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Business Customer eXperience Alignment Framework: Improving Customer Satisfaction

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Abstract Globalization and technological innovation has led to an increasing competition between telecommunication service providers and has eroded traditional product- and service-based differentiation. One way to gain a competitive advantage is to create distinctiveness by improving customer experience in such a manner that it leads to higher customer satisfaction and loyalty. One of the drivers to improve the customer experience is the service interface. To improve this service interface, organizations must get insight into their customer interaction process. The amount of data about customers and the service provider processes is increasing and becoming more readily available for analysis. Process mining is a technique to provide insight into these processes. In this paper, a framework is presented to improve the customer satisfaction by alignment of the business service delivery process and the customer experience by applying process mining.

Keywords: • Customer satisfaction • Customer journey • Interaction process • Service quality • Process mining • Telecommunication industry •

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1 Introduction

In a saturated telecommunication market where the offer of services is huge, the options for the customer are overwhelming, and government regulations force providers to make services more transparent and more comparable, the risk of a commodity trap is lurking. Services are more and more alike, and customers make their decisions based on price. This can start a negative price cycle which leads to a 'commodity trap' (Lanen, 2008). According to Fornell (1992), one of the strategies in the telco industry to avoid a commodity trap is to improve the customer satisfaction as this has a strong positive effect on the customer loyalty intentions. Overall satisfaction has a positive effect on customer usage of telco services (Bolton & Lemon, 1999) and has a positive effect on retention (Gustafsson, Johnson, & Roos, 2005). Customer experience drives customer satisfaction (Pine & Gilmore, 1998) and service providers must innovate on customer experience instead of only on services. Customer experience is based on the interactions between the customer and the service provider, and the gain in value for the customer and the provider is created through these interactions (Addis & Holbrook, 2001). In regards to customer experience, there is a distinction between direct or indirect contact between customer and service provider (Meyer & Schwager, 2007) and it is strictly personal (Gentile, Spiller, & Noci, 2007). It is not only the touchpoints that matter when the customer interacts with the company, but it is the full journey of service delivery, service interruption or complaint handling that counts (Rawson, Duncan, & Jones, 2013). To improve the customer satisfaction, service providers must understand and get insight into this direct, personal and end-to-end interaction process that drives the customer satisfaction. Service providers can use new technologies and processes in making a personalized customer journey with contextual interaction based on where the customer is, in her or his journey. Hereby customers will stay because they benefit from the journey itself (Edelman & Singer, 2015). However, the interaction process between customer and service provider has increased in complexity due to the ability to interact via different channels and the influence the customer has in the service delivery process. More refined process analysis techniques are needed to improve the customer interaction process. Through process automation and digitization on the customer side, there is an enormous growth of data about both operational processes and customer actions. Process mining techniques allow service providers to extract knowledge from information systems that store process-related data (Van Der Aalst, 2016). These techniques provide ways to discover, monitor and improve processes. The combination of event data and business process models gives new opportunities for process-centric analytics (Van Der Aalst, 2011).

2 Research question and paper structure

In the IT research field, scholars have identified IT/business alignment as an important principle for the success of IT deployment and implementation. Compared to this, the research in this paper is driven by the need to improve the alignment between the business processes and the customer experience through getting insight into the interaction process by applying process mining. The objective of this study is to improve the customer experience of service delivery by using the available data in information systems of an

organization. For this a business customer experience alignment framework (BCX-framework) is developed to manage process mining analyses. The contribution of this paper is both practical and academic. For service providers, it gives a guideline for the alignment process between the business processes and the customer experience by applying process mining. The academic contribution is a new framework which integrates the service quality model (SERVQUAL) with the process mining model and the customer journey (mapping). Also, concepts out of the marketing research field (SERVQUAL model and customer journey mapping), and the data science research field (process mining) are connected.

The remainder of this paper is organized as follows. In the next section the research method used, design science research, is explained. Section 3 describes the theoretical background of the research. In section 4 the framework is presented and in section 5 it is applied to the case of a service delivery process in the Telecommunications industry. The paper ends with conclusions and suggestions for further research.

