practitioners think about lean service, they should consider both aspects equally. If lean service is perceived as a coin, 'valueline' and 'streamline' are two different sides of it.

Disregarding the 'valueline' side in particular would mean to leave the coin incomplete and therefore, literally, valueless.

Thus, the value of customer integration into service operations through the presented lean service model can be summarized as enabling pure service organizations to prosper in a full lean way. This is achieved not only through banishing waste, but much more through enhancing customer value.

References

- Abdi, F., Shavarini, S. K., & Seyed Hoseini, S. M. (2006). GLEAN LEAN: HOW TO USE LEAN APPROACH IN SERVICE INDUSTRIES? [Article]. *Journal of Services Research*, 6, 191-206.
- Åhlström, P. (1998). Sequences in the implementation of lean production. *European management journal*, 16(3), 327-334.
- Aichner, T. (2012). The Zero Moment of Truth in Mass Customization. *International Journal of Industrial Engineering and Management*, 3(4), 173-178.
- Akaka, M. A., Kelleher, C., Lusch, R. F., Maglio, P. P., Seo, M. Y., & Vargo, S. L. (2013). THE ROLE OF SYMBOLS IN VALUE CO-CREATION.
- Akehurst, G. (2008). What do we really know about services? *Service Business*, 2(1), 1-15. doi: 10.1007/s11628-006-0015-6
- Albani, A., Terlouw, L., Hardjosumarto, G., & Dietz, J. L. (2009). *Enterprise ontology based service definition*. Paper presented at the 4th International Workshop on Value Modelling and Business Ontologies, Amsterdam, The Netherlands.
- Alony, I., & Jones, M. (2008). Lean Supply Chains, JIT and Cellular Manufacturing -- The Human Side. *Issues in Informing Science & Information Technology*, 5, 165.
- Anderson, H. L. (1986). Metropolis, Monte Carlo, and the MANIAC. *Los Alamos Science*, 14, 96-108.
- Andersson, R., Eriksson, H., & Torstensson, H. (2006). Similarities and differences between TQM, six sigma and lean. [Article]. *TQM Magazine*, 18(3), 282-296.
- Andreassen, T. W., & Olsen, L. L. (2008). The impact of customers' perception of varying degrees of customer service on commitment and perceived relative attractiveness. *Managing Service Quality*, 18(4), 309-328.
- Andreu, L., Sánchez, I., & Mele, C. (2010). Value co-creation among retailers and consumers: New insights into the furniture market. *Journal of Retailing and Consumer Services*, 17(4), 241-250. doi: <http://dx.doi.org/10.1016/j.jretconser.2010.02.001>
- Arbós, L. s. C. (2002). Design of a rapid response and high efficiency service by lean production principles: Methodology and evaluation of variability of performance. [Article]. *International Journal of Production Economics*, 80, 169-183. doi: 10.1016/s0925-5273(02)00316-x
- Arfmann, D., & Topolansky, F. G. (2014). The Value of Lean in the Service Sector: A Critique of Theory & Practice. *International Journal of Business and Social Science*, 5(2), 18-24.
- Argyris, C., Putnam, R., & Smith, D. (1985). *Action Science: Concepts, Methods, and Skills for Research and Intervention*. San Francisco, CA: Jossey-Bass.
- Argyris, C., & Schön, D. A. (1978). *Organisational learning: a theory of action perspective*. Reading, MA: Addison-Wesley.
- Aronson, J. (1994). A pragmatic view of thematic analysis. *The Qualitative Report*, 2(1), 1-3.
- Ash, S. L., & Clayton, P. H. (2004). The articulated learning: An approach to guided reflection and assessment. *Innovative Higher Education*, 29(2), 137-154.
- Ayim, M. (1974). Retrodution: The rational instinct. *Transactions of the Charles S. Peirce Society*, 34-43.
- Barbour, R. S. (2003). The newfound credibility of qualitative research? Tales of technical essentialism and co-option. *Qualitative Health Research*, 13(7), 1019-1027.
- Barratt, M., Choi, T. Y., & Li, M. (2011). Qualitative case studies in operations management: Trends, research outcomes, and future research implications. [Article]. *Journal of Operations Management*, 29, 329-342. doi: 10.1016/j.jom.2010.06.002
- Bate, P., Khan, R., & Pyle, A. J. (2000). Culturally sensitive structuring: an action research-based approach to organization development and design. [Article]. *Public Administration Quarterly*, 23(4), 445-470.

- Baum, F., MacDougall, C., & Smith, D. (2006). Participatory action research. *J Epidemiol Community Health, 60*(10), 854–857. doi: 10.1136/jech.2004.028662
- Baxter, P., & Jack, S. (2008). Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. *Qualitative Report, 13*(4), 544-559.
- Becker, A., Ebert, F., & Semmler, T. (2014). Kunden-Burnout eine Folge von Kundenintegration? In K. Butzer-Strothmann, F. Ahlers & N. Guelke (Eds.), *Kundenintegration: Potential- und Perspektivenvielfalt für Unternehmen* (Vol. 1, pp. 225-241). Göttingen: Cuvillier, E.
- Belz, F.-M., & Baumbach, W. (2010). Netnography as a Method of Lead User Identification. [Article]. *Creativity & Innovation Management, 19*(3), 304-313. doi: 10.1111/j.1467-8691.2010.00571.x
- Ben Naylor, J., Naim, M. M., & Berry, D. (1999). Leagility: integrating the lean and agile manufacturing paradigms in the total supply chain. *International Journal of Production Economics, 62*(1), 107-118.
- Bergin, M., Wells, J. S. G., & Owen, S. (2008). Critical realism: a philosophical framework for the study of gender and mental health. *Nursing Philosophy, 9*(3), 169-179.
- Bhaskar, R. (1986). *Scientific realism and human emancipation*: London : Verso, 1986.
- Bhaskar, R. (1998). Philosophy and scientific realism *Critical Realism: Essential Readings, Critical Realism: Interventions B2 - Critical Realism: Essential Readings, Critical Realism: Interventions* (pp. 16-47). London: Routledge.
- Bhaskar, R. (2010). Contexts of interdisciplinarity: interdisciplinarity and climate change *Interdisciplinarity and Climate Change B2 - Interdisciplinarity and Climate Change* (pp. 1-24). London: Routledge.
- Bhaskar, R., & Danermark, B. (2006). Metatheory, Interdisciplinarity and Disability Research: A Critical Realist Perspective. *SCANDINAVIAN JOURNAL OF DISABILITY RESEARCH, 8*(4), 278-297.
- Bicheno, J., & Holweg, M. (2009). *The Lean Toolbox: The Essential Guide to Lean Transformation*. Buckingham: Production and Inventory Control, Systems and Industrial Engineering (PICSIE) Books.
- Bowen, D. E., & Youngdahl, W. E. (1998). "Lean" service: in defense of a production-line approach. [Article]. *International Journal of Service Industry Management, 9*(3), 207.
- Bradbury, H., & Reason, P. (2001). *Handbook of action research : participative inquiry and practice*: London ; Thousand Oaks, Calif. : SAGE, 2001.
- Braglia, M., Carmignani, G., & Zammori, F. (2006). A new value stream mapping approach for complex production systems. [Article]. *International Journal of Production Research, 44*(18/19), 3929-3952.
- Brophy, A. (2013). *FT Guide to Lean: How to streamline your organisation, engage employees and create a competitive edge*. London: FT Publishing International.
- Brown, S. W., Fisk, R. P., & Bitner, M. J. (1994). The Development and Emergence of Services Marketing Thought. [Article]. *International Journal of Service Industry Management, 5*(1), 21.
- Buckless, F. A., & Ravenscroft, S. P. (1990). Contrast coding: A refinement of ANOVA in behavioral analysis. *Accounting Review, 933-945*.
- Burgess, N. J. (2012). *Evaluating Lean in Healthcare*. (Doctor of Philosophy in Business), University of Warwick, Warwick.
- Burrell, G., & Morgan, G. (1979). *Sociological paradigms and organisational analysis : elements of the sociology of corporate life*: London : Heinemann, 1979.
- Büttgen, M. (2007). *Kundenintegration in den Dienstleistungsprozess : eine verhaltenswissenschaftliche Untersuchung* (1. Aufl. ed.): Wiesbaden : Dt. Univ.-Verl.
- Canel, C., Rosen, D., & Anderson, E. A. (2000). Just-in-time is not just for manufacturing: a service perspective. *Industrial Management & Data Systems, 100*(2), 51-60.

- Carlile, P. R., & Christensen, C. M. (2004). The cycles of theory building in management research.
- Carr, W. (2006). Philosophy, Methodology and Action Research. *Journal of Philosophy of Education*, 40(4), 421-435.
- Carter, B., Danford, A., Howcroft, D., Richardson, H., Smith, A., & Taylor, P. (2011). 'All they lack is a chain': lean and the new performance management in the British civil service. [Article]. *New Technology Work and Employment*, 26(2), 83-97. doi: 10.1111/j.1468-005X.2011.00261.x
- Chase, R. B., & Apte, U. M. (2007). A history of research in service operations: What's the big idea? *Journal of Operations Management*, 25(2), 375-386. doi: 10.1016/j.jom.2006.11.002
- Choi, K., Narasimhan, R., & Kim, S. W. (2012). Postponement strategy for international transfer of products in a global supply chain: A system dynamics examination. *Journal of Operations Management*, 30(3), 167-179.
- Coghlan, D. (2008). Exploring Insight: The Role of Insight in a General Empirical Method in Action Research for Organization Change and Development. [Article]. *Explorar la comprensión: papel de la comprensión dentro de un método empírico general para la investigación de acción para el cambio y desarrollo de la organización*. (65), 343-355.
- Collm, A., & Schedler, K. (2012). Managing crowd innovation in public administration. *International Public Management Review*, 13(2).
- Cook, T. D., & Campbell, D. T. (1976). The design and conduct of quasi-experiments and true experiments in field settings. *Handbook of industrial and organizational psychology*, 223, 336.
- Coughlan, P., & Coughlan, D. (2002). Action research for operations management. *International Journal of Operations & Production Management*, 22(2), 220-240.
- Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*: SAGE Publications.
- Dahiyat, S. E., & Al-Zu'bi, Z. b. M. (2012). The role of knowledge acquisition in facilitating customer involvement in product development: examining the mediation effect of absorptive capacity. *International Journal of Learning and Change*, 6(3), 171-206.
- Dahlsten, F. (2004). Hollywood wives revisited: a study of customer involvement in the XC90 project at Volvo Cars. *European Journal of Innovation Management*, 7(2), 141-149.
- Daly, A., Grove, S. J., Dorsch, M. J., & Fisk, R. P. (2009). The impact of improvisation training on service employees in a European airline: a case study. *European Journal of marketing*, 43(3/4), 459-472.
- Damkuvienė, M., Tijunaitienė, R., Petukienė, E., & Bersenaite, J. (2012). Customer Perceived Co-creation Value: Synthesis of the Extant Literature. [Article]. *Klientų suvokiamos dalyvavimo vertės konceptas: mokslinės literatūros sintezė.*, 2012(4), 59-68.
- Danermark, B. (2002a). *Explaining society : critical realism in the social sciences* London ; New York : Routledge, 2002.
- Danermark, B. (2002b). Interdisciplinary research and critical realism. The example of disability research (Vol. 5, pp. 56-64).
- Daniels, P. W. (2002). *Service industries: a geographical appraisal*: Routledge.
- Daoud, M., & Mahmoud, Q. H. (2008). Monte Carlo simulation-based algorithms for estimating the reliability of mobile agent-based systems. *Journal of Network and Computer Applications*, 31(1), 19-31. doi: 10.1016/j.jnca.2006.06.007
- Dawson, K. (2012). Using Action Research Projects to Examine Teacher Technology Integration Practices. *Journal of Digital Learning in Teacher Education*, 28(3), 117-124.
- Deming, W. E. (1982). *Out of the crisis : quality, productivity and competitive position / W.Edwards Deming*: Cambridge : Cambridge University Press, 1982.

- Deming, W. E. (2000). *Out of the Crisis*: Massachusetts Institute of Technology, Center for Advanced Engineering Study.
- Deming, W. E. (2007). Out of the Crisis (Book Review). [Book Review]. *Bloomsbury Business Library - Management Library*, 80-80.
- Diefenbach, T. (2009). Are case studies more than sophisticated storytelling?: Methodological problems of qualitative empirical research mainly based on semi-structured interviews. *Quality & Quantity*, 43(6), 875-894.
- Dilley, P. (2000). Conducting Successful Interviews: Tips for Intrepid Research. *Theory into Practice*, 39(3), 131-137.
- Dong, B., Jia, H., Li, Z., & Dong, K. (2012). Implementing Mass Customization in Garment Industry. *Systems Engineering Procedia*, 3, 372-380. doi: 10.1016/j.sepro.2011.10.059
- Dooley, L. M. (2002). Case study research and theory building. *Advances in developing human resources*, 4(3), 335-354.
- Downe, S. (2008). Metasynthesis: a guide to knitting smoke. *Evidence Based Midwifery*, 6(1), 4-8.
- Downward, P., & Mearman, A. (2007). Retrodution as mixed-methods triangulation in economic research: reorienting economics into social science. *Cambridge Journal of Economics*, 31(1), 77-99.
- Dubois, A., & Gadde, L.-E. (2002). Systematic combining: an abductive approach to case research. *Journal of business research*, 55(7), 553-560.
- Duclos, L. K., Siha, S. M., & Lummus, R. R. (1995). JIT in services: a review of current practices and future directions for research. [Article]. *International Journal of Service Industry Management*, 6(5), 36.
- Dunnion, J., & O'Donovan, B. (2012). Systems Thinking and Higher Education: The Vanguard Method. *Systemic Practice and Action Research*, 1-15.
- Dyer, W. G., & Wilkins, A. L. (1991). Better stories, not better constructs, to generate better theory: a rejoinder to Eisenhardt. *Academy of management review*, 16(3), 613-619.
- e Cunha, M. P., Rego, A., & Kamoche, K. (2009). Improvisation in service recovery. *Managing Service Quality*, 19(6), 657-669.
- Easterby-Smith, M., Thorpe, R., & Lowe, A. (1991). *Management research : an introduction / Mark Easterby-Smith, Richard Thorpe, Andy Lowe*: London ; Newbury Park : Sage, 1991.
- Easton, G. (1995). *Case research as a methodology for industrial networks: a realist apologia*. Paper presented at the IMP Conference (11th).
- Edvardsson, B., Kristensson, P., Magnusson, P., & Sundström, E. (2012). Customer integration within service development—A review of methods and an analysis of insitu and exsitu contributions. *Technovation*, 32(7-8), 419-429. doi: <http://dx.doi.org/10.1016/j.technovation.2011.04.006>
- Eikeland, O. (2012). Action Research -- Applied Research, Intervention Research, Collaborative Research, Practitioner Research, or Praxis Research? [Article]. *International Journal of Action Research*, 8(1), 9-44. doi: 10.1688/1861-9916&lowbarIJAR&lowbar2012&lowbar01&lowbarEikeland
- Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of management review*, 14(4), 532-550.
- Eisenhardt, K. M. (1991). Better stories and better constructs: The case for rigor and comparative logic. *Academy of management review*, 16(3), 620-627.
- Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: opportunities and challenges. *Academy of management journal*, 50(1), 25-32.
- Enkel, E., Gassmann, O., & Chesbrough, H. (2009). Open R&D and open innovation: exploring the phenomenon. [Article]. *R&D Management*, 39(4), 311-316. doi: 10.1111/j.1467-9310.2009.00570.x

