Review article

Digitization and Lean Customer Experience Management: success factors and conditions, pitfalls and failures

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A B S T R A C T

In recent years, the use of Lean Customer Experience Management (CEM) by companies and practitioners has been increasingly encountered, but with abstracted and incomprehensible approaches. Lean CEM is hardly rooted in academic literature, providing an excellent opportunity to further investigate the term's theoretical and practical validity. The "Lean CEM", principles, best practices, success factors and conditions, pitfalls and failures among Digitization, enhanced by Artificial Intelligence (AI), Lean Management and CEM are discussed. This work is a first step of a design science research, consisting of literature and practice review and provides insights for design propositions for application instructions for a Digitized Lean CEM.

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1. Introduction

Over the last years, the terms "Lean Customer Experience" and "Lean Customer Experience Management" are used in literature and online web resources by companies and practitioners. The initial research question is what they exactly entail. A first online search on the terms "Lean Customer Experience Management" (Lean CEM) and "Lean Customer Experience" (Lean CX) yield fuzzy results, because there are no clear definitions of the terms and how to apply them, and whether they constitute a desirable management style, a technique, a philosophy, or any other alternative. Lean CEM, according to the literature review, is an approach, a technique, a principle, a collaboration or a combination between Lean Thinking and Customer Experience (CX), a new concept, a philosophy, an application, a model, or an idea. Is Lean CEM one of those or all of them or something else?

The cited in this paper publications refer to the creation of a terrific CX or Customer Journey through the implementation of Lean principles, as mentioned in Lean Thinking by J. P. Womack and D. T. Jones, in conjunction with Digitization, and occasionally with Artificial Intelligence (AI). AI is defined as "a system's ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation" [1]. A machine must be able to

transfer and apply learning in another context in order to be considered Artificial Intelligent [2].

This lack of a universally accepted and unequivocal definition provides a great opportunity for design science research [3], which will produce guidelines or a protocol for a successful implementation of Lean CEM. This paper aims at providing a start for this research in the manner of a literature review in order to find the necessary input design propositions [4]. This will be used for the final design: application instructions and procedures for Lean CEM. Section 2 addresses the research methodology. Sections 3 elaborates on defining the collaboration between Digitization and Lean Management, and between Digitization and CEM, respectively, where findings from Internet research, literature review and authors' personal experience are included. Moreover, the section introduces the "Lean CEM", discovers unresearched areas and proposes principles and best practices for "Lean CEM". A discussion on how AI can enhance a Digitized Lean CEM is initiated. Section 4 includes the conclusion and future research.

2. Research methodology

This work is a first step of a design science research, consisting of literature and practice review and provides insights for design propositions for application instructions for a Digitized Lean CEM. This research is expanded in the field of practice, because of the minor academic research. It is a comparison between academics and practitioners. The results are Internet research findings from web resources, namely websites, online articles, online newspapers and literature review findings from scientific journals, books and conference proceedings. The Internet research was conducted through the Google search engine and the academic literature review utilized Google Scholars,

both from an IP (Internet Protocol) address in the Netherlands between February 2020 and May 2020. The findings could be processed in the future to design propositions using the CIMO-logic (Context-Intervention-Mechanism-Outcomes) [5].

3. Results and discussions

3.1 Digitization (AI) and Lean Management collaboration

This section discusses the collaboration between Digitization - enhanced by AI - and Lean Management. Similar discussion was conducted by other researchers in the past. A library method was developed to evaluate the collaboration between technologies of Industry 4.0 and principles of Lean Management [6]. Digitization and AI substantiate the technologies of Industry 4.0. This paper considers Industry 4.0 as part of Digitization.