3 Research method

As part of the research a framework is developed. Therefore, a design science research method is followed based on Peffers's research methodology for information systems research (Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007). The steps defined by Peffers et al., are implemented as follows:

1. **Problem identification and motivation.** The problem motivating our research is how to avoid the commodity trap that results from services becoming increasingly similar and thus only competing on price.
2. **Define the objectives for a solution.** The objective of the framework is to support process mining analyses (using available data) in order to improve the service delivery process in such a way that it increases customer satisfaction.
3. **Design and development.** Based on extant literature we operationalized the concepts that are relevant to improving service delivery and related them to each other in a framework: customer satisfaction, service quality, customer journey, and process mining analysis.
4. **Demonstration.** We demonstrate the use of the framework by applying it to the service delivery process of a large Dutch telecommunication service provider. The telecommunication industry and especially the Dutch telecommunication industry is a saturated and highly competitive market (Albrecht, 2017), showing characteristics of high costs of attracting new customers and the commodity trap of price.
5. **Evaluation.** Though a first application of the framework showed its usefulness, real evaluation of the framework still has to be done.
6. **Communication.** Communication is done by presenting the results and publishing a research report and this paper.

4 Theoretical background

The key concepts of the BCX framework are customer satisfaction, service quality, customer journey and process mining.

Customer satisfaction is frequently measured by the Net Promoter Score (NPS); the willingness to promote a company by a customer is a strong indicator of loyalty (Reichheld, 2003). However, NPS is not the only indicator companies need to monitor and manage to realize success (Grisaffe, 2007). Therefore, the Net Promoter Score has evolved into the Net Promoter System (Reichheld & Markey, 2011). One of the basics of the system is the feedback that is given by the customer on individual events such as particular transactions or specific parts of the customer's experience. This granularity allows the company to improve specific parts of the customer journey or delivery aspects. NPS provides feedback on brand level or on transaction level e.g. delivery. These are 'the remember experience' or event measurements. NPS also provides feedback on interaction with the company (e.g. with employees). These are the in-the-moment experience or contact measurements. In the case study, the NPS event measurement service delivery is used.

Service quality is a major determinant of satisfaction and has a positive relationship with satisfaction in both the short and the long run (Oliver, 1993). A recent study confirms that this relationship also exists in the e-commerce industry (Ribbink, Van Riel, Liljander, & Streukens, 2004). Service quality and customer satisfaction are two independent but closely related constructs from a customer's point of view. When service quality increases this leads to an increased customer satisfaction (Sureshchandar, Rajendran, & Anantharaman, 2002). The service quality which the customer perceives is influenced by the technical aspect ("what" service is provided), the functional aspect ("how" the service is provided) and the image of the organization or brand (Grönroos, 1984). Originally the well-known SERVQUAL model distinguishes ten service quality determinants which later were captured in five generic service quality determinants: reliability, assurance, tangibles, empathy, and responsiveness (Parasuraman et al., 1991). Customers use these determinants as criteria in judging the service quality, reliability is the most critical determinant (Zeithaml, Parasuraman, & Berry, 1990). In research about satisfiers and dissatisfiers of perceived service quality by Johnston (1995), one of the conclusions was that responsiveness is a key component in providing satisfaction and that lack of it is a major source of dissatisfaction. Reliability is predominantly a source of dissatisfaction not of satisfaction (Johnston, 1995). To measure the performance of service, the SERVQUAL model uses the gap between the customer's expectation and customer's perceived experience of the service performance (Parasuraman, Zeithaml, & Berry, 1985). The SERVQUAL model enables to identify systematically service quality gaps between variables that influence the quality of service delivery from a customer point of view. Five quality gaps are identified: 1) incorrect perception, 2) incorrect specification, 3) incorrect delivery, 4) incorrect communication and 5) incorrect experience. The first four gaps refer to the organizational aspects of quality while gap 5 refers to the customer aspect of quality. In further research, the service quality model was elaborated in an

extended service quality model in which gap 5 was identified as a function of the first 4 gaps with a positive relation between the size of gap 5: customer based measure and the size of gap 1-4: service provider based measure (Parasuraman, Berry, & Zeithaml, 1991). In the framework, the service quality is presented as a function of the differences between expectations and performance along the five quality determinants.