- Ernst, M., Voigt, K.-I., & Neumann, S. (2012). *Integration of lead users in the sporting goods industry: Potentials of virtual customer integration*. Paper presented at the Technology Management for Emerging Technologies (PICMET), 2012 Proceedings of PICMET'12:.
- Esper, T., Ellinger, A., Stank, T., Flint, D., & Moon, M. (2010). Demand and supply integration: a conceptual framework of value creation through knowledge management. [Article]. *Journal of the Academy of Marketing Science*, 38(1), 5-18. doi: 10.1007/s11747-009-0135-3
- Etherington, L. (2008). Norwich Union. [Article]. *Journal of Database Marketing & Customer Strategy Management*, 15(3), 141-145. doi: 10.1057/dbm.2008.10
- European Commission. (2010, 10.10.2011). The EU Single Market, from http://ec.europa.eu/internal_market/top_layer/index_19_en.htm
- Facione, N. C., & Facione, P. A. (1996). Externalizing the critical thinking in knowledge development and clinical judgment. *Nursing Outlook*, 44(3), 129-136.
- Fann, K. T. (1970). *Peirce's theory of abduction*: Springer.
- Finsterwalder, J., & Kuppelwieser, V. G. (2011). Co-creation by engaging beyond oneself: The influence of task contribution on perceived customer-to-customer social interaction during a group service encounter. *Journal of Strategic Marketing*, 19(7), 607-618. doi: 10.1080/0965254x.2011.599494
- Fisher, D., & Torbert, W. R. (1995). Personal and Organizational Transformations: The True Challenge of Continual Quality Improvement *Personal and Organizational Transformations: The True Challenge of Continual Quality Improvement B2 - Personal and Organizational Transformations: The True Challenge of Continual Quality Improvement*. London: McGraw Hill.
- Fleetwood, S. (1997). Aristotle in the 21st century. *Cambridge Journal of Economics*, 21(6), 729-744.
- Franke, N., & Schreier, M. (2008). Product uniqueness as a driver of customer utility in mass customization. [Article]. *Marketing Letters*, 19(2), 93-107. doi: 10.1007/s11002-007-9029-7
- Fredberg, T., & Piller, F. T. (2011). The paradox of tie strength in customer relationships for innovation: a longitudinal case study in the sports industry. [Article]. *R&D Management*, 41(5), 470-484. doi: 10.1111/j.1467-9310.2011.00659.x
- Füller, J. (2010). Refining Virtual Co-Creation from a Consumer Perspective. [Article]. *California Management Review*, 52(2), 98-122.
- Füller, J., Hutter, K., & Faullant, R. (2011). Why co-creation experience matters? Creative experience and its impact on the quantity and quality of creative contributions. [Article]. *R&D Management*, 41(3), 259-273. doi: 10.1111/j.1467-9310.2011.00640.x
- Füller, J., Matzler, K., Hutter, K., & Hautz, J. (2012). Consumers' creative talent: Which characteristics qualify consumers for open innovation projects? An exploration of asymmetrical effects. *Creativity and Innovation Management*, 21(3), 247-262. doi: 10.1111/j.1467-8691.2012.00650.x
- Füller, J., Mühlbacher, H., Matzler, K., & Jaweck, G. (2009). Consumer Empowerment Through Internet-Based Co-creation. [Article]. *Journal of Management Information Systems*, 26(3), 71-102.
- Gersch, M., Hewing, M., & Schöler, B. (2011). Business Process Blueprinting – an enhanced view on process performance. [Article]. *Business Process Management Journal*, 17(5), 732-747. doi: 10.1108/14637151111166169
- Gibbert, M., Ruigrok, W., & Wicki, B. (2008). What passes as a rigorous case study? *Strategic Management Journal*, 29(13), 1465-1474.
- Glaser, B. G., Strauss, A. L., & Strutzel, E. (1968). The discovery of grounded theory; strategies for qualitative research. *Nursing Research*, 17(4), 364.

- Godlevskaja, O., Iwaarden, J. v., & Wiele, T. v. (2011). Moving from product-based to service-based business strategies: Services categorisation schemes for the automotive industry. *INTERNATIONAL JOURNAL OF QUALITY AND RELIABILITY MANAGEMENT*, 28(1), 62-94.
- Golafshani, N. (2003). Understanding Reliability and Validity in Qualitative Research. *The Qualitative Report*, 8(4), 597-607. doi: citeulike-article-id:8257799
- Goodale, J. C., Verma, R., & Pullman, M. E. (2003). A MARKET UTILITY-BASED MODEL FOR CAPACITY SCHEDULING IN MASS SERVICES. [Article]. *Production & Operations Management*, 12(2), 165-185.
- Grissemann, U. S., & Stokburger-Sauer, N. E. (2012). Customer co-creation of travel services: The role of company support and customer satisfaction with the co-creation performance. *Tourism Management*, 33(6), 1483-1492. doi: <http://dx.doi.org/10.1016/j.tourman.2012.02.002>
- Gronroos, C. (1978). A service-orientated approach to marketing of services. *European Journal of marketing*, 12(8), 588-601.
- Gronroos, C. (2011). Value co-creation in service logic: A critical analysis. *Marketing Theory*, 11(3), 279-301.
- Gronroos, C., & Voima, P. (2013). Critical service logic: making sense of value creation and co-creation. [Article]. *Journal of the Academy of Marketing Science*, 41(2), 133-150. doi: 10.1007/s11747-012-0308-3
- Grove, S. J., & Fisk, R. P. (1992). Observational Data Collection Methods for Services Marketing: An Overview. [Article]. *Journal of the Academy of Marketing Science*, 20(3), 217.
- Guba, E. G. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries. *ECTJ*, 29(2), 75-91.
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research*. (pp. 105-117). Thousand Oaks, CA US: Sage Publications, Inc.
- Guba, E. G., & Lincoln, Y. S. (2001). Guidelines and checklist for constructivist (aka fourth generation) evaluation. Retrieved June, 18, 2008.
- Guthrie, C. (2007). On learning the research craft: Memoirs of a journeyman researcher. *Journal of Research Practice*, 3(1), Article M1.
- Harré, R. (2008). Thinking with models. *Self-Care, Dependent-Care & Nursing*, 16(1), 22-27.
- Harré, R. (2009). Saving Critical Realism. *Journal for the Theory of Social Behaviour*, 39(2), 129-143.
- Harris, R. L. (1991). *The Customer is King!* : ASQC quality press.
- Harrison, R. T., & Leitch, C. M. (2000). Learning and organization in the knowledge-based information economy: Initial findings from a participatory action research case study. *British Journal of Management*, 11, 103-119.
- Härtel, H.-H. (2004). Hausaufgaben nicht gemacht: Schwarzarbeit. *Wirtschaftsdienst*, 84(1), 5-5.
- Heineke, J., & Davis, M. M. (2007). The emergence of service operations management as an academic discipline. [Article]. *Journal of Operations Management*, 25, 364-374. doi: 10.1016/j.jom.2006.11.003
- Hines, P., & Rich, N. (1997). The seven value stream mapping tools. [Article]. *International Journal of Operations & Production Management*, 17(1), 46-64.
- Hirschman, E. C. (1986). Humanistic Inquiry in Marketing Research: Philosophy, Method, and Criteria. *Journal of Marketing Research (JMR)*, 23(3).
- Hofmann, E., & Knébel, S. (2013). Alignment of manufacturing strategies to customer requirements using analytical hierarchy process. *Production & Manufacturing Research*, 1(1), 19-43.

- Hongqi, Z., & Ruoyu, L. (2008). *A model for the relationship between Customer Knowledge Management and Service Innovation Capability*. Paper presented at the Service Systems and Service Management, 2008 International Conference on.
- Houston, S. (2010). Prising open the black box: critical realism, action research and social work. *Qualitative Social Work, 9*(1), 73-91. doi: 10.1177/1473325009355622
- Jeppesen, S. (2005). Critical Realism as an Approach to Unfolding Empirical Findings. *The Journal of Transdisciplinary Environmental Studies (TES), 4*(1), 1-9.
- Jodlbauer, H. (2008). A time-continuous analytic production model for service level, work in process, lead time and utilization. [Article]. *International Journal of Production Research, 46*(7), 1723-1744. doi: 10.1080/00207540601080498
- John, J., Grove, S. J., & Fisk, R. P. (2006). Improvisation in service performances: lessons from jazz. *Managing Service Quality, 16*(3), 247-268.
- Johns, C. (2010). *Guided reflection: a narrative approach to advancing professional practice* (2nd ed.). Chichester, West Sussex ; Ames, Iowa: Blackwell Pub.
- Johnston, R. (1999). Service operations management: return to roots. [Article]. *International Journal of Operations & Production Management, 19*(2), 104-127. doi: 10.1108/01443570510633657
- Johnston, R. (2005). Service operations management: from the roots up. [Article]. *International Journal of Operations & Production Management, 25*(12), 1298-1308. doi: 10.1108/01443570510633666
- Johnston, R., & Clark, G. (2008). *Service operations management: improving service delivery* (Vol. Third Edition): Financial Times Prentice Hall.
- Kapitan, T. (1992). Peirce and the autonomy of abductive reasoning. *Erkenntnis, 37*(1), 1-26.
- Katok, E. (2011). Using Laboratory Experiments to Build Better Operations Management Models. [Article]. *Foundations & Trends in Technology, Information & Operations Management, 5*(1), 1-1. doi: 10.1561/02000000022
- Kirk, R. E. (2012). *Experimental Design: Procedures for the Behavioral Sciences: Procedures for the Behavioral Sciences*: SAGE.
- Kirshner, B., Pozzoboni, K., & Jones, H. (2011). Learning How to Manage Bias: A Case Study of Youth Participatory Action Research. [Article]. *Applied Developmental Science, 15*(3), 140-155. doi: 10.1080/10888691.2011.587720
- Kissimoto, K. O., & Laurindo, F. J. B. (2010). *Information technology as an enabler for mass customization strategy: Integrating customer and organization*. Paper presented at the Technology Management for Global Economic Growth (PICMET), 2010 Proceedings of PICMET'10:.
- Kohler, T., Fueller, J., Stieger, D., & Matzler, K. (2011). Avatar-based innovation: Consequences of the virtual co-creation experience. *Computers in Human Behavior, 27*(1), 160-168. doi: <http://dx.doi.org/10.1016/j.chb.2010.07.019>
- Kohler, T., Matzler, K., & Füller, J. (2009). Avatar-based innovation: Using virtual worlds for real-world innovation. *Technovation, 29*(6-7), 395-407. doi: <http://dx.doi.org/10.1016/j.technovation.2008.11.004>
- Koshy, E., Waterman, H., & Koshy, V. (2010). *Action Research in Healthcare*: SAGE.
- Kuhn, T. S. (1962). *The structure of scientific revolutions*. Chicago: University of Chicago Press.
- Kuhn, T. S. (1996). *The structure of scientific revolutions*: Chicago, IL : University of Chicago Press, 1996.
- 3rd ed.
- Kuo, D. C.-L., Lin, C.-C., & Yang, J.-L. (2011). Reconsidering the role of brainstorming in the marketing of technology-driven innovation. *International Journal of Technology Marketing, 6*(1), 4-16.
- Levitt, T. (1972). Production-line approach to service. [Article]. *Harvard Business Review, 50*(5), 41-52.

- Leyer, M., & Moormann, J. (2012). A method for matching customer integration with operational control of service processes. [Article]. *Management Research Review*, 35(11), 1046-1069. doi: 10.1108/01409171211276936
- List, J. A., Sadoff, S., & Wagner, M. (2011). So you want to run an experiment, now what? Some simple rules of thumb for optimal experimental design. *Experimental Economics*, 14(4), 439-457.
- Lynham, S. A. (2002). The general method of theory-building research in applied disciplines. *Advances in developing human resources*, 4(3), 221-241.
- Mackenzie, J., Tan, P.-L., Hoverman, S., & Baldwin, C. (2012). The value and limitations of Participatory Action Research methodology. [Article]. *Journal of Hydrology*, 474, 11-21. doi: 10.1016/j.jhydrol.2012.09.008
- Magrath, A. J. (1986). When Marketing Services, 4 Ps Are Not Enough. [Article]. *Business Horizons*, 29(3), 44.
- Marr, B., & Neely, A. (2004). Managing and measuring for value: the case of call centre performance *Cranfield School of Management Report B2 - Cranfield School of Management Report*. Cranfield.
- Martínez-Torres, M. R. (2013). Application of evolutionary computation techniques for the identification of innovators in open innovation communities. *Expert Systems With Applications*, 40(7), 2503-2510. doi: <http://dx.doi.org/10.1016/j.eswa.2012.10.070>
- Mattsson, J. (1992). A service quality model based on an ideal value standard. *International Journal of Service Industry Management*, 3(3), 18-33.
- McDermott, R. (2002). Experimental methods in political science. *Annual Review of Political Science*, 5(1), 31-61.
- Meredith, J. (1998). Building operations management theory through case and field research. *Journal of Operations Management*, 16(4), 441-454.
- Meyer, S. B., & Lunnay, B. (2013). The Application of Abductive and Retroductive Inference for the Design and Analysis of Theory-Driven Sociological Research. *Sociological Research Online*, 18(1), 12.
- Miller, R. G. J. (1997). *Beyond ANOVA: basics of applied statistics*: CRC Press.
- Mota Pedrosa, A. (2012). Customer Integration during Innovation Development: An Exploratory Study in the Logistics Service Industry. [Article]. *Creativity & Innovation Management*, 21(3), 263-276. doi: 10.1111/j.1467-8691.2012.00648.x
- Mukhtar, M., Ismail, M. N., & Yahya, Y. (2012). A hierarchical classification of co-creation models and techniques to aid in product or service design. *Computers in Industry*, 63(4), 289-297. doi: <http://dx.doi.org/10.1016/j.compind.2012.02.012>
- Mullins, L. J., & Christy, G. (2010). *Management and organisational behaviour [electronic resource] / Laurie J. Mullins ; with Gill Christy*: Harlow, Essex, England ; New York : Financial Times Prentice Hall, 2010.
- 9th ed.
- Ng, I., & Briscoe, G. (2011). Value, Variety and Viability: Designing For Co-creation in a Complex System of Direct and Indirect (goods) Service Value Proposition.
- Ohno, T. (1988). *Toyota Production System: Beyond Large-scale Production*. Boca Raton: CRC Press.
- Okoli, C. (2012). A critical realist guide to developing theory with systematic literature reviews. Available at SSRN 2115818.
- Olaussen, C., & Bunch, E. H. (2011). Using metasynthesis as a method to synthesize qualitative research: a studied example related to hiv-stigma [Norwegian]. *Nordic Journal of Nursing Research & Clinical Studies / Vård i Norden*, 31(2), 24-29.
- Olsen, W. (2007). Critical Realist Explorations in Methodology. *Methodological Innovations Online*, 2(2), 1-5.