3.1.1 Digitization (AI) and Lean Management: success factors and conditions

How Industry 4.0, AI and Digitization affect the design and implementation of Lean Value Streams is not widely researched yet and little empirical evidence is found in the literature, see Table 1. Process improvement can be achieved by the integration of Lean Management and Digitization even before the pursuit of Industry 4.0 [7]. According to the literature, most of the findings refer to industrial appliance of Digitization in Lean Organizations [8] and less to service, administration or CEM. This work reveals the opposite for the past 1.5 years. The literature review was conducted from January 2019 till May 2020 and found six types of successful collaboration between Digitization and Lean Management. All find-

Table 1. Clusters by Keywords

References grouped by collaboration type		
Collaboration Type	Literature Review – Academics	Internet Research – Practitioners
1. AI makes Lean Six Sigma tools smart.	[9], [10], [11]	
2. AI to realize Industry 4.0.	[9], [12], [13], [14]	[15]
3. AI and Lean Management as two different methods to improve business.	[16], [17], [18], [20]	[19], [21]
4. Digitization as tool for Lean Administration transformation.	[22], [24], [25], [29], [33], [34], [35]	[23], [26], [27], [28], [30], [31], [32]
5. AI as a technology for Control in the DMAIC method (Define, Measure, Analyze, Improve, Control).	[37], [38]	
6. Lean principles and philosophy for AI tools development.	[42], [43], [44]	[41]

ings are presented in Table 1 and grouped into the six collaboration types.

Although the work [36] mentions both terms, a collaboration is not identified. Therefore, this reference is not included in the findings. Another paper mentions "Lean Manufacturing was born from the idea of controlling production through the computer" [39], which is highly controversial to the Toyota Production System (TPS), where Kanban was introduced in 1953 [40], a time when microprocessors and computers, as they are known now, were used in manufacturing later in 1970s. So, Kanban was used before controlling production through the computer. Therefore, this reference is not included in the findings in Table 1.

3.1.2 Digitization (AI) and Lean Management: pitfalls and failures

Since it was puzzling to find relevant references in literature review to cover this topic, the following pitfalls and failures derive from personal observations and experience. A common mistake, which could happen during improvement activities and especially implementing Lean Management, is the Suboptimization. The scope of improvement activities should be holistic from the beginning in order to "seeing the whole." Focusing on one part of a system or a process may improve and optimize only this part and damage the whole system.

Another condition of unsuccessfulness is to digitize an ineffective, inefficient, and not customer-oriented system or process [45]. Therefore, Lean Management should be implemented prior to Digitization, improve first and then digitize.

The last condition is when Top Management is not involved and committed to implement any type of collaboration between Digitization (AI) and Lean Management. This is also known not only in Lean Management, but also in Change Management, where Top Management influences the outcome of such activities. Obviously, more pitfalls and failures could exist, and consequently, further research is needed.

3.2 Digitization (AI) and CEM collaboration

Hafsi and Assar [46] identified four major groups of how Digitization can transform customer experience: understanding the customer, enabling selling activities, managing customer touchpoints, and integrating digital technologies, which enable customer interaction activities. Therefore, the systematic man-

agement of Digitization projects through enterprise architecture modeling (EAM) can potentially support customer experience improvement projects.

The influence of sales digitization technologies, which include Digitization and AI, is likely to be more significant and more far reaching than previous sales technologies, because of the possibility to process a lot of dynamic customer data [47]. People in marketing or customer service deal with a large amount of data in order to interact in a personal way with customers [48]. However, they cannot always instantly access the right information without any support of automated, digitized tools or even AI; the volume of data captured and used render databases like traditional Customer Relationship Management (CRM) systems. AI has the powerful ability to acquire and analyze large volumes of data and provide decisions for action [48][49][50]. So, in the future, AI appears likely to influence marketing strategies, including business models, sales processes, and customer service options, as well as customer behaviors [50][51] through:

- Recommendation engines to select content based on an analysis of past behavior of users or similar users, better predicting the next best and personalized offer to show a consumer [52][53] thereby streamlining marketing efforts and reducing costs of marketing research and general advertising [54][55].

- Content creation engines, automated customer service systems, and chatbots using natural language processing to perform contextual searches, streamline processes, and answer questions.

- Speech recognition to predict the most likely words someone says.

- Facial recognition, which recognizes or identifies a person, in order to personalize the interaction.