Customer journey nowadays encompasses a myriad of touchpoints in multiple channels and media (Lemon & Verhoef, 2016). Norton & Pine (2013) define customer journey as “the sequence of events - whether designed or not - that customers go through to learn about, purchase and interact with company offerings - including commodities, goods, services or experiences”. The aim of customer journey design is “... to deliver value to the customer, profitability to the company and differentiation from the competition” (Norton & Pine, 2013, p.12).

There are various techniques to analyse customer journeys related to different fields and needs. Some techniques require manual labour by in-depth interviews, while other techniques require big-data and automated algorithms. Techniques for analysing customer journeys are often used to analyse and improve services from a customer point of view (Dunn & Davis, 2003; Lee & Karahasanović, 2013; Robertson, 2015; Schmidt-Subramanian, 2014). Several methods have been developed to analyse the interaction process between the customer and the service provider. The most common methods are the Brand Touch Wheel (Dunn & Davis, 2003), the customer journey canvas (Stickdorn & Schneider, 2010) and the customer journey map (Schmidt-Subramanian, 2014).

Customer journey mapping originated from the widely used service blueprint technique which applies a process map to show the service delivery process from a customer perspective (Shostack, 1987). From a customer point of view, all touchpoints from beginning to the end of the service delivery are described. A touchpoint is defined as “an instance or a potential point of communication or interaction between a customer and a service provider” (Halvorsrud, Lee, Haugstveit, & Følstad, 2014). The customer journey can depict the negative and positive touchpoints with the customer. This will give an emotion-curve through all customer interaction steps and enables improvement of the services. In this study, the service blueprint is used as a starting point and extended with the timeline of the customer journey map. The service blueprint consists of the following five components: customer actions, onstage/visible contact employee actions, backstage/invisible contact employee actions, support processes and physical evidence (Bitner, Ostrom, & Morgan, 2008). Service blueprint can be further extended by creating customer groups based on personas (Cooper, Reimann, & Cronin, 2007).

Process mining is a technique to extract knowledge from event logs that are derived from information systems (Van Der Aalst, et al., 2011). The advantage of mining processes from event logs is that there is no room for subjectivity because the process model is based on the process executions recorded in the event log. Process mining aims to bridge the gap between data-centric analysis techniques and model-based process analysis techniques. There are three basic process mining techniques: process discovery, conformance checking and process enhancement (Van Der Aalst, 2012). For analysis of

the interaction process in the case study as part of this research, process discovery techniques will be used (De Weerd, De Backer, Vanthienen, & Baesens, 2012). There are three key methodologies to support organizations with their execution of process mining projects: 1) the Process Diagnostic Method (PDM) (Bozkaya, Gabriels, & Van Der Werf, 2009), 2) the L* life-cycle model (Van Der Aalst, 2016) and the Process Mining Project Methodology (PM²) (Van Eck, Lu, Leemans, & Van Der Aalst, 2015). While PDM aims to quickly retrieve insights from event logs in the absence of domain knowledge, the L* life cycle methodology proposes a more profound step-wise approach to discover a control flow model which can be extended with insights from other process mining perspectives. A limitation of the L* life-cycle model is that it is primarily designed for the analysis of structured processes and aims at discovering a single integrated process model. The PM² methodology emphasizes the iterative character of process data analysis and states that both process models and analytical models can be generated from event data. Furthermore, it is suitable for the analysis of both structured and unstructured processes. Therefore, the PM² methodology is most suitable to be used in this study as part of the framework for analysing the interaction process. PM² is based on six stages: planning, extraction, data processing, mining and analysis, evaluation and process improvement. Stage 1 and 2 are needed for initialization of the project; stage 3, 4 and 5 are performed in one or more analysis iterations with specific research questions; if the findings are satisfactory they can be used in stage 6 for process improvement.