- Pain, M. A., Harwood, C., & Mullen, R. (2012). Improving the Performance Environment of a Soccer Team During a Competitive Season: An Exploratory Action Research Study. *Sport Psychologist*, 26(3), 390-411.
- Parasuraman, A., Berry, L. L., & Zeithaml, V. A. (1991). Perceived Service Quality as a Customer-Based Performance Measure: An Empirical Examination of Organizational Barriers Using an Extended Service Quality Model. [Article]. *Human Resource Management*, 30(3), 335-364.
- Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality. [Article]. *Journal of Retailing*, 64(1), 12-40.
- Patton, M. Q. (1990). *Qualitative evaluation and research methods*: SAGE Publications, inc.
- Peirce, C. S. (2009). The Nature of Abduction. *Philosophy of Science: An Historical Anthology*, 284.
- Pettersen, J. (2009). Defining lean production: some conceptual and practical issues. *TQM JOURNAL*, 21(2), 127-142.
- Piercy, N., & Rich, N. (2009). Lean transformation in the pure service environment: the case of the call service centre. [Article]. *International Journal of Operations & Production Management*, 29(1/2), 54-76.
- Price, J. H., & Murnan, J. (2004). Research limitations and the necessity of reporting them. *American Journal of Health Education*, 35(2), 66-67.
- Radnor, Z. (2010). Transferring Lean into government. *Journal of Manufacturing Technology Management*, 21(3), 411-428. doi: doi:10.1108/17410381011024368
- Radnor, Z., & Johnston, R. (2013). Lean in UK Government: internal efficiency or customer service? [Article]. *Production Planning & Control*, 24(10/11), 903-915. doi: 10.1080/09537287.2012.666899
- Richman, E., & Coleman, D. (1981). Monte Carlo Simulation for Management. [Article]. *California Management Review*, 23(3), 82-91.
- Ritchie, J., & Spencer, L. (1994). Qualitative data analysis for applied policy research *Qualitative data analysis for applied policy research B2 - Qualitative data analysis for applied policy research* (pp. 172-194). London: Routledge.
- Roth, W.-M. (2013). Translation in Qualitative Social Research: The Possible Impossible. [Article]. *Forum: Qualitative Social Research*, 14(2), 1-24.
- Ryzhkova, N. (2012). Web-based customer innovation: A replication with extension. [Article]. *Innovation: Management, Policy & Practice*, 14(3), 416-430.
- Sandström, S., Edvardsson, B., Kristensson, P., & Magnusson, P. (2008). Value in use through service experience. *Managing Service Quality*, 18(2), 112-126.
- Sauerwein, E., Bailom, F., Matzler, K., & Hinterhuber, H. H. (1996). *The Kano model: How to delight your customers*. Paper presented at the International Working Seminar on Production Economics.
- Sayer, A. (1992). *Method in social science : a realist approach*: London : Routledge, 1992
2nd ed.
- Sayer, A. (2000). *Realism and social science*: London ; Thousand Oaks, Calif. : SAGE, 2000.
- Schaarschmidt, M., & Kilian, T. (2013). Impediments to customer integration into the innovation process: A case study in the telecommunications industry. *European management journal*(0). doi: <http://dx.doi.org/10.1016/j.emj.2013.04.004>
- Seddon, J. (2005). Freedom from command and control. [Article]. *Management Services*, 49(2), 22-24.
- Seddon, J. (2012). Debate: Academia can tax one's patience. [Article]. *Public Money & Management*, 32(2), 127-128. doi: 10.1080/09540962.2012.656018
- Seddon, J., & Caulkin, S. (2007). Systems thinking, lean production and action learning. [Article]. *Action Learning: Research & Practice*, 4(1), 9-24. doi: 10.1080/14767330701231438

- Seddon, J., & O'Donovan, B. (2010). Rethinking Lean Service. [Article]. *Management Services*, 54(1), 34-37.
- Seddon, J., & O'Donovan, B. (2010). Why aren't we all working for Learning Organisations. *AMED e-Organisations and People*, 17(2).
- Shahin, A., & Samea, M. (2010). Developing the Models of Service Quality Gaps: A Critical Discussion. [Article]. *Business Management & Strategy (BMS)*, 1(1), 1-11.
- Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for information*, 22(2), 63-75.
- Shostack, G. L. (1977). Breaking Free from Product Marketing. [Article]. *Journal of Marketing*, 41(2), 73-80.
- Sichtmann, C., & von Selasinsky, M. (2010). Exporting Services Successfully: Antecedents and Performance Implications of Customer Relationships. [Article]. *Journal of International Marketing*, 18(1), 86-108. doi: 10.1509/jimk.18.1.86
- Sigala, M. (2012). Exploiting Web 2.0 for new service development: Findings and implications from the Greek tourism industry. *International Journal of Tourism Research*, 14(6), 551-566. doi: 10.1002/jtr.1914
- Skaržauskaitė, M. (2013). Measuring and managing value co-creation process: overview of existing theoretical models. *Social Technologies/Socialines Technologijos*, 3(1).
- Smith, G. (2009). Social networking and the transfer of knowledge. *Electronic Journal of Knowledge Management*, 7(1), 165-178.
- Somekh, B. (2005). Action Research: A Methodology for Change and Development. *Open University Press*.
- Spear, S. J. (2005). Fixing health care from the inside, today. *Harvard Business Review*, 83(9), 78.
- Spear, S. J., & Bowen, H. K. (1999). Decoding the DNA of the Toyota Production System. [Article]. *Harvard Business Review*, 77(5), 96-106.
- Staats, B. R., Brunner, D. J., & Upton, D. M. (2011). Lean principles, learning, and knowledge work: Evidence from a software services provider. [Article]. *Journal of Operations Management*, 29, 376-390. doi: 10.1016/j.jom.2010.11.005
- Stake, R. E. (1995). *The art of case study research / Robert E. Stake*: Thousand Oaks, Calif. ; London : Sage, 1995.
- Stank, T. P., Esper, T. L., Crook, T. R., & Autry, C. W. (2012). Creating Relevant Value Through Demand and Supply Integration. [Article]. *Journal of Business Logistics*, 33(2), 167-172. doi: 10.1111/j.0000-0000.2012.01049.x
- Steckler, A., McLeroy, K. R., Goodman, R. M., Bird, S. T., & McCormick, L. (1992). Toward integrating qualitative and quantitative methods: an introduction. *Health education quarterly*, 19(1), 1-8.
- Stuart, I., McCutcheon, D., Handfield, R., McLachlin, R., & Samson, D. (2002). Effective case research in operations management: a process perspective. [Article]. *Journal of Operations Management*, 20, 419-433. doi: 10.1016/s0272-6963(02)00022-0
- Suárez-Barraza, M. F., Smith, T., & Dahlgaard-Park, S. M. (2012). Lean Service: A literature analysis and classification. [Article]. *Total Quality Management & Business Excellence*, 23(3/4), 359-380. doi: 10.1080/14783363.2011.637777
- Swank, C. K. (2003). The Lean Service Machine. [Article]. *Harvard Business Review*, 81(10), 123-129.
- Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: combining qualitative and quantitative approaches*: Sage.
- Teehan, R., & Tucker, W. (2010). A simplified lean method to capture customer voice. *International Journal of Quality & Service Sciences*, 2(2), 175.
- Temple, B., & Young, A. (2004). Qualitative research and translation dilemmas. *Qualitative research*, 4(2), 161-178.

- Torbert, W. R., & Cook-Greuter, S. (2004). *Action inquiry : the secret of timely and transforming leadership / Bill Torbert with Susanne Cook-Greuter [et al.]*: San Francisco, Calif. : Berrett-Koehler ; [London : McGraw-Hill], 2004.
- Tossavainen, P. J. (2013). Beyond sporadic actions: How to approach multi-party stakeholder collaboration in service development. *jbm-Journal of Business Market Management*, 6(4), 171-191.
- Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. [Article]. *British Journal of Management*, 14(3), 207-222. doi: 10.1111/1467-8551.00375
- Tuunanen, T., Bragge, J., Häivälä, J., Hui, W., & Virtanen, V. H. (2011). A method for recruitment of lead users from virtual communities to innovate IT enabled services for consumers in global markets. *Pacific Asia Journal of the Association for Information Systems*, 3(2), 3.
- Twinn, S. (1997). An exploratory study examining the influence of translation on the validity and reliability of qualitative data in nursing research. *Journal of Advanced Nursing*, 26(2), 418-423. doi: 10.1046/j.1365-2648.1997.1997026418.x
- Vaisnore, A., & Petraite, M. (2011). Customer Involvement into Open Innovation Processes: a Conceptual Model. [Article]. *Vartotojų įtraukimas į atvirųjų inovacijų procesą: konceptualus modelis.*, 73(3), 62-73.
- Vargo, S. L. (2008). Customer integration and value creation Paradigmatic Traps and Perspectives. *Journal of Service Research*, 11(2), 211-215.
- Vargo, S. L., & Lusch, R. F. (2004a). Evolving to a New Dominant Logic for Marketing. [Article]. *Journal of Marketing*, 68(1), 1-17.
- Vargo, S. L., & Lusch, R. F. (2004b). The four service marketing myths remnants of a goods-based, manufacturing model. *Journal of Service Research*, 6(4), 324-335.
- Vargo, S. L., Maglio, P. P., & Akaka, M. A. (2008). On value and value co-creation: A service systems and service logic perspective. *European management journal*, 26(3), 145-152.
- Voss, C. (2009). Case research in operations management. In C. Karlsson & C. Karlsson (Eds.), *Researching operations management*. (pp. 162-195). New York, NY US: Routledge/Taylor & Francis Group.
- Voss, C., Tsiriktsis, N., & Frohlich, M. (2002). Case research in operations management. *International Journal of Operations & Production Management*, 22(2), 195-219.
- Wainwright, D. (1997). Can sociological research be qualitative, critical and valid? *Qualitative Report* Retrieved 2, 3, from <http://www.nova.edu/ssss/QR/QR3-2/wain.html>
- Wang, Y. Y. (1971). Probabilities of the type I errors of the Welch tests for the Behrens-Fisher problem. *Journal of the American Statistical Association*, 66(335), 605-608.
- Watcharapanyawong, K., Sirisoponsilp, S., & Sophatsathit, P. (2011). A Model of Mass Customization for Engineering Production System Development in Textile and Apparel Industries in Thailand. *Systems Engineering Procedia*, 2(0), 382-397. doi: <http://dx.doi.org/10.1016/j.sepro.2011.10.052>
- Waterman, H., Tillen, D., Dickson, R., & de Koning, K. (2001). Action research: a systematic review and guidance for assessment. *Health Technology Assessment*, 5(23), 1-166.
- Wei-Chang, Y., Yi-Cheng, L., & Yuk Ying, C. (2009). Performance analysis of cellular automata Monte Carlo Simulation for estimating network reliability. [Article]. *Expert Systems With Applications*, 37, 3537-3544. doi: 10.1016/j.eswa.2009.09.070
- Weigand, C. (2006). *Statistik mit und ohne Zufall*: Springer.
- Wilkinson, A., Snape, E., & Allen, P. (1990). Total customer service. *The TQM Magazine*, 2(5).
- Williams, C. S., & Saunders, M. N. K. (2006). Developing the service template process: From measurement to agendas for improvement. *Service Industries Journal*, 26(5), 581.
- Winter, G. (2000). A comparative discussion of the notion of validity in qualitative and quantitative research. *The Qualitative Report*, 4(3), 4.

- Wirtz, B. W., Nitzsche, P. T., & Ullrich, S. (2014). User integration in social media: an empirical analysis. [Article]. *International Journal of Electronic Business*, 11(1), 63-84. doi: 10.1504/ijeb.2014.057901
- Womack, J. P., & Jones, D. T. (1996). *Lean thinking : banish waste and create wealth in your corporation*: New York : Simon & Schuster, 1996.
- Womack, J. P., & Jones, D. T. (2003). *Banish waste and create wealth in your corporation*: New York: Free Press.
- Womack, J. P., Jones, D. T., & Roos, D. (1990). *The machine that changed the world*: New York : Rawson Associates, 1990.
- Xiong, X., Juga, J., & Pekkarinen, S. (2012). Service dominant logic: implications for postponement in service supply chains.
- Yang, B., & Burns, N. (2003). Implications of postponement for the supply chain. *International Journal of Production Research*, 41(9), 2075-2090.
- Yin, R. K. (2003). *Case study research : design and methods*: Thousand Oaks, Calif : Sage Publications, 2003
- 3rd ed.
- Yin, R. K. (2009). *Case Study Research: Design and Methods*: SAGE Publications.
- Yin, R. K. (2014). *Case study research: Design and methods*: Sage publications.
- Zhang, X., Miao, C., Li, Y., & Zhang, H. (2008). *Beyond product customization: Towards a conceptual framework for Collaborative Customer Innovation*. Paper presented at the Computer Supported Cooperative Work in Design, 2008. CSCWD 2008. 12th International Conference on.
- Zolnowski, A., & Bohmann, T. (2013). *Customer integration in service business models*. Paper presented at the System Sciences (HICSS), 2013 46th Hawaii International Conference on.

Annex I Systematic Literature Review charts and tables

Table 22 List of excluded studies

Reference
Alotaibi, M., & Rigas, D. (2009). The role of avatars with facial expressions to communicate customer knowledge. <i>International Journal of Computers, NAUN</i> , 3, 1-10.
Arnold, M., & Barth, V. (2012). Open innovation in urban energy systems. <i>Energy efficiency</i> , 5 (3), 351-364.
Barlatier, P. J., & Giannopoulou, E. (2011). The Dual Perspective of Sustainable Development in Service Innovation: A Conceptual Model Proposition for Research and Technology Organizations. In <i>Exploring Services Science</i> (pp. 98-112). Springer Berlin Heidelberg.
Biggemann, S., Williams, M., & Kro, G. (2014). Building in sustainability, social responsibility and value co-creation. <i>Journal of Business & Industrial Marketing</i> , 29 (4), 5-5.
Biraghi, S., & Gambetti, R. C. (2013). Corporate branding: Where are we? A systematic communication-based inquiry. <i>Journal of Marketing Communications</i> , (ahead-of-print), 1-24.
Breuer, H., Wolze, Z., & Umbach, E. (2013). User-centered soft innovation in established business fields. In <i>Design, User Experience, and Usability. Web, Mobile, and Product Design</i> (pp. 3-12). Springer Berlin Heidelberg.
Brockhoff, K. (2013, July). Customer integration in technology development of IT-based services. In <i>Technology Management in the IT-Driven Services (PICMET), 2013 Proceedings of PICMET'13</i> : (pp. 41-47). IEEE.
Carlborg, P., Kindström, D., & Kowalkowski, C. (2013). Service innovation and new service development: An analysis of research 1986-2012. In <i>Proceedings of the QUIS13 International Research Symposium on Service Excellence in Management</i> (pp. 480-482).
Cesaroni, F., & Duque, L. C. (2013). Open innovation and service dominant logic: application of foundational premises to innovative firms. <i>Harvard Deusto Business Research</i> , 2 (1), 17-34.
Christine, V., & Sylvia von, W. (n.d). An online discursive inquiry into the social dynamics of multi-stakeholder brand meaning co-creation. <i>Journal Of Business Research</i> , 66 (Advanced Research Methods in Marketing), 1505-1515. doi:10.1016/j.jbusres.2012.09.012
Dahiyat, S. E., & Al-Zu'bi, Z. B. M. (2012). The role of knowledge acquisition in facilitating customer involvement in product development: examining the mediation effect of absorptive capacity. <i>International Journal of Learning and Change</i> , 6(3), 171-206.
de Moura, H. T., & Adler, I. K. (2011). The ecology of innovation and the role of Strategic Design. <i>Strategic Design Research Journal</i> , 4 (3).
Dorn, J., & Seiringer, W. (2012). A Cost Model for Services. In <i>Collaborative Networks in the Internet of Services</i> (pp. 548-558). Springer Berlin Heidelberg.
Dorn, J., & Seiringer, W. (2013, January). A Prototype for Service-Based Costing. In <i>System Sciences (HICSS), 2013 46th Hawaii International Conference on</i> (pp. 1300-1309). IEEE.
Edvardsson, B., & Enquist, B. (2011). The service excellence and innovation model: lessons from IKEA and other service frontiers. <i>Total Quality Management & Business Excellence</i> , 22 (5), 535-551 doi:10.1080/14783363.2011.568242