AI is allowing organizations to improve the productivity and value of customers' interaction with the organization [56], to "deliver an ad experience that is more personalized for each user, shapes the customer journey, influences purchasing decisions, and builds brand loyalty" [53][57] and to create a long-lasting relationship with the brand [58]. When a company succeeds in making customers feel valued, it is a small step for customers to be engaged in product or service co-creation [59].

3.2.1 Digitization (AI) and CEM: success factors and conditions

The success factors and conditions to choose and adapt a digitization strategy with the application of AI, which can successfully improve CX can be categorized in four categories. First there is the economic category, which requires investments in digitization and AI be budgeted as much for integration and adoption as for technology [60] and offer a benefit economically [61]. Therefore, companies must target the efforts and investments carefully [62], looking at not only the technological and organizational aspects of the investments, but also at the expected benefits in terms of CX improvements.

Next, there is the technological category. Before embarking on an AI initiative, companies must understand, which technologies perform what types of tasks, and the strengths and limitations of each [63], assessing the capability to interact with the customer before deployment [60][64], by starting small with one or a few pilots, before expanding [60]. One should also investigate the condition, whether systems are ready to process and deliver the required data [61]. Relevant data must be available and reliable to deliver personalized messages in the right channel at the right moment [49][65].

A third category consists of organizational conditions [49][60][61][66], like top management commitment [51][61][64], a cross-functional approach [60][61], where business and operational people work side by side with analytics experts. When development teams involve end users in the design of applications, the chances of adoption increase dramatically [60]. To ensure the adoption of AI, companies need to educate everyone, from the top leaders down [49][60] to master the required new skills for AI [67].

The final category focuses on customer-directed conditions, which can also be categorized as "understanding the customer better" [64]. In order to improve the customer experience, it is necessary to consider customer's perspective. It is recommended to make the customer a stakeholder to participate by providing inputs and receiving benefits. But, from the customer's point of view, the technology is generally not apparent and obvious. Digital transparency is only one aspect of the transparency. The challenges are to seek consensus in a climate of renewed trust, to share value with customers in a better way, and to think about long-term relationships rather than short-term transactions. It is also challenging to be proactive and flexible with customers, to establish equality between partners, respect for promises, the morality of duty and aspirations, equity, trust, responsibility, and commitment of multiple partners in relational exchanges [50]. Understanding and mapping Customer Journey by collecting data will make it possible to evaluate and optimize systems and touchpoints [64]. Design skills must make the different physical and digital touchpoints homogeneous in order to facilitate the customer's transition from one touchpoint to another [67], reduce the irritability caused by the multiplicity of touchpoints throughout the customer's decision-making process, create fluidity between the touchpoints [68], and increase the level of customer satisfaction [69] [70].

Finally, companies create a learning culture environment and infrastructure to learn continuously from the customer in order to provide a better experience to the customer. Using inferred data from only current activities for future behavior may yield low accuracy in this complex interaction of customers and information, therefore yielding low Return On Investment (ROI) in the digital customer experience transformation [64].

3.2.2 Digitization (AI) and CEM: pitfalls and failures

Despite the promise of AI to improve CX, many organizations' efforts with it fall short. According to a study, which surveyed thousands of executives about how companies use and organize AI and advanced analytics, only 8% of firms engage in all core practices and support widespread adoption [60]. Four studies [60] [63] [64][71] provide the most common reasons for failing in digitization with AI. Most of these failures in adopting AI are caused by failing to meet one or more conditions for success, mentioned above. One of the main problems is the lots of debate about the "best organizational model." Whether to centralize or decentralize depends on a firm's individual situation [60]. Deciding to get a few projects up and running, they begin investing millions in data infrastructure, AI software tools, data expertise, and model development. Some of the pilots manage to collect small gains in pockets of organizations. Also, firms struggle to move from the pilots to companywide programs—and from a focus on discrete business problems, such as improved customer segmentation, to big business challenges, like optimizing the entire Customer Journey [60].

Another study encountered several organizations, which wasted time and financial resources pursuing the wrong technology for the job at hand. Acquiring this understanding for the right technology requires

ongoing research and education, usually within IT or an innovation group [63].