5 Business Customer eXperience alignment framework

The BCX alignment framework is developed based on the concepts of service quality, customer journey and process mining and gives guidelines for how to align business processes to touchpoints in a customer journey in order to improve the customer experience (Figure 1). The framework combines the perspectives of 1) *getting the right question*: examine the expectations of the customer, 2) *getting the right data*: extracting relevant data about the customer interaction process and 3) *getting the right analysis*: gaining insight into the perceived service during the interaction process. These perspectives, and with the use of process mining project methodology, guides the alignment of business processes and customer journey's in order to gain more customer satisfaction and loyalty. For the right question, the service quality determinants of the SERVQUAL model are used, to get insight in the satisfiers and dissatisfiers of the customer experience. For the right data, the five components of customer journey mapping are used, to get the right process and customer data. For the right analysis, process mining techniques are applied by performing the Process Mining Project Methodology (PM²).

Figure 7: The Business Customer eXperience alignment framework

Figure 2 shows the integrated model of the three concepts on which the BCX-framework is developed. According to the SERVQUAL model, the integrated model is based on the gap analysis between the customer expected and perceived service (gap 5). Including with the customer world, this is the customer view of the model. The size of the gap can be analysed with the customer journey data and depends on the nature of the organizational gaps which is the organizational view of the model.

Figure 8: Integrated model

6 Demonstration: application in a Telecommunication service provider

To test the applicability of the BCX framework, it was applied at a large Dutch telecommunication service provider with a market share of approximately 40% for fixed services. In the case study, the delivery process of internet services (internet, voice, and TV) via a fixed network is analysed. The service provider aims to be a customer-centric provider and strives to improve the NPS by getting more insight into the customer interaction process. The BCX framework was operationalized in three ways. First, existing customer satisfaction surveys were used to get insight into the service quality determinants (the right question) as well as the expected and perceived service. To this end, customer satisfaction survey results are related to the SERVQUAL determinants. Second, the required data sources are determined, based on the five service blue print components. Third, process mining techniques were applied with the PM² approach, and the open source ProM 6.7 toolkit.

7606 customer satisfaction surveys for the service delivery were collected in a period from 01-01-2016 till 28-03-2017. After data cleaning 5302 surveys appeared useful for further research. Not all cases could be matched with the customer interaction data, which decreased the total number of cases to 4065. Besides the NPS question, the customer satisfaction survey contained 12 questions: 6 customer journey event questions and 6 service delivery aspect questions with a 5-point Likert scale. To examine the relation between these 12 questions and the NPS recommendation score, a correlation analysis was performed with the Pearson's R method (Bryman & Bell, 2015). Table 1 shows the

outcomes of the comparison between those survey questions related to the 5 determinants of the SERVQUAL model (column 1 and 3). The number in parenthesis indicates the ranking of the correlation between the 12 survey questions and the NPS score (column 2).

Table 5: Relationship between service delivery aspects and SQ determinants

Survey questions	Correlation (Pearson's R)	SQ determinant
Service provider follow up promises	.622** (2)	Reliability
Progress information	.599** (3)	Responsiveness
Service provider took responsibility	.649** (1)	Assurance
Call centre is easy to reach	.501** (11)	Empathy
Information clear and understandable	.579** (4)	Tangibles

Out of the 12 survey questions, the questions with the highest correlation with the NPS score were service delivery aspects questions. This confirms that the service quality determinants are indeed important for customer satisfaction of the telecom industry. Besides the correlation analysis, a regression analysis was performed using the Enter and Stepwise regression method for priority analysis. The result is depicted in Figure 3, where the relation between the satisfaction level, based on the Likert score (x-axis), and the degree of importance with the NPS recommendation score (y-axis) of all 12 survey questions is shown.