Ellen, T. (n.d). Supplier integration in new product development: Computer mediated communication, knowledge exchange and buyer performance. <i>Industrial Marketing Management</i> , doi:10.1016/j.indmarman.2013.05.018
Enkel, E., & Gassmann, O. (2010). Creative imitation: exploring the case of cross-industry innovation. <i>R&D Management</i> , 40(3), 256-270. doi:10.1111/j.1467-9310.2010.00591.x
Enkel, E., Gassmann, O., & Chesbrough, H. (2009). Open R&D and open innovation: exploring the phenomenon. <i>R&D Management</i> , 39(4), 311-316. doi:10.1111/j.1467-9310.2009.00570.x
Ewing, M. T. (2009). Integrated marketing communications measurement and evaluation. <i>Journal Of Marketing Communications</i> , 15(2/3), 103-117. doi:10.1080/13527260902757514
Ferguson, S., Olewnik, A., Malegaonkar, P., Cormier, P., & Kansara, S. (2010, January). Mass customization: A review of the paradigm across marketing, engineering and distribution domains. In <i>ASME 2010 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference</i> (pp. 133-150). American Society of Mechanical Engineers.
Frank, J., & Wolfgang, U. (n.d). The transition from product to service in business markets: An agenda for academic inquiry. <i>Industrial Marketing Management</i> , 37(The Transition from Product to Service in Business Markets), 247-253. doi:10.1016/j.indmarman.2007.09.009
Franke, N., & Schreier, M. (2008). Product uniqueness as a driver of customer utility in mass customization. <i>Marketing Letters</i> , 19(2), 93-107.
Ganz, W., Moerschel, I. C., Schletz, A., & Kicherer, F. (2013). Productivity of services NextGen: beyond output/input. <i>The Service Industries Journal</i> , 33(3-4), 279-281.
Goduscheit, R. C., & Jørgensen, J. H. (2013). User toolkits for innovation—a literature review. <i>International Journal of Technology Management</i> , 61(3), 274-292.
Hunt, D. M., Geiger-Oneto, S., & Varca, P. E. (2012). Satisfaction in the context of customer co-production: A behavioral involvement perspective. <i>Journal Of Consumer Behaviour</i> , 11(5), 347-356. doi:10.1002/cb.1370
Jacob, F., & Ulaga, W. (2008). The transition from product to service in business markets: An agenda for academic inquiry. <i>Industrial Marketing Management</i> , 37(3), 247-253.
Jacob, F., Bruns, K., & Sievert, J. (2013). Value in Context—Eine ressourcen-dynamische Perspektive. In <i>Theorie und Praxis des Dienstleistungsmarketing</i> (pp. 27-50). Springer Fachmedien Wiesbaden.
Jacob, F., Kleipaß, U., & Pohl, A. (2013). Nature and role of customer satisfaction in the solution business. <i>European Management Journal</i> . doi:10.1016/j.emj.2013.08.002
JANZIK, L., & RAASCH, C. (2011). ONLINE COMMUNITIES IN MATURE MARKETS:: WHY JOIN, WHY INNOVATE, WHY SHARE?. <i>International Journal Of Innovation Management</i> , 15(4), 797-836.
Jiménez, F. R., Voss, K., & Frankwick, G. L. (2013). A classification schema of co-production of goods: an open-systems perspective. <i>European Journal of Marketing</i> , 47(11), 4-4.
Jitpaiboon, T., Dobrzykowski, D. D., Ragu-Nathan, T. S., & Vonderembse, M. A. (2013). Unpacking IT use and integration for mass customisation: a service-dominant logic view. <i>International Journal of Production Research</i> , 51(8), 2527-2547.
Jonas, J. M., Möslin, K. M., & Roth, A. (2013). PASSIVE INTEGRATION OR MUTUAL CO-CREATION? EXPLORING THE ROLE OF STAKEHOLDERS IN SERVICE INNOVATION. <i>Service excellence in Management</i> , 406.
Keinz, P., Hienerth, C., & Lettl, C. (2012). Designing the organization for user innovation. <i>Journal of Organization Design</i> , 1(3), 20-36.
Kukk, J., & Leppiman, A. INCREASING VALUE PERCEPTION IN KNOWLEDGE-INTENSIVE SERVICE ACTIVITY BY SERVICE DESIGN. <i>International Scientific Publications</i> , 36.

Kuo, D. C. L., Lin, C. C., & Yang, J. L. (2011). Reconsidering the role of brainstorming in the marketing of technology-driven innovation. <i>International Journal of Technology Marketing</i> , 6(1), 4-16.
Lamberti, L. (2013). Customer centricity: the construct and the operational antecedents. <i>Journal of Strategic marketing</i> , 21 (7), 588-612.
Lay, G., Biege, S., Buschak, D., Copani, G., & Marvulli, S. (2010). Early Stage Assessment of Service-based Business Concepts. In <i>CIRP IPS2 Conference 2010</i> (p. 253).
Lin, Y., Wang, Y., & Yu, C. (2010). Investigating the drivers of the innovation in channel integration and supply chain performance: A strategy orientated perspective. <i>International Journal of Production Economics</i> , 127 (2), 320-332.
Lucio, L., & Giuliano, N. (n.d). Marketing strategy and marketing performance measurement system: Exploring the relationship. <i>European Management Journal</i> , 28 139 doi:10.1016/j.emj.2009.04.007
Manfred, B., Stefanie, S., & Daniela, S. (n.d). Antecedents and consequences of the quality of e-customer-to-customer interactions in B2B brand communities. <i>Industrial Marketing Management</i> , doi:10.1016/j.indmarman.2013.08.008
Mario, S., & Thomas, K. (n.d). Impediments to customer integration into the innovation process: A case study in the telecommunications industry. <i>European Management Journal</i> , doi:10.1016/j.emj.2013.04.004
Martin, V., & Alexander, K. (n.d). Impact of relationship value on project portfolio success — Investigating the moderating effects of portfolio characteristics and external turbulence. <i>International Journal Of Project Management</i> , 31 847-861. doi:10.1016/j.ijproman.2012.11.005
Martinez, V., & Turner, T. (2011). Designing Competitive Service Models. In <i>Service Design and Delivery</i> (pp. 61-81). Springer US.
Matthyssens, P., Vandenbempt, K., & Weyns, S. (2009). Transitioning and co-evolving to upgrade value offerings: A competence-based marketing view. <i>Industrial Marketing Management</i> , 38 (5), 504-512.
Müller, P., & Stark, R. (2010, May). A generic PSS development process model based on theory and an empirical study. In <i>11th International Design Conference-Design</i> (pp. 17-20).
Murtonen, M., Kortelainen, H., Kupi, E., & Rouhiainen, V. Paper I: Development of B-to-B security business: From guarding to knowledge-intensive expert services. <i>More value from security</i> , 57.
Paul, M., Koen, V., & Sara, W. (n.d). Transitioning and co-evolving to upgrade value offerings: A competence-based marketing view. <i>Industrial Marketing Management</i> , 38 (IMP 2007 - Exploiting the B2B Knowledge Network), 504-512. doi:10.1016/j.indmarman.2008.08.008
Pharr, J. M. (2011). A research agenda for investigating the effectiveness of branding in virtual reality. <i>Journal of Management & Marketing Research</i> , 8.
Polese, F., Carrubbo, L., & Di Nauta, P. (2012). Smart Energy Management. A Viable Systems Approach Perspective. <i>Business Systems Review</i> , 1 (1), 202-24.
Reichwald, R., & Piller, F. (2009). Interaktive Wertschöpfung—neue Formen der Arbeitsteilung und des Wissenstransfers zwischen Anbietern, Kunden und externen Experten. In <i>Interaktive Wertschöpfung</i> (pp. 45-114). Gabler.
Rese, M., Meier, H., Gesing, J., & Boßlau, M. (2013). An Ontology of Business Models for Industrial Product-Service Systems. In <i>The Philosopher's Stone for Sustainability</i> (pp. 191-196). Springer Berlin Heidelberg.
Romero, D., & Molina, A. (2011). Collaborative networked organisations and customer communities: value co-creation and co-innovation in the networking era. <i>Production Planning & Control</i> , 22(5-6), 447-472.

Schlagwein, D., Schoder, D., & Fischbach, K. (2011). Social Information Systems: Review, Framework, and Research Agenda. In <i>ICIS</i> .
Schroll, A., & Mild, A. (2011). Determinants of open innovation: an empirical study on organisational, market, and human drivers of open innovation adoption across Europe. <i>International Journal of Innovation and Regional Development</i> , 3 (5), 465-485.
Schroll, A., & Mild, A. (2012). A critical review of empirical research on open innovation adoption. <i>Journal für Betriebswirtschaft</i> , 62 (2), 85-118.
Schweitzer, F. M., Buchinger, W., Gassmann, O., & Obrist, M. (2012). Crowdsourcing: leveraging innovation through online idea competitions. <i>Research-Technology Management</i> , 5, 32-38.
Seiringer, W. (2013). A Rating for Customer Participation during the Process of Service Co-creation. In <i>Product-Service Integration for Sustainable Solutions</i> (pp. 647-658). Springer Berlin Heidelberg.
Shamsuzzoha, A. H. M., & Helo, P. T. (2009). Reconfiguring product development process in auto industries for mass customisation. <i>International Journal of Productivity and Quality Management</i> , 4 (4), 400-417.
Sievänen, M. (2008). A cost management viewpoint to mass customizable services: a review and considerations. <i>Mass Customization Services, Copen-hagen</i> , 118-128.
Sommer, A. F., & Hansen, A. P. (2013). Value Creating Logic of Customer-Driven Product Development. <i>Creativity and Innovation Management</i> .
Sommer, A. F., Dukovska-Popovska, I., & Steger-Jensen, K. (2013). Supplier Value of Customer-Initiated Product Development: An In-Depth Case Study of a European Industrial Mass-Producer. In <i>Advances in Production Management Systems. Sustainable Production and Service Supply Chains</i> (pp. 383-394). Springer Berlin Heidelberg.
Sugiyama, D., Shirahada, K., & Kosaka, M. (2012, July). Strategic 5Ps and their IT based service business model for corporate sustainability. In <i>Technology Management for Emerging Technologies (PICMET), 2012 Proceedings of PICMET'12</i> : (pp. 1209-1215). IEEE.
Tanev, S., Bailetti, T., Allen, S., Milyakov, H., Durchev, P., & Ruskov, P. (2011). How do value co-creation activities relate to the perception of firms' innovativeness?. <i>Journal of Innovation Economics & Management</i> , (1), 131-159.
Tanev, S., Ruskov, P., Georgiev, L., & Bailetti, T. (2011). A Business intelligence tool for studying value co-creation and innovation. <i>Information Technologies and Control</i> , 2011 (1), 2-9.
Verma, R., & Rajagopal. (2013). Conceptualizing Service Innovation Architecture: A Service-Strategic Framework. <i>Journal of Transnational Management</i> , 18 (1), 3-22.
Wang, Y. G., & Zhang, Y. (2012, May). Analysis of Marketing Logic of China's Online Travel Agency through a Configurative Lens. In <i>Service Sciences (IJCSS), 2012 International Joint Conference on</i> (pp. 238-243). IEEE.
Wetter-Edman, K., & Magnusson, P. R. (2013). NARRATIVES FOR PROBING CONTEX OBSERVING SERVICE DESIGN AT WORK. <i>Service excellence in ManageMent</i> , 385.
Yichen, L., Yichuan, W., & Chiahui, Y. (n.d). Investigating the drivers of the innovation in channel integration and supply chain performance: A strategy orientated perspective. <i>International Journal Of Production Economics</i> , 127 (Supply Chain Planning and Configuration in the Global Arena), 320-332. doi:10.1016/j.ijpe.2009.08.009
Zhang, X., Wang, G. X., ShangGuan, J., & Xiao, Y. (2008, December). Value co-creation with customers and its impact on capabilities. In <i>Industrial Engineering and Engineering Management, 2008. IEEM 2008. IEEE International Conference on</i> (pp. 2087-2091). IEEE.

Study	Source	Field	Focus	Mode	Direct reference
Aichner, T. (2012)	G	Operations	Mass Customization	Mode 2	yes
Andreu, L., Sánchez, I., & Mele, C. (2010)	G	Operations	Business Process Modelling	Mode 3	no
Belz, F. M., & Baumbach, W. (2010)	G	Marketing	Lead users	Mode 3	yes
Dong, B., Hongmei, J., Zheng, L., & Kangcheng, D. (2012)	E	Operations	Mass Customization	Mode 2	yes
Finsterwalder, J. & Kuppelwieser, V.G. (2011)	E	Marketing	Service experience	Mode 3	no
Franke, N., & Schreier, M. (2008)	E	Operations	Mass Customization	Mode 2	yes
Fredberg, T., & Piller, F. T. (2011)	E	Marketing	Innovation and development	Mode 3	yes
Füller, J. (2010)	E	Marketing	Innovation and development	Mode 3	yes
Füller, J., Hutter, K., & Faillant, R. (2011)	E	Marketing	Innovation and development	Mode 3	yes
Füller, J., Matzler, K., Hutter, K., & Hautz, J. (2012)	E	Marketing	Innovation and development	Mode 3	yes
Füller, J., Mühlbacher, H., Matzler, K., & Jaweck, G. (2009)	E	Marketing	Innovation and development	Mode 3	yes
Gersch, M., Hewing, M., & Schöler, B. (2011)	E	Operations	Business Process Modelling	Mode 1	no
Grissmann, U. S. and Stokburger-Sauer, N. E. (2012)	E	Operations	Business Process Modelling	Mode 2	no
Hofmann, E., & Knébel, S. (2013)	G	Operations	Business Process Modelling	Mode 1	no
Kissimoto, K. O., & Laurindo, F. J. B. (2010)	G	Operations	Mass Customization	Mode 1	yes
Kohler, T., Fueller, J., Stieger, D. and Matzler, K. (2011)	E	Marketing	Web 2.0	Mode 3	yes
Kohler, T., Matzler, K., & Füller, J. (2009)	G	Marketing	Web 2.0	Mode 3	yes
Leyer, M., & Moormann, J. (2012)	G	Operations	Business Process Modelling	Mode 1	yes
Martínez-Torres, M. R. (2013)	G	Marketing	Lead users	Mode 3	yes
Mota Pedrosa, A. (2012)	E	Marketing	Innovation and development	Mode 3	no
Ryzhkova, N. (2012)	G	Marketing	Innovation and development	Mode 3	yes
Schaarschmidt, M., & Kilian, T. (2013)	G	Marketing	Innovation and development	Mode 3	no
Sigala, M. (2012)	E	Marketing	Web 2.0	Mode 3	no
Tossavainen, P. J. (2013)	G	Marketing	Innovation and development	Mode 3	no
Tuunanen, T., Bragge, J., Häivälä, J., Hui, W., & Virtanen, V. H. (2011)	G	Marketing	Lead users	Mode 3	no
Watcharapanyawong, K., Sirisoponsilp, S. and Sophatsathit, P. (2011)	E	Operations	Mass Customization	Mode 2	yes
Zolnowski, A., & Bohmann, T. (2013)	G	Operations	Business Process Modelling	Mode 2	no