Collecting and using reliable data is a problem a study survey discovered about the limited effort in grasping the fundamental or the core element of the digital transformation which is: "Understanding the customer" [64]. Gathering data of customer around the product, online activities, or related services do not give a company comprehensive information or profile about the customer [45]. Customers embark and disembark easily at any point of Customer Journey, because they have access to information and multiple choices at any stage of the journey [64].

But, nevertheless, most literature highlights predominantly positive consequences of AI, without detailing the widespread and justifiable concerns associated with AI's use. However, AI might not deliver on all AI's promises, due to the challenges related to data privacy, ethics, and job security [50] [51].

Cognitive technologies may create unemployment, but according to a study the majority of workers' jobs are safe [63]. The theory asserts job replacements by AI fundamentally at the "lower" (easier for AI) intelligence task, rather than the job level [72]. On the other hand, another study [72] asserts AI's capability to perform even the intuitive and empathetic tasks, which enables innovative ways of human–machine integration for providing service, which also may fundamentally threat human employment [72]. The problem of job reduction fears has not been decided on yet.

Companies should develop in line with the technological, social, and environmental developments, which have been highlighted, clear rules and strategies – such as transparency – to better reconcile business performance with respect for customers. A customer relationship manager could investigate the consequences of actions and estimate any positive (satisfaction, well-being, etc.) and negative (frustrations, overconsumption, environmental impact, etc.) externalities. An annual reporting would make it possible to draw up a balance sheet and see how much the company has been able to improve the overall management of the customers. In other words, customer relationship management must now move beyond the logic of optimizing customer processes (acquisition, satisfaction, retention, enhancement) to explore new avenues, which will allow it to reinvent itself [50].

3.3 Lean Management and CEM collaboration

3.3.1 Lean CEM: success factors and conditions

How is Lean CEM already conceived? Lean CEM is the approach of identifying non-value added work between "Breakpoints" or touchpoints in a Customer Journey [73]. Breakpoint implies a point inside a time duration, where Customer Journey is broken. But in reality, Customer Journey continues between the touchpoints [74], namely "In-Between Touchpoint" in a "Total Customer Experience" [75]. Lean CEM is mentioned by practitioners with a non-standard way as the Internet research shows. More practitioners' than academics' references were found, but still not enough to be statistically significant, due to the small number of references, see Table 2. This situation can be a research opportunity for the academia to open a discussion and to contribute to the creation of the Lean CEM.

Due to the previous not statistically significant

Table 2. References on "Lean Customer Experience Management" or "LCXM"

Research findings	References on Lean Customer Experience Management or LCXM
Literature Review – Academics	1. Approach and technique [73]. 2. Customer - oriented perfection and Customer Satisfaction can be created and developed continuously [76].
Internet Research – Practitioners	1. LCXM is a collaboration and a new concept. AI is utilized, too [77]. 2. Philosophy based on Lean tools and Lean principles, which affect Customer [78]. 3. Lean and CEM as training courses [79] [80] [81]. 4. Business event for Lean CEM [82]. 5. Lean applied to CEM [83].

findings, the investigation was expanded by using the keyword "Lean Customer Experience". The findings from practitioners are numerous with more details than those from academics, passing the race baton to practitioners. Practitioners are way ahead with Lean CX presenting 21 references instead of only 2 references from academics, see Table 3. There is a lack of a universally accepted definition and framework on what Lean CX is or could achieve, providing a great opportunity for research.

CEM is narrowly focused only on the company's performance during touchpoints with the customer and seems inadequate because the Customer Journey includes more. It consists of everything from the existence of customer's needs till customer's satisfaction. The Customer Journey is the whole time including not only the touchpoints, but also the In-between touchpoints, speaking for a Total CEM (TCEM) or Total CX (TCX). This whole time is called Lead Time in Lean Six Sigma (LSS) methodology – and in Lean Management. Lean Customer Journey, Lean TCEM or Lean TCX could be a method to continuously improving and designing Customer Journey, TCEM or TCX. The method can be based on the implementation of LSS methodology for the whole Customer Journey, including touchpoints, administration, office, back-office, and operational processes, where value is created and influences customer's satisfaction. In this paper, the term "Lean CEM" refers also to "Lean Customer Journey", "Lean CX", "Lean TCX" or "Lean TCEM", as the terms are used by other authors for the same purpose denoting the same meaning.