The higher the degree of importance with NPS and the lower the satisfaction level, the higher the priority for improvement. A remark must be made about the items 'period between request and delivery' and 'pace from order to delivery'. Both have a low degree of importance and are not significant. However, they are highly correlated (.800**). This means that in regression analysis these two items interfere with each other, which leads to a lower score.

Figure 9: Priority analysis

Figure 3 shows that ‘service provider took responsibility’ is a candidate for improvement through a low satisfaction level and a high degree of importance with NPS. Therefore, this topic was further analysed by investigating the degree of interaction between the service provider and the customer.

For the case study, the interaction data was collected from twelve different systems. The basis was formed by the customer satisfaction survey data and enriched with data for the customer journey, i.e. order process, shop & web-site visits, call centre, engineer, marketing communications and customer profile information. The customer journey was made more specific, by adding the attributes of customer profile, e.g. singles or families, and the customer situation, e.g. new or moving internet line. A query was developed for creating the event log for process mining. Basic process mining techniques such as filtering, process discovery and log visualizer were used. For the above mentioned topic ‘service provider took responsibility’, the event log contained 1373 cases with 1020 variants, and 39.676 events and divided into 584 detractors cases, with a NPS score of 1-6 and 789 promoter cases with a NPS score of 9-10. Several explorative analysis iterations

have been performed, each iteration leading to more detailed questions that were investigated in additional iterations.

Figure 10: Interaction process model

For illustration purposes, Figure 4 shows the process model created with the ProM Plug-in Inductive Visual Miner. The aim of this analysis was to investigate whether a difference exists in interaction process and the degree of interactions between detractors and promoters.

Table 6: Detail call information detractors and promoters

event	sub-event	Detractor (584)		Promoter (789)	
		number of events	Average service time	number of events	Average service time
call	Change	78	00:10:05	56	00:07:42
call	Churn	16	00:12:00	18	00:03:15
call	Complaint	328	00:14:20	200	00:14:41
call	Orientation	52	00:05:09	52	00:06:30
call	Sales	86	00:11:11	78	00:10:09
call	Question	1044	00:13:12	752	00:12:13

Moreover, as can be noticed in Figure 4, the phone calls of detractors take place at the beginning of the delivery process, while the calls of promoters take place after installation. Furthermore, the analysis showed that detractors place more calls than promoters, i.e. 1604 calls and 1156 calls as shown in Table 2). In this case study, process mining gave more insight into the interaction process and the moment of when the events occur in the journey.

7 Conclusions and further research

The objective of this research was to improve the service delivery process in such a way that it increases the customer experience and makes optimal use of available data. To this

end, a Business Customer eXperience alignment framework was developed, by combining the concepts of service quality, customer journey and process mining techniques. To test the usability of the framework it was applied in a case study to a telecommunication service provider. The case study shows that the introduction of customer journey data analysis, using process mining techniques, leads to an iterative cycle of analysis and refined question formulation. This cycle stimulates the generation of new questions leading to deeper insights.

Based on this study we conclude that the use of process mining provides many possibilities to explore and analyse processes. Process mining techniques are an add-on to existing analysis techniques and can be used to gain more insight into processes by creating various views on the customer journey with data.

To improve the framework directions of further research are provided by the three perspectives: *getting the right question*, *getting the right data* and *getting the right analysis*. For *getting the right question*, future work could focus on the exploration of the satisfiers and dissatisfiers of the customer journey related to the SERVQUAL determinants and extend the NPS measurement of the service delivery with the NPS contact measurement of the interaction moment, e.g. call or engineer visit. For *getting the right data*, future work could focus on extending the customer journey of delivery with data of the orientation phase prior the delivery and add journeys that are running at the same time, e.g. a delivery journey and a malfunction of another service of the customer. For *getting the right analysis*, future work could focus on developing process mining techniques that support analysis of processes with high variance and multiple journeys in parallel.

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