Table 23 Study familiarization characteristics

Table 24 Indexing and charting results

Reference	Understand demand	Single piece flow and routines	Train staff and customers	Performance measurement and continuous improvement	Functional and emotional value	Turn waste into value
Aichner, T. (2012)	<ul style="list-style-type: none"> - Demand is created at ZMT - Customization increases with high product knowledge and product involvement - Customization is driven by extrinsic value drivers self-expression and individualism - Customers are willing to pay premium price for customization 	-	<ul style="list-style-type: none"> - Customization increases with high product knowledge and product involvement 	-	<ul style="list-style-type: none"> - Self expression and individualism represent emotional value to customers - Customized (physical) product is rather functional value 	<ul style="list-style-type: none"> - Customization means to increase variety in demand and operations, sold at a higher price
Andreu, L., Sánchez, I., & Mele, C. (2010)	<ul style="list-style-type: none"> - Customer preferences have to be carried out with provider - Customers see the provider as responsible for creation 	<ul style="list-style-type: none"> - Routines are set from retailers in pre-store and in-store activities - After-sales activities include installation - No use support after installation is provided, though customers would appreciate 	<ul style="list-style-type: none"> - Training customers in advance through websites with detailed information and examples - Training in each process step to enhance customer knowledge - Examples of potential use and realistic settings in the store 	<ul style="list-style-type: none"> - Improvements are made indirectly through gathered buying data and to identify market trends / opportunities for new products 	-	-
Belz, F. M., & Baumbach, W. (2010)	<ul style="list-style-type: none"> - Lead users influence non-lead users views - Lead users are ahead of trends, highly involved, experienced in use and possess high product knowledge - Lead users are significantly dissatisfied 	-	<ul style="list-style-type: none"> - Lead user identification through netnography recommended 	-	-	-
Dong, B., Hongmei, J., Zheng, L., & Kangcheng, D. (2012)	<ul style="list-style-type: none"> - Use internet platforms as information exchange to provide tailored products 	<ul style="list-style-type: none"> - Tailored products are analyzed by a data system, designed for production afterwards and inventory considered - Intelligence and knowledge is provided through integrated IT-systems 	-	-	-	-
Finsterwalder, J. & Kuppelwieser, V.G. (2011)	<ul style="list-style-type: none"> - Distinguish between task orientation and social element of service creation 	-	<ul style="list-style-type: none"> - Customers should be trained on the importance of contribution of other customers, not only of staff, in group service creation 	-	<ul style="list-style-type: none"> - Distinguish between task orientation and social element of service creation 	-
Franke, N., & Schreier, M. (2008)	<ul style="list-style-type: none"> - Distinguish functional fit and perceived uniqueness of a customized product - Perceived uniqueness seems to be more important to experience than functional fit - Consumers possessing a high need for uniqueness appreciate customization 	-	-	-	<ul style="list-style-type: none"> - Functional fit and perceived uniqueness are two distinct aspects of value perception 	<ul style="list-style-type: none"> - Customization means to increase variety in demand and operations, sold at a higher price - Willing to pay increases with variation of perceived uniqueness
Fredberg, T., & Piller, F. T. (2011)	<ul style="list-style-type: none"> - Strong ties help to identify customer preferences and develop ideas beyond current preferences and needs - Expert knowledge is needed for significant innovations 	<ul style="list-style-type: none"> - Consider customer relationship as either active or passive to set up subsequent flow of activities 	<ul style="list-style-type: none"> - Gaining knowledge together with customers - Co-development of products and use - Richness of knowledge exchange increases with degree of customer participation 	<ul style="list-style-type: none"> - Improvement through iteration loops of customer integration on product design and use 	-	-

Füller, J. (2010)	<ul style="list-style-type: none"> - Intrinsically motivated as well as reward-orientated participants like to contribute best for understanding demand - Need-driven seek solution for specific problems - Curiosity-driven seek involvement in products, firm and others 	<ul style="list-style-type: none"> - Consumer motives significantly influence tasks and activities they expect - Provider should define tasks, intensity and extent, tools and media, interaction between participants, incentives, partner 	<ul style="list-style-type: none"> - Companies tend to pay more attention to incentives (prices) than to interaction design - Design is more important to participants (customers) 	<ul style="list-style-type: none"> - Create improvement communities instead of single events 	-	-
Füller, J., Hutter, K., & Faulant, R. (2011)	<ul style="list-style-type: none"> - Self selection of value co-creators is recommendable 	<ul style="list-style-type: none"> - Self selection of value co-creators is recommendable - Experience must be designed well to achieve peak level of performance of participants 	<ul style="list-style-type: none"> - Set up possibility for staff to be lead-users and create ideas in advance to research projects - Experienced customers are more interested in gaining knowledge 	<ul style="list-style-type: none"> - Create improvement communities instead of single events 	<ul style="list-style-type: none"> - Emotional experience matters more than functional results - Community and cooperation revealed to be fruitful 	-
Füller, J., Matzler, K., Hutter, K., & Hautz, J. (2012)	<ul style="list-style-type: none"> - Task motivation is important for idea generation but not for further co-creation activities - Lead users seek / may turn ideas into concepts or prototypes 	<ul style="list-style-type: none"> - Domain specific skills are crucial for idea generation and performance 	<ul style="list-style-type: none"> - Knowledge creation can be supported by professional staff of the provider 	-	-	-
Füller, J., Mühlbacher, H., Matzler, K., & Jawecki, G. (2009)	-	<ul style="list-style-type: none"> - IT tool support is trigger for experience in virtual NPD projects - Good experience contributes positively to customer performance - Tools can lower the need for high degree knowledge 	<ul style="list-style-type: none"> - Knowledge must be provided through tools 	<ul style="list-style-type: none"> - Tools should support knowledge and have therefore to be improved constantly 	<ul style="list-style-type: none"> - Functionality and value are seen as distinct 	-
Gersch, M., Hewing, M., & Schöler, B. (2011)	<ul style="list-style-type: none"> - Usage phase must be redesigned and guided by provider to create value - Consider customer (group) specific needs and designs 	<ul style="list-style-type: none"> - Clearly identify customer interaction points - Adjust degree of interaction (more or less) 	<ul style="list-style-type: none"> - Measure usage in customer sphere may be possible through IT tools to gain knowledge about it 	<ul style="list-style-type: none"> - Implement costs and potential revenue measures on sub-processes (variety) - Implement continuous improvement of process design 	<ul style="list-style-type: none"> - Usage propositions are currently beyond provider's perceptions - Providers focus functional value 	<ul style="list-style-type: none"> - Variety in sub-processes could contain additional revenue potentials
Grissemann, U. S. and Stokburger-Sauer, N. E. (2012)	<ul style="list-style-type: none"> - High quality contribution of customers did not lead higher satisfaction with provider - But it led to higher overall satisfaction - Customers are willing to pay for high integration and close collaboration 	<ul style="list-style-type: none"> - Customer integration must not mean to shift work to customers in order to save resources - Employees have to understand customer needs through interaction 	<ul style="list-style-type: none"> - Knowledge creation through active dialogue is needed 	-	<ul style="list-style-type: none"> - Self designed service creates more value to customers 	<ul style="list-style-type: none"> - Highly individualized journeys enhance the willing to pay
Hofmann, E., & Knébel, S. (2013)	<ul style="list-style-type: none"> - Demand switches to individualized products and services 	<ul style="list-style-type: none"> - No general statement for optimal strategy possible, but - Make to order operations strategy for high product variety expectations of customers - Assemble to order for high product availability and installation support 	<ul style="list-style-type: none"> - Knowledge about customer needs is essential for selecting operations strategy - Also valid vice versa -> tell customers what is possible or useful for their purpose 	-	-	-
Kissimoto, K. O., & Laurindo, F. J. B. (2010)	<ul style="list-style-type: none"> - Customer preferences are essential for customization - Mass customization focuses pre-defined options in catalogues 	<ul style="list-style-type: none"> - Integration of information systems (e.g. IT) are sought to increase possibility of customization 	-	<ul style="list-style-type: none"> - Data mining and business intelligence software enhances knowledge about customer preferences and needs 	-	-
Kohler, T., Fueller, J., Stieger, D. and Matzler, K. (2011)	<ul style="list-style-type: none"> - Compelling experience enhances time spent on co-creation - Time is not passively spent, but enhances content and value to project - Recognize motivations 	<ul style="list-style-type: none"> - Use of virtual worlds for NPD is recommendable - Recognize motivations and set up experience accordingly 	<ul style="list-style-type: none"> - Learning and knowledge creation is supported by compelling experience 	-	-	-

Kohler, T., Matzler, K., & Füller, J. (2009)	- Apply design competitions in virtual worlds to gain ideas	- Consider three main stages need identification and idea generation, concept and design, test and market launch	-	-	-	-
Leyer, M., & Moormann, J. (2012)	-	- Degree of true customer integration affected process steps is low - Independent process steps could be initiated when capacity is available - Customer driven processes come first - High degree of variation leads to inability to control operations	- Company should learn more about customer affected and independent processes	- Measurement of cycle times and productivity	-	-
Martinez-Torres, M. R. (2013)	- Lead users are active in open innovations, receive more feedback on their ideas, provide more critical reviews to peers	-	-	-	-	-
Mota Pedrosa, A. (2012)	- Understand current and future customer needs to set up new services - Observation of customers can reveal unexpressed preferences, requirements and usage behaviors - Prioritize observations and further improve with customers	- Consider three main stages need identification and idea generation, concept and design, test and market launch	- Unexpressed preferences, requirements and usage can be observed in customer behavior - Enable pro-active as well as re-active customer integration and learning	- Set up learning cycles for idea generation and further improvement - Enable pro-active as well as re-active customer integration and learning - Regularly measure quality of knowledge and customer integration	- Unexpressed preferences, requirements and usage can be observed in customer behavior	Unavoidable waste in terms of customer claims should be used to generate knowledge and improve portfolio
Ryzhkova, N. (2012)	- Customer involvement needs more complex systems than only transferring preferences	- Customer integration seems to be easier in first and last steps of innovation	-	-	-	-
Schaarschmidt, M., & Kilian, T. (2013)	- Active dialogue with customers preferable, but seldom applied by companies	- Customer integration demands more absorptive capacity and innovation culture from provider	- Too much gathered data may lead to problems to transfer information into innovation - Intrinsic motivation of customers is desirable	-	-	-
Sigala, M. (2012)	- Use customer segmentation, targeting and reward strategies	- Customer integration predominantly in first and last step	- Train employees in customer integration tools	-	-	-
Tossavainen, P. J. (2013)	- Concurrent and direct multi-stakeholder collaboration in service development is beneficial - Participants should be identified at point of contact at provider's site	- Set up integrated co-creation workshops to gain more ideas and provide fruitful discussion, shared understanding and experiences	- Integration of various stakeholder from different levels enhance knowledge about service system and gains improvements	- Workshop iteration loops recommendable, followed by discussion, results and next workshop planning activities	- Functional value (physical house) is turned to value-in-use (service) within discussions	-
Tuunanen, T., Bragge, J., Häivälä, J., Hui, W., & Virtanen, V. H. (2011)	- Lead user identification through virtual communities is recommendable	- Either use existing, or create new virtual communities	-	-	-	-
Watcharapanyawong, K., Sirisoponsilp, S. and Sophatsathit, P. (2011)	-	- Reduce lead times to be able to cope with variety - Enhance information systems and integration	-	-	-	-
Zolnowski, A., & Bohmann, T. (2013)	- Value is not created at the end of a chain - Individual value has to be considered as customers constantly provide subjective needs	FTU framework; facilities represent provider's resources, independent from customer; transformation means resource integration with customers; usage phase is when value is created through customer	- High interaction between customer and provider necessary to fulfill needs and gain knowledge	- Think of leveraging or accommodating specific customers for improvements	- Value means more than the result of value adding process steps in a chain - Value is rather provided throughout all stages of the process and all interactions with customers	-

Table 25 Studies rated with 'D'

Study	Quality Rating	Cre	Dep	Tra	Con	Year of publicatio	Country code of study	Major construct / theory	Method used - author's description
Collm, A., & Schedler, K. (2012)	D	0	1	0	0	2012	UK	Crowed innovation	Essay
Edvardsson, B., Kristensson, P., Magnusson, P., & Sundström, E. (2012)	D	1	1	0	1	2012	n/a	Service development	Literature Review
Ernst, M., Voigt, K.-I. and Neumann, S. (2012)	D	1	1	1	0	2012	DE	Open innovation	Qualitative case study
Hongqi, Z., & Ruoyu, L. (2008)	D	0	1	0	0	2008	CN	Knowledege management	Literature Review
Mukhtar, M., Ismail, M. N. and Yahya, Y. (2012)	D	0	1	0	0	2012	n/a	Value co-creation	Case study
Skaržauskaitė, M. (2013)	D	0	1	0	0	2013	LT	Value co-creation	Literature Review
Vaisnore, A., & Petraite, M. (2011)	D	0	1	0	0	2011	LT	Open innovation	Literature Review
Wirtz, B. W., Nitzsche, P. T., & Ullrich, S. (2014)	D	0	1	0	0	2014	DE	Open innovation	Theory building
Zhang, X., Miao, C., Li, Y., & Zhang, H. (2008)	D	0	1	0	0	2008	CN	Operations strategy	Literature review

Annex II Monte Carlo Simulation Example and Value Creation Maps

Calculation of training area cycle time with MCS and 150,000 simulated occasions.

MCS calculation of training area cycle time (150,000 occasions)

# occasions	# machines	exercise duration	break duration	total duration
1	8,42	1,52	2,40	99,22
2	7,58	1,36	1,23	91,01
3	9,86	0,66		
4	5,77	1,81		
5	12,80	0,65		
6	5,75	0,74	2,45	54,86
7		0,53	1,84	84,79
8		1,61		
9		1,75		
.
.
1000	12,45	1,40	1,88	122,54

$= 13 - 9 * rand()$
Random number between 4 and 13 machines

$= ((\#machines * exercise) + \#machines * breaks) * 3 sets$

$= 2 - 1.5 * rand()$
Random number between 0.5 and 2 min of exercises

$= 2 - 1.5 * rand()$
Random number between 0.5 and 2.5 min of breaks



x 150

# occasions	Average	Min	Max	SD
1	69,53	15,47	158,04	28,13
2	70,24	17,29	172,09	29,86
3	70,44	15,97	164,10	30,55
4	69,97	17,73	165,91	28,83
5	67,83	14,68	155,68	27,11
6	69,65	17,35	167,85	27,87
7	70,61	18,68	157,28	29,76
8	70,11	13,66	154,96	28,60
9	70,55	17,71	164,51	28,49
.
.
150	70,33	15,10	154,07	28,20
TOTAL	70,10	12,85	172,85	28,81

The total line reflects the mean average results of 150 times 1,000 random occasions. Thus, the minimum visit duration for CIP training area at company A is 12.85 minutes. The maximum duration is 172.85 minutes and an average of 70.10 minutes is simulated with a mean SD of 28.81.

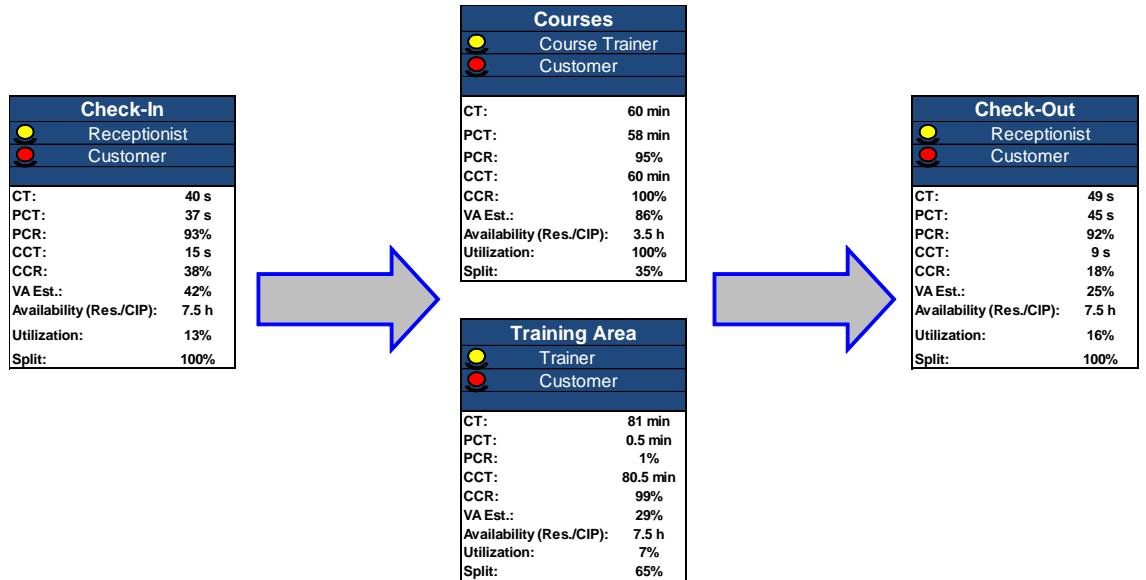


Figure 32 VCM Case Company A 'before'

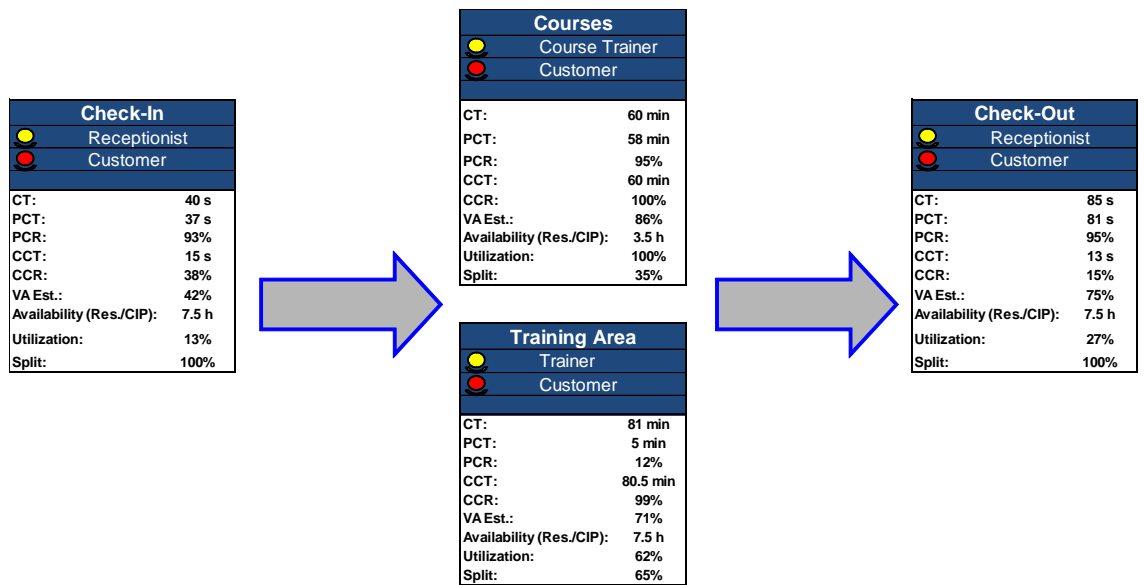


Figure 33 VCM Case Company A 'after'

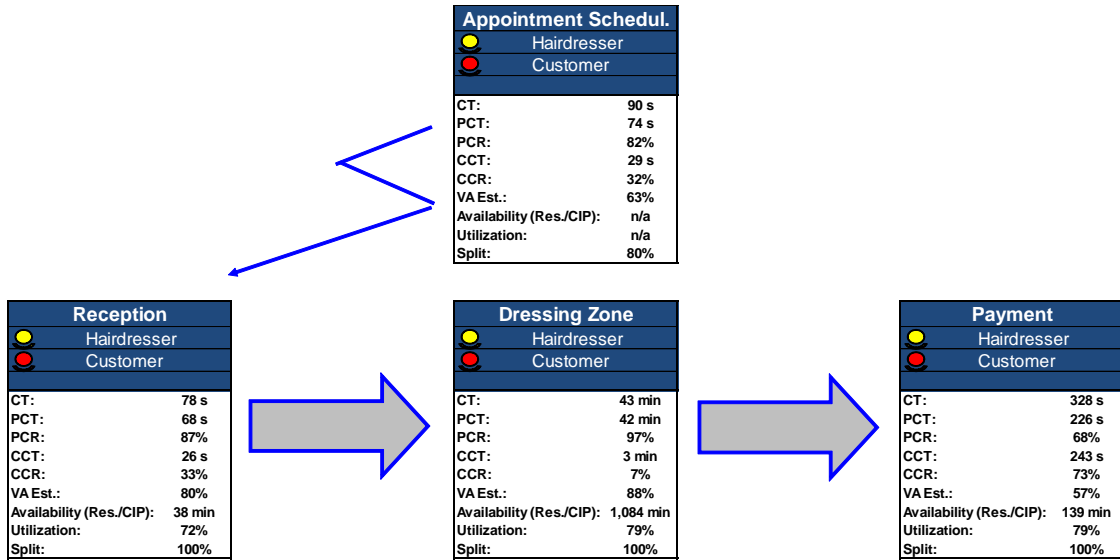


Figure 34 VCM Case Company B 'before'

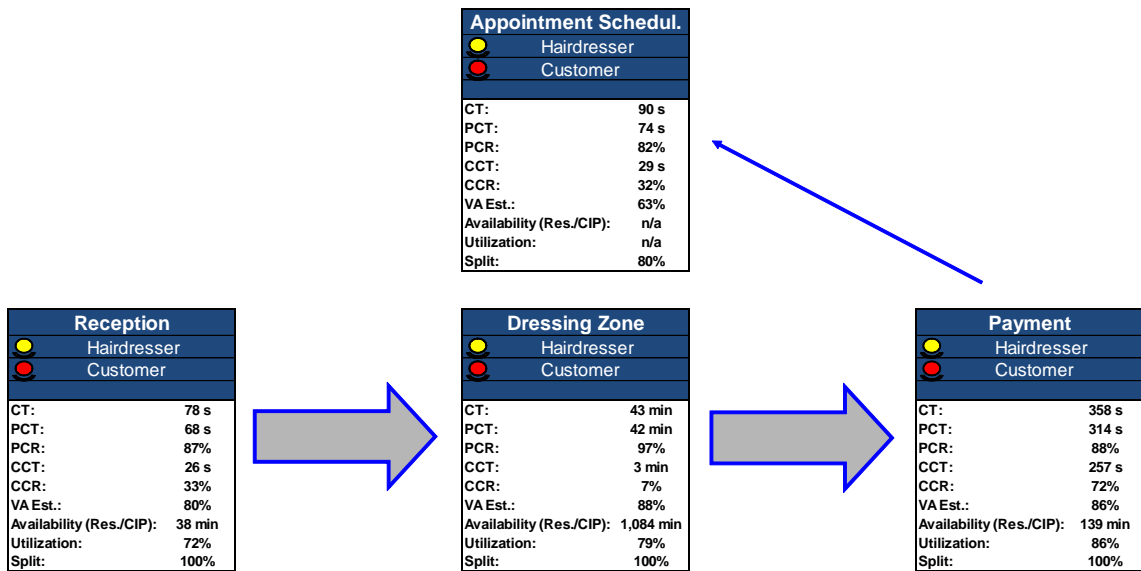


Figure 35 VCM Case Company B 'after'

Annex III Process observation sheets

Process observation sheet

Case company: A

Customer interaction point: Check-in

Date: 11.08.14

Observer: D. Arfmann

#	Task	Description	Actors	Split	CT	PCT	PCR	CCT	CCR	Est. VA	Observation notes
1	Welcome	Reception of the customer	Receptionist Customer	100%	0:10	0:10	100%	0:05	50%	medium	<ul style="list-style-type: none"> No standardized welcome phrase Initiator of welcome varies (sometimes receptionist, sometimes customer) Customer feel comfortable with friendly reception When reception disengaged, customers uncertain Few customers are welcomed with their names
2	Account card	Hand over account card	Customer Receptionist	100%	0:05	0:02	40%	0:04	80%	low	<ul style="list-style-type: none"> No recognition of names (displayed on cards) Often no communication while handing over Seems mechanical
3	System Check-In	Check-In customer in system and check account details	Receptionist	100%	0:10	0:10	100%	0:00	0%	high	<ul style="list-style-type: none"> Quick overview of customer data (e.g. date of birth) and open items provided in the system
4	Open items	Discuss and resolve / pay open items	Receptionist Customer	3%	3:00	3:00 (0:05)	100%	2:25 (0:04)	80%	low	<ul style="list-style-type: none"> Uncertainty of staff Customers often demand to talk to the manager
5	Locker key	Hand out key for wardrobes in locker room	Receptionist Customer	100%	0:08	0:08	100%	0:02	25%	medium	<ul style="list-style-type: none"> No question of what locker is preferred Quick hand out of keys due to organized key box
6	Good training	Wish good training	Receptionist	100%	0:02	0:02	100%	0:00	0%	low	<ul style="list-style-type: none"> Customer seem to recognize positively a wish on good training Staff very seldom wishes good training Nearly no additional value adding beside these steps (e.g. referring to gastronomic offers) Additional value adding strongly depends on concrete actors (manager = high, staff = low)
TOTAL				-	0:40	0:37	93%	0:15	38%	42%	

Process observation sheet

Case company: A

Customer interaction point: Courses

Date: 15.08.14

Observer: D. Arfmann

#	Task	Description	Actors	Split	CT	PCT	PCR	CCT	CCR	Est. VA	Observation notes
1	Training tools>	Prepare training tools for work-out (bikes, etc.), trainer provides assistance	Customer Trainer	100%	3:00	1:00	33%	3:00	100%	high	<ul style="list-style-type: none"> Assistance is provided to (predominantly) new or inexperienced customers
2	Warm-up	Warm-up exercises to prevent injuries	Customer Trainer	100%	5:00	5:00	100%	5:00	100%	high	<ul style="list-style-type: none"> Warm-up is thoroughly done due to trainer presence
3	Work-out	Undergo training exercises including breaks under guidance of trainer	Customer Trainer	100%	45:00	45:00	100%	45:00	100%	high	<ul style="list-style-type: none"> Work-out is thoroughly done due to trainer presence
4	Cool-down & stretching	Cool-down on cardio-machines and stretching exercises	Customer	100%	5:00	5:00	100%	5:00	100%	high	<ul style="list-style-type: none"> Cool-down is thoroughly done due to trainer presence
5	<Training tools	Put back and clean training tools	Customer	100%	2:00	0:00	0%	2:00	100%	medium	<ul style="list-style-type: none"> Conversation among customers and between customers and trainer Positive group experience Customer behave more like a group than on training area Guidance by trainer ensures beneficial training performance
TOTAL				-	60:00	58:00	95%	60:00	100%	86%	

Process observation sheet

Case company: A

Customer interaction point: Training Area

Date: 14.08.14

Observer: D. Arfmann

#	Task	Description	Actors	Split	CT	PCT	PCR	CCT	CCR	Est. VA	Observation notes
1	Training schedule>	Get training schedule with procedures for work-out (exercises, etc.) from rack	Customer	10%	0:20	0:00	0%	0:20	100%	low	<ul style="list-style-type: none"> Most customers do not use a training schedule There is no need to note performance of the day to the sheet Rack is slightly hidden and inconspicuous
2	Warm-up	Warm-up exercises to prevent injuries	Customer	100%	10:00	0:00	0%	10:00	100%	medium	<ul style="list-style-type: none"> Cardio machines are available, but some are old Composition in the studio seems to be unbalanced and disharmonious
3	Check-up	Check-up training where professional trainer advises	Trainer	0,5%	60:00 (0:30)	60:00 (0:30)	100%	0:00	0%	high	<ul style="list-style-type: none"> Initially and every 6 weeks check-ups should take place As customers are responsible for check-up and not informed actively by provider, check-up is rare
4	Work-out	Undergo training exercises including breaks	Customer	100%	60:00	0:00	0%	60:00	100%	medium	<ul style="list-style-type: none"> Customers predominantly do their exercises on their own, without any support No trainer is available at the training area Support of customers is poor
5	Cool-down & stretching	Cool-down on cardio-machines and stretching exercises	Customer	75%	10:00	0:00	0%	10:00	100%	medium	<ul style="list-style-type: none"> Not all customers do cool-down and stretching, but most of them do Cool-down and warm-up are done on the same machines
6	Training schedule	Put back training schedule in rack	Customer	10%	0:15	0:00	0%	0:15	100%	low	<ul style="list-style-type: none"> -
TOTAL				-	81:05	0:30	1%	80:35	99%	29%	<ul style="list-style-type: none"> Presence of trainer on training area not given Interaction customer to customer is also rare Customers have often to switch floors while training

Process observation sheet

Case company: A

Customer interaction point: Check-out

Date: 12.08.14

Observer: D. Arfmann

#	Task	Description	Actors	Split	CT	PCT	PCR	CCT	CCR	Est. VA	Observations
1	Locker key receipt	Receive locker key from customer	Receptionist Customer	100%	0:08	0:04	50%	0:04	50%	medium	<ul style="list-style-type: none"> Often only non-verbal communication between receptionist and customer No additional value offers provided actively Some customers seek conversation
2	Catering offer	Offer / prepare drinks and food	Receptionist Customer	10%	3:00 (0:18)	3:00 (0:18)	100%	0:20 (0:02)	11%	Low	<ul style="list-style-type: none"> No active offer. Most customers leave without beverages or food
3	System Check-out	Check-out customer in system and check account details	Receptionist	100%	0:10	0:10	100%	0:00	0%	high	<ul style="list-style-type: none"> Quick and standardized process (keys have numbers and cards can be identified quickly) System provides good overview about open items
4	Open items	Discuss and resolve / pay open items	Receptionist Customer	5%	1:00 (0:01)	1:00 (0:01)	100%	0:45 (0:01)	75%	low	<ul style="list-style-type: none"> Uncertainty of staff Customers often demand to talk to the manager
5	Account card	Hand over account card	Customer Receptionist	100%	0:10	0:10	100%	0:02	20%	low	<ul style="list-style-type: none"> No recognition of names (displayed on cards) Often no communication while handing over Seems mechanical
6	Goodbye	Say goodbye	Receptionist	100%	0:02	0:02	100%	0:00	0%	low	<ul style="list-style-type: none"> Only few customers stay for a protein shake or other gastronomic offers No chance for customers to provide any feedback to their training or experience Nearly no additional value adding beside these steps (e.g. referring to gastronomic offers) Additional value adding strongly depends on concrete actors (manager = high, temp. staff = medium to low)
TOTAL				-	0:49	0:45	92%	0:09	18%	25%	

Process observation sheet

Case company: B

Customer interaction point: Reception

Date: 10.10.14

Observer: D. Arfmann

#	Task	Description	Actors	Split	CT	PCT	PCR	CCT	CCR	Est. VA	Observation notes
1	Welcome	Friendly welcome of customer (if possible namely)	Hairdresser Customer	100%	0:15	0:08	50%	0:05	33%	High	<ul style="list-style-type: none"> Customers wait in reception area Eventually guideline for reception is needed
2	Ask for occasion	Ask what customer wants to request	Hairdresser Customer	100%	0:10	0:08	80%	0:05	50%	Medium	<ul style="list-style-type: none"> Provider does not always be prepared on specific customer, though appointments are made in >80% of cases – necessary at all?
3	Without appointment	Check current availability / capacity	Hairdresser Customer	20%	0:20 (0:04)	0:15 (0:03)	75%	0:10 (0:02)	50%	Medium	<ul style="list-style-type: none"> No standard instruction how to handle customers without appointment – handled very individually
4	Escort to seat	Escort customers to their appointed seat	Hairdresser	100%	0:10	0:10	100%	0:10	100%	High	<ul style="list-style-type: none"> All customers are escorted to their seats Customers seem to feel well while they are escorted to their seat
5	Offer beverages	Offer hot and cold beverages to customers	Hairdresser Customer	75%	0:50 (0:38)	0:50 (0:38)	100%	0:05 (0:04)	10%	High	<ul style="list-style-type: none"> Question is always posed but not at a standardized point of time – rather individual
TOTAL				-	1:18	1:08	87%	0:26	33%	80%	<ul style="list-style-type: none"> Overall very good with some slight improvements in terms of guidelines

Process observation sheet

Case company: B

Customer interaction point: Dressing Zone

Date: 10.10.14

Observer: D. Arfmann

#	Task	Description	Actors	Split	CT	PCT	PCR	CCT	CCR	Est. VA	Observation notes
1	Identification of customer request	Ask customer what services (s)he requests	Hairdresser Customer	100%	0:35	0:35	100%	0:04	11%	High	<ul style="list-style-type: none"> Female customers seem to take longer than males (CT between 10 and 70 seconds)
2	Dressing advices	Professional, individual advices provided by hairdresser	Hairdresser Customer	80%	2:00 (1:36)	1:00 (0:48)	50%	1:00 (0:48)	50%	Medium	<ul style="list-style-type: none"> Equal effort in conversations Type of conversation (formal, informal) is quite individual and depends on specific relationship Hair care (products) not discussed
3	Hair washing	To achieve a better end result, hairs are washed for free	Hairdresser Customer	90%	5:45 (5:11)	5:45 (5:11)	100%	0:20 (0:18)	5%	High	<ul style="list-style-type: none"> Customers seem to appreciate the washing for free Needed duration (CT) strongly depends on hair length
4	Fulfill requested service	Cutting, coloring, make-up, etc.	Hairdresser	100%	24:00	24:00	100%	1:12	5%	High	<ul style="list-style-type: none"> Usually friendly conversations Customers seem to enjoy atmosphere and conversation
5	Feedback	If necessary, rework according to customer instruction	Hairdresser Customer	30%	1:00 (0:18)	1:00 (0:18)	100%	0:06 (0:02)	10%	Medium	<ul style="list-style-type: none"> Male seem to be less critical as no man demands rework, whereas 50% of females requested (minor) changes; could be by accident
6	Styling	Styling and / or drying (sometimes customer self service)	Hairdresser Customer	100%	10:30	10:30	100%	0:10	2%	High	<ul style="list-style-type: none"> Offering magazines while drying seems to be appreciated by customers, but is only actually used by 30% Seldom done by customers on their own
7	Final feedback	Ask customer for final feedback	Hairdresser Customer	20%	0:30	0:20	66%	0:15	50%	Low	<ul style="list-style-type: none"> Usually after rework no double-check is made actively by hairdresser
TOTAL				-	42:38	41:42	97%	2:49	7%	88%	<ul style="list-style-type: none"> Overall of good quality but leading conversations on provider's side, especially dressing advices for hair care, may be improved significantly

Process observation sheet

Case company: B

Customer interaction point: Payment

Date: 10.10.14

Observer: D. Arfmann

#	Task	Description	Actors	Split	CT	PCT	PCR	CCT	CCR	Est. VA	Observation notes
1	Customer to pay-desk	Friendly escort customer to pay-desk	Hairdresser Customer	100%	0:30	0:30	100%	0:30	100%	High	<ul style="list-style-type: none"> Always done calm, friendly and without precipitance
2	Product sales	Eventually sale hair care products from prior recommendations	Hairdresser Customer	5%	1:00 (0:03)	0:45 (0:02)	75%	0:25 (0:01)	25%	Low	<ul style="list-style-type: none"> Product sales is nearly no topic. Customers need to address this topic by themselves. Only reactive actions by hairdressers. Seem to avoid this topic as they feel uncomfortable with it.
3	Actual duration	Open appointment in IT system and enter actual duration	Hairdresser	0%	0:10	0:10	100%	0:00	0%	Low	<ul style="list-style-type: none"> System function currently deactivated, but could be seen as beneficial for planning improvements
4	Invoicing	Invoice provided services and products at pay-desk	Hairdresser	100%	0:20	0:20	100%	0:00	0%	Medium	<ul style="list-style-type: none"> As customers have to wait for invoicing, they maybe could do something while waiting? -> "Waste" into „Value“ (e.g. follow-up)
5	Make Payment	Pay either by card or cash	Hairdresser Customer	100%	2:20	0:40	29%	2:00	86%	High	<ul style="list-style-type: none"> -
6	Follow-up appointment	Ask for follow-up appointment	Hairdresser Customer	25%	0:05	0:04	80%	0:02	40%	Low	<ul style="list-style-type: none"> Unfortunately only 25% of customers ask or are asked for a follow-up appointment
7	Schedule appointment	Agree on and schedule follow-up appointment	Hairdresser Customer	0%	1:00	1:00	100%	0:30	50%	Low	<ul style="list-style-type: none"> No follow-up appointment scheduling observed Topic needs more intention as it is crucial to customer loyalty as well as to resource utilization
8	Goodbye	Friendly goodbye with some small talk	Hairdresser Customer	100%	1:00	1:00	100%	1:00	100%	High	<ul style="list-style-type: none"> Always friendly goodbye
TOTAL				-	5:28	3:46	68%	4:03	73%	57%	<ul style="list-style-type: none"> Overall a good process, but product sales and also follow-up appointment scheduling need more attention

Process observation sheet

Case company: B

Customer interaction point: Appointment Scheduling

Date: 21.10.14 Observer: D. Arfmann

#	Task	Description	Actors	Split	CT	PCT	PCR	CCT	CCR	Est. VA	Observation notes
1	Greeting	Friendly greeting and repeat name	Hairdresser Customer	100%	0:05	0:04	80%	0:02	40%	Medium	<ul style="list-style-type: none"> Always done friendly but names are often not repeated or at least kept in mind A reminder to smile on the phone may be applied to ensure friendliness even in stressful situations
2	Preferred date and time	Ask for preferred date and time (period)	Hairdresser Customer	100%	0:10	0:08	80%	0:04	40%	High	<ul style="list-style-type: none"> Overall of high standard and according to work instructions
3	Preferred hairdresser	Clarify regular or preferred hairdresser	Hairdresser Customer	100%	0:05	0:04	80%	0:02	40%	High	<ul style="list-style-type: none"> Overall of high standard and according to work instructions
4	Services	Identify services that need to be done	Hairdresser Customer	100%	0:10	0:08	80%	0:04	40%	High	<ul style="list-style-type: none"> Overall of high standard and according to work instructions
5	Search appointment	Search for free appointments in IT scheduling system	Hairdresser	100%	0:10	0:10	100%	0:00	0%	Low	<ul style="list-style-type: none"> Scheduled duration needs more intention. Seems to be a bit vague but is crucial to overall resource utilization and efficiency
6	Make appointments	Provide at least two options to customers and agree on one	Hairdresser Customer	100%	0:35	0:28	80%	0:14	40%	High	<ul style="list-style-type: none"> Overall of high standard and according to work instructions Selected hairdresser is changed if necessary
7	Summary and goodbye	Summarize the discussed and say friendly goodbye	Hairdresser Customer	100%	0:15	0:12	80%	0:03	20%	Medium	<ul style="list-style-type: none"> Summary is done but could be improved, e.g. by offering to send a reminder as mail or text message one day prior to appointment
TOTAL				-	1:30	1:14	82%	0:29	32%	63%	<ul style="list-style-type: none"> Overall a process of high standard, but duration of scheduled appointments and ensuring that appointments are kept need more attention



Figure 36 Mind map guide for CIPs Check-In / Check-Out in case company A

Annex IV Blank interview protocol

Case study ‘Customer integration into lean service operations’ at ‘COMPANY’, ‘LOCATION’, ‘DATE’

Management Interview with ‘NAME’

1. Company background
 - What is the company’s history?
 - What is the current structure?

2. Philosophy
 - What is unique to the company?
 - What value do you offer?
 - How should customers perceive your company?

3. Product portfolio
 - What service and products do you offer?
 - What are most / less relevant?
 - What opportunities do you have in regards to services and products?

4. Customers
 - What are your target groups?
 - How many and what kind of customers do you have?
 - How long do customers regularly stay with your company?

5. Management self assessment
 - How do you assess the following criteria?
 - o Customer satisfaction
 - o Staff satisfaction
 - o Cost efficiency
 - o Earnings (actual and potential)
 - Where do you see areas of improvement?

6. Goal definition for case study
 - The general goals are e.g. identification of CIPs and customer contribution, VCM and simulation, customer workshops and trainings (‘Explain process more in detail’)
 - Do you have any additional goals?

Annex V Experiment questionnaire (example)



Public transport

Degree of contribution to value creation

Provider					Both					Customer										
10	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	10



Please indicate your perceived degree of service creation contribution with an 'x' on the scale.



Public transport

Customer contributions

Some customer activities

Gather information about lines and scheduled departure / arrival

Buy ticket

Hop on, hop off the train

Get a safe seat / stance

Managing delays and late arrivals

Eventually provide valid ticket for ticket inspection

Degree of contribution to value creation

Provider					Both					Customer										
10	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	10



Please indicate your perceived degree of service creation contribution with an 'x' on the scale.

Annex VI Reflective commentary

In qualitative research reflections play a significant role to enhance credibility of a study (Guba & Lincoln, 1994). The reflective commentary chapter aims at supporting the investigator 'to evaluate the project, again as it develops [...] dealing with emerging patterns and theories should inform that part of the research report that addresses the project's results' (Shenton, 2004). AR scholars also strongly recommended reflective and critical thinking not only about the content, but also on the act of how insights have been gained. Coghlan (2008, p. 344) defined insights as 'the result of inquiring intelligence'. The author further referred to the three-step heuristic process of human knowing. This process considers experience (e.g. gaining empirical data), understanding (analyzing and discussing data), as well as judgement (reflection and conclusions). 'What makes evidence sufficient depends on the experience of prior judgements. New judgements correct, complement and criticise former judgements' (Coghlan, 2008, p. 347). Thus, it is necessary to reflect not only on the insights, but also on the way these have been gained prior to final judgements in terms of conclusions and recommendations. As in AR the researcher is actively incorporating with the research object, the reflective commentary needs to consider researcher's personal reflections in particular (Dawson, 2012).

In order to cover these aspects, reflection process is guided by a set of questions that were developed in service-learning:

- 1) What did I learn?
- 2) How, specifically, did I learn it?
- 3) Why does this learning matter, or why is it significant?
- 4) In what ways will I use this learning? (Ash & Clayton, 2004, p. 142)

Along the process, critical thinking can be seen as key in gaining insights while answering questions above. Therefore, a thorough analysis, evaluation, interpretation, as well as explanation of considerations is necessary (Facione & Facione, 1996). However, reflection should not only be a self assessment approach, but also be enriched with other perspectives (Johns, 2010). Therefore, each question is answered through considering own thoughts, e.g. from researcher diary, but also (written) feedback provided by supervisors, lecturers or journal reviewers at different stages of

the project. As reflection sections aim at exploring the researcher's perspective in detail, first person writing is used in most sections.

The way of research conduction

Without evaluating and reflecting on the selected research approach and research conduction, relevance of research findings cannot be judged reasonably. Therefore, the paradigm development, methodology and research design, as well as research methods are considered in this section.

Paradigm

On 12th of November 2011, I noted in my research diary that 'I am a positivist, supposing one underlying truth'. I further mentioned that I need to challenge my perspective, in order to learn more about myself and the way I could shape my project appropriately. This can be seen as the starting point of my worldview journey. Only two weeks later, I noted that I might be an interventionist, referring to the fact that I am trying to create a better world. However, worldview still did not have any deeper meaning to me. At this point, I perceived discussing paradigms rather as a research necessity than as a valuable insight. This is reflected in my notes in January 2012. I noted that 'nothing can be as useless as defining his own worldview'. From my perspective the world was too complex to plausibly argue any arbitrary perspective and thus, it had no deeper meaning to me. Furthermore, I thought that traditional paradigms were incompatible with my 'handsome and practice focused research topic'. Thus, I tried to justify a pragmatic worldview in my formative DBA501, as an alternative in the absence of any personal worldview. However, it did not work sufficiently. Throughout the process of writing the assignment, I revealed 'the greater meaning of a worldview as it enables me to access my field of investigation and to assess myself' (all notes from research diary, 12th June 2012).

In the following weeks I literally absorbed different philosophies and traditions, their meaning and application in former research, as well as their meaning to my project and myself. This led me to a thorough understanding of CR paradigm, and significantly impacted the development of this thesis. The marker's feedback on my DBA501 was

that my 'work demonstrates a deep understanding of research methodology related to Critical Realism and how this approach can be seen as appropriate for the research topic' (marker's feedback on formative DBA501).

The CR way of contemplating the world is a special one. It considers physical observations and underlying forces, but also personal feelings and perceptions. In social science, this can be seen as quite difficult. 'In physics the active agents such as charges, forces and fields, are in the domain of unobservables. In social psychology the active agents are in the domain of observables, namely people' (Harré, 2009, p. 136). One main goal of intensive research design in CR is to understand and reveal underlying rules and mechanisms (Bhaskar, 1998; Sayer, 2000). In social science, it is important to realize that these are all within the observables, within people. Thus, it is comprehensive that what is observed could be either a cause, but also an effect. In regards to the given research project, the findings that case company B management and staff find it hard to sell products can be interpreted in two different ways. On the one hand it could be argued that this is an effect of a cultural aspect, predominantly established by the owner-manager. On the other hand it could also be identified as a cause for low product sales. In this case it may reasonably be argued that it is both, a cause as well as an effect. However, it does not seem to be the root cause for low product sales. In TPS, a method is applied that addresses this issue. It is called the '5 Whys'. 'Repeating why five times [...] can help uncover the root problem and correct it' (Ohno, 1988, p. 17).

This example demonstrates that CR worldview enhanced this research project and is in line with some core elements of the lean idea. This is particularly valid when looking at diverse considerations on a single observation or problem. However, CR also demands significant investigative effort and thorough justifications.

Approaching the problem statement

The major reason for starting my DBA study had been the strong willing to understand why 'it is often so hard for organizations and especially decision makers to cope with service operations systems and further develop them in a medium and long term' (notes from research diary, 11th November 2011). While looking for answers I was reading dozens of articles with conceptual frameworks, case studies, experiments and

many others. Soon I realized that in the field of service operations management, predominantly production-line approaches were applied like JIT, lean, TQM or six-sigma. Interestingly, they had all the same root: the Toyota *Production System*.

Having a closer look upon lean service, literature also indicated that there are many aspects that do not support positive effects of lean application in service organizations. In particular, positive effects on quality and enhancing value creation were questioned by various authors. This is also in line with what I experienced in my business life. There, e.g. call centre managers attempted to cover the diversity of technical requests within process flow charts. The results were disappointing and without practical implications as flow charts did not provide any benefit or insight to employees or managers respectively. At this point, my opinion that existing lean service theory did not contribute to managing service organizations successfully seemed to be confirmed. I found many studies supporting this. Even when I got back to the roots of lean, I noted on Ohno (1988) that there is 'no word on value creation. It is rather a descriptive set of activities to reduce waste' (notes from research diary, 19th August 2013). The whole book seemed to me rather descriptive than sophisticated.

Through reading many articles of lean applications in service business, I recognized that service characteristics were merely considered by the authors. Furthermore, insufficient improvements in service quality were predominantly reasoned through wrong lean service application or efficiency focus. For instance, Radnor and Johnston (2013) highlighted that efficiency, as well as value needs to be focused in lean service projects. The authors argued that otherwise, only efficiency gains may be achieved. However, from my perspective these explanations did not go far enough. From my perspective it would be necessary to challenging the whole lean method from a service point of view. This was initially been done by Seddon and O'Donovan (2010) and I found it needing to be enhanced.

Thus, I elaborated arguments why the existing concept and application of lean service is insufficient. The outcome was the later published journal article 'The Value of lean in the Service Sector: A Critique of Theory & Practice', which was co-authored by my first supervisor. It was not a straightforward process, but I experienced something like passion for the topic. For the first time in this project, I felt that I created something worthy and meaningful. This is also reflected in the feedback from journal reviewers:

'The focus on lean service is of interest since it is underrepresented in the literature and the authors have provided some interesting insights that are presented in an engaging style. [...] The most important side of this paper is the critical analysis of the research topic. A well match was found between objectives and analysis of the study' (Comments and suggestions from IJBSS, February 2014). After completing the article I noted in my research diary that 'I am back on track and have high motivation to succeed and push my thesis' (notes from research diary, 2nd January 2014).

When I am looking back and reconsider my thoughts and feelings, I wonder if I was a bit unsophisticated. On the one hand I tried to express my point of view, but on the other hand I could have misinterpreted some relevant aspects, leading me to a biased perspective. However, one of the great benefits from this article was that my research topic became much clearer. I even completely rewrote my already submitted, but still pending RD1, which was accepted very quickly afterwards. Within this period of approaching the problem of this thesis I learned two major things. First, it is beneficial to assess and reconsider data through different phases, as e.g. proposed by the double-loop learning concept (Argyris & Schön, 1978). It could be called critical assessment. Second, I learned that enthusiasm in finding and defending own positions may significantly enhance outcomes. It seems that if a topic means something to oneself, it is more likely that you can inspire others. It may be seen as a sort of courage for change. For the subsequent research process, I tried to reasonably combine both aspects. Amongst others, these thoughts guided the process of designing methodology and methods in the following.

Methodology and methods development

According to the insights above, I tried to achieve a balance between critical assessment and courage for change in the overall research design. This encompassed case selection, internal and external validity, as well as actual data conduction and analysis.

One of the first major questions was whether to apply an extensive or intensive research design. I preferred an intensive design to achieve an in-depth understanding of how lean may be applied to service organizations and what effects occur. Though Sayer (1992) argued that intensive research does not necessarily need to be

representative, I felt that this research topic required generalizability to a certain extent. Furthermore, a DBA thesis needs to contribute to both, knowledge, as well as management practice. Therefore, a research design was needed that enabled in-depth understanding leading to a new lean service theory, as well as supporting generalizability of findings.

I learned that applying propositions is useful for theory building and testing (Barratt et al., 2011; Carlile & Christensen, 2004; Dooley, 2002). Throughout the research process, propositions validation provided a guideline for data analysis and discussions in particular. In contrast to these benefits, it may potentially hide important findings that need to be unfolded through additional perspectives (Jeppesen, 2005). The emerging patterns that had been identified in the first analysis stage could have been disregarded by solely focusing research propositions. In a review circle, further insights were identified that contributed positively to understanding lean application in service environment. This is a good example of how I applied my learning at a later stage.

However, finding an appropriate way to test propositions was quite difficult as major questions needed to be considered. Would it be beneficial to do AR in cases? What about triangulation? How could these things be organized in a coherent way? Though my RD1 stated that I would apply case research, I frequently challenged this approach. 'I tend to do experiments instead of AR [in case companies]. It should avoid external causes in a case company that do not belong to the theory, but may significantly influence results' (notes in research diary, 15th June 2014). The mentioned reason was significant to me. I thought that it would be best to achieve distinct results. Interferences within daily business of companies and other uncontrollable external influences could distort any identification of meaning. But then I reconsidered the purpose of a DBA thesis. Thus, developing and recommending a model, which has never been applied in practice before, turned out to be unacceptable. Nevertheless, the frequent and intensive discussions with my supervisor on e.g. case selection or the number of case studies definitely strengthened overall research design and its reasoning. What really helped me at this stage was that I could come up with my own ideas and challenge these. However, I needed to thoroughly explain and argue, e.g. why I think that method X is more or less appropriate than Y.

While conducting the case research, improvisation sometimes was indispensable. Though there was a clear pathway of how to conduct the case study in my mind, it frequently was necessary to adjust schedules or postpone activities. For instance, on the first day at case company A the required system data had not been provided in advance as agreed. Thus, I needed to manage that data was collected during the day. These minor disruptions had all been manageable, but nearly no day passed without such 'surprises'. In such situations I benefited from my professional project management experiences. These enabled me to smoothly carry out the study, without negative impact on the case company. However, the main reason for the missing system data was that I only mentioned it verbally in advance to the meeting. I improved my own preparation for case company B according to learning from the first one as, e.g. suggested by Meredith (1998). Thus, company B would probably perceive the overall process as more professional. It was quite important to me to be as professional as possible in the case companies. The participants might have not considered any inconsistencies of actions along the process, or at least they did not show. But this could also be reasoned in their 'respect' for a DBA student. To reduce potential personal distances caused by respect, I tried to establish a close and open-minded relationship to the managers. Through this, I sought to also facilitate and enable critical discussions. Without critical discussions, the current state could never be improved. Therefore, the regular debriefing sessions were established as 'forums' where recent findings were critically discussed and improvements agreed.

Methods effectiveness

In order to assess effectiveness of applied methods, I would like to address goals and actual outcomes of the methods. The case studies should provide in-depth insights upon the application of the new lean service model, as well as validating the propositions. It may be argued that both cases provided rich data and thus supported a thorough understanding of value perceptions, actors and improvements through model implementation. Also the application of mixed methods within the case companies provided several different perspectives on the same phenomena.

Having a closer look upon single research methods, it can be recognized that document analysis only contributed to validation of two propositions in case company B and to

none in A. At the same time, it demanded high effort on providers, as well as on researcher's side. Hence, this method could be considered as quite ineffective. But it is important to take into account that especially IT system data, as well as job instructions enabled the researcher to learn about the company, customer demand, capacity and processes. Thus, without document analysis issues like the planning problem in company B or machines' utilization in company A would have not been identified.

Despite the fact that experiment should only validate one single proposition, it also provided lots of additional insights and contemplating findings. However, experiment design could also have been addressed directly to the specific proposition. Instead, hypothesis was formulated regarding the aspect of treatment effect, which was certainly an interesting issue, but definitely increased effort of analysis. In favour of receiving rich data for deeper insights, I decided to choose the given experiment design. One may question if it was the most effective one, but it definitely contributed to validation of propositions and is in line with the idea of intensive research design. Nevertheless, one main learning of designing the experiment was a formula for optimal sample calculation by List et al. (2011). It was outlined as 'total available budget divided by costs per sample'. This told me that in terms of credibility and generalizability endless sources of data might be desirable. But real budget and capacity need always to be considered.

At an early stage, I planned to further enrich the findings and discussion with an expert panel. Even the Delphi method had already been set up and potential participants identified, but in the end I recognized that such an additional method would exceed the manageable effort for this thesis in terms of time and word space. Without a doubt it could have further enriched the project, but in the end it was rejected due to mentioned reasons.

This was a hard decision as I am used to complete what I have planned. Though the issues of conducting the expert panel became clearer, I was still willing to keep it in the project. But after a while and several discussions with my supervisors, I realized that in this case it was better to take an alternative route, in order to enable a deeper examination of the data gathered through the other methods.

The research findings

Though the research findings have already been addressed in the discussion chapter, it can be seen as beneficial to reflect moreover on theory development throughout the project. Guba and Lincoln (2001, p. 6) called this ‘progressive subjectivity’, which means ‘continuous checking of developing constructions against records of constructions that were expected prior to data collection’. This process seeks to further enhance credibility of findings. Therefore, prior expectations are contrasted and critically reflected to actual findings. This is done for three different stages along the research process: initial theory, emerging patterns, as well as resulting theory (Shenton, 2004).

Initial theory

Development of initial theory was predominantly based upon the five arguments of criticizing lean theory and practice. Furthermore, it considered emerging insights from other fields of research, e.g. from marketing scholars. In this circumstance I had an enlightening moment, realizing that ‘people think lean only in internal ways as they supposedly think in ‘value-in-exchange’ manner. They seem to perceive value as being created in a sequence of firm’s internal activities. That means that value, from their perception, is manufactured’ (notes from research diary, 6th February 2014). In turn, this would mean that also operational design and all improvement activities were based upon this way of thinking. I wanted my lean service model to change this paradigm from ‘value-in-exchange’ to ‘value-in-use’ thinking. From my perspective, *use* was not limited to organizational boundaries.

Against this background, I applied the value (co-)creation concept as a central element of ‘value-in-use’ in my SLR (Gronroos & Voima, 2013). I expected that this would bring up valuable insights and concepts of how customers may be integrated into service operations. Indeed, many concepts and methods could be identified that were addressing multiple ways to do so. It was also beneficial that these methods emphasized different focus areas, ranging from product or service development over lead user identification to service blueprinting. However, SLR also revealed that there was no concept available, which provided a holistic model of customer integration, encompassing new service development, as well as continuous improvements. It can

be considered that the absence of a holistic model was expected in advance, as the project explicitly addresses this gap.

However, the goal that SLR studies were free from 'value-in-exchange' paradigm could not be achieved. This is supported e.g. by recognizing that 10 out of 27 SLR articles addressed traditional designs 'for' or 'with' customers (mode 1 and 2). Against this background, the presented initial theory is rather an evolutionary step towards 'value-in-use' with some origins within 'value-in-exchange'. But this is not necessarily negative. It could rather be seen as beneficial as it increases reliability and dependability of the study.

Emerging patterns

Throughout the study diverse patterns emerged. Some were consciously intended, e.g. experimental design addressed moreover treatment effects on perceiving customer (co-) creation, whereas others occurred coincidentally. The challenge was to deal with unexpected patterns. The pathway of formulating and testing propositions provided a useful guideline for data analysis from a specific point of view (Yin, 2014). This allowed deriving meaning from rich data. However, it also narrowed focus and thereby additional insights might were disregarded. One way to deal with this could have been to regularly re-adjust propositions, whenever additional patterns emerged. However, this would also mean to regularly change significant parts of the research design. Such actions could have led to a dangerous pathway of constant adjustments ending up on a lost track. Therefore, I decided not to change propositions, but to consider further emerging patterns in specific review circles. For instance, the 'chaotic' way of service value creation at CIP had not been covered by propositions properly. Thus, data was analyzed again in order to learn more about this specific pattern, as e.g. recommended by Aronson (1994). This seemed to enhance the findings and resulting theory.

Resulting theory

Several expected, but also unexpected research findings contributed to composition of the final model. Initially, I thought that the framework of how to implement the lean service theory could be straightforward. There were four clearly defined stages; value

and roles definition, process design, as well as improvement and training. I was convinced that this logical process could be rolled-out smoothly step by step. This turned out to be a false assumption. Though all stages could be legitimated throughout the study, the pathway of implementation differed significantly. The AR research design allowed and even encouraged to make necessary adjustments along the process. For instance, I noted on the first case study that 'part 3 – process design without waste turned into process design for value' (notes from research diary, 1st September 2014). Surprisingly, value was much more important to the case companies that I had expected in advance. This might be reasoned in case companies' size or that both are family-owned.

From my perspective it was beneficial to this study that value played a superior role in case research. Sufficient consideration of value creation was one major issue in traditional lean service studies. But it is also noteworthy that my knowledge about this gap could have led into a value direction. Furthermore, only value creation processes or CIPs were considered. Administrative processes like procurement were out of focus as they were not perceived as relevant for customer integration. However, these aspects potentially caused an underrepresentation of further efficiency gains that could also be achievable within these companies. Against this background, it is important to also discuss the role of the researcher within the project more in detail.

Researcher's skills

Beside researcher's potential influence upon application of research methods, as well as upon research findings, also researcher's skills need thorough attention. It was argued by various AR scholars that researcher's skills and capabilities can be seen as crucial to research project's success (Bate et al., 2000; Mackenzie et al., 2012; Pain et al., 2012). The authors mentioned that sound project and change management skills are highly important in AR projects. This addresses defining roles, setting goals, and leading sensitively participants through change processes. Therefore, AR scholars need to get access to the core of organizational behaviour, which demands effective networking with participants and stakeholders (see also 5.2.2).

Do I personally fulfil these criteria? My 'SkillsForge' self-assessments, as well as reflections with my supervisor confirmed my ability to undergo an AR project.

Furthermore, my personal professional background seemed to be important. My CV shows that I already proofed the requested skills and capabilities in my career. Through more than five years of leading large, as well as small size international projects, the required skills reflected my daily business. The feedback I received on my business projects from stakeholders and participants were positive throughout. When I started as a project manager, I strictly tried to keep all stakeholders informed and to treat everybody with respect. The most important task in the beginning of any project was listening. In later projects, my ideal state of keeping every stakeholder informed slightly turned into keeping the relevant ones informed. I learned that my project was not as important for others as it was for me or the project team respectively.

But is this the same in research projects? I think yes and no. Running this research project in both companies shared various similarities with business projects. I needed to plan activities, set target dates, managing emerging issues, as well as reporting my findings and developing solutions. Also listening played a significant role within the case research in this thesis. First, it was part of the applied lean service model to receive a detailed picture of roles and values. Furthermore, it was necessary to establish a close and open-minded relationship between the participants and myself. Nevertheless, there were also significant differences that I did not expect in advance.

First of all it was 'my' project. Case companies did neither initiate it, nor did they perceive it as their projects. This is quite different to my business projects. In these projects, though some might have been unpopular to some stakeholders, I had always at least one party supporting it, usually the senior management. Taking into account that one of the great ideas of lean is that the whole company is involved and pushes lean transformation, I had to overcome a significant barrier. It was necessary to change state of mind in case companies from 'his project' to 'our project'. I tried to resolve this issue through conversations, especially within the debriefing sessions and workshops. It was important to me to understand what participants consider to be improved. Or in Lewin's words, the stage of unfreezing took longer than expected. In the following stages, this problem constantly decreased and an 'our project' mentality could be established. This was very important to the overall outcome of the project. I am convinced that without this change, improvements could at best be achieved only on a theoretical level. An implementation and realization of these would not have been possible.

Another difference existed in the nature of project reporting. Whereas business projects are predominantly outcome driven, research projects much more demand a thorough documentation and analysis of the way these outcomes were produced. Due to the variety of different data sources within the case companies, it was really hard work and sometimes reached the limit of my capacity. Thus, it can be argued that applying the new lean service model in larger companies could only be carried out with a team of researchers. It is doubtful that one single researcher could manage this.

Furthermore, I experienced that the mix of inductive and deductive research approach in two SMEs made the project more explorative as expected. Jeppesen (2005, p. 6) mentioned that undergoing intensive research should be 'studying fields that have been thoroughly investigated by other researchers earlier [...] [which] is precisely not the situation concerning SMEs'. Not before I completed my studies I realized the meaning of these sentences. From the perspective of Eikeland (2012) the conceptualization of research design could be improved in AR studies. However, I learned that detailed conceptualization of explorative research in advance to the project is hard to do. Thus, reflections upon the process and findings are indispensable to judge findings and to provide meaningful results.