The sequential principles for Lean CEM will be the same principles with Lean Thinking [108] and advanced by the Customer Journey Map (CJM) [109] [110], CX – TCX and CEM – TCEM [111]:

(1) Specify Value for the customer in the whole Customer Journey.

(2) Identify the Value Stream in the whole Customer Journey.

(3) Establish data Flow in the whole Customer Journey.

(4) Establish data Pull in the whole Customer Journey.

(5) Seek for Perfection continually or continuously for a flawless, joyful, and delightful holistic Customer Journey.

Best practices for Lean CEM implementation are proposed in Figure 1 [111].

3.3.2 Lean CEM: pitfalls and failures

After defining Lean CEM, principles and best practices, the following non-exhaustive pitfalls and failures are found. They are based on author's observations and personal experience, due to the lack of references in the literature. Suboptimization, lack of Top Management's involvement and commitment,

Table 3. References on "Lean Customer Experience" or "Lean CX"

Research findings	References on Lean Customer Experience or Lean CX
Literature Review – Academics	1. Application of Lean Management [84] [85]. 2. Lean as a tool to design Service and CX [86].
Internet Research – Practitioners	1. The term is mentioned [87]. 2. Application of Lean principles [88]. 3. Methodology to rearrange resources and automate processes [89]. 4. Step by step framework for white-collar businesses [90]. 5. Very useful and promising combination [91]. 6. Lean Management and CX are two worlds and a tradeoff is needed [92]. 7. Application of "Lean 6 Sigma" to improve services [93]. 8. Optimization to improve contact center [94]. 9. Roadmap to achieve an End-to-End vision of the Customer Journey [95]. 10. Training course on combining Lean methodology and UX [96]. 11. "Lean Customer Experience platform" as an IT tool [97]. 12. More references without technical details [98] [99] [100] [101] [102] [103] [104] [105] [106] [107]

Qualifications, skills, knowledge, and experience of the resources, who implement Lean CEM, can influence Lean CEM's outcome.

3.4 Digitization (AI) and Lean CEM collaboration

After analyzing the collaboration between Digitization (AI) and Lean Management, and the collaboration between Digitization and CEM, a discussion on Digitization (AI) and Lean CEM follows. The initial intention is to analyze the collaboration between Digitization (AI) and Lean CEM.

3.4.1 Digitization (AI) and Lean CEM: success factors and conditions

In conclusion, Collaboration Types 1, 2, 4 and 5 mentioned in section 3.1.1, together with the conditions from section 3.2.1 structure the conditions for successful collaboration between Digitization (AI) and Lean CEM [111]:

(1) LSS methodology tools are used by the best practices for Lean CEM, and AI makes those tools smart.

(2) Industry 4.0 is referred to production process, which influences the lead time in the Customer Journey, and AI realizes Industry 4.0.

(3) Administration processes need to be transformed into Lean Administration processes and Digitization is a tool for this transformation.

(4) After designing and creating a Lean Customer Journey, controlling, and managing the journey is the next step. AI as a technology for Control in the DMAIC method is another successful Condition, see number 19 of best practices for Lean CEM.

(5) Review investments for Digitization technologies and AI for any benefits in terms of customer experience improvement.

(6) Review systems whether they are ready to process and deliver the required data in the Customer Journey and improve them inherently. Data must be available and reliable to deliver personalized content and processes to the customer.

(7) Avoid a fully engineered tool with all capabilities but follow a pilot-approach of small tools easy to complete.

(8) Take a cross-functional approach, with business, operational, analytical people and end users (in some cases the customer) working together at broad organizational issues.

(9) Educate and train all employees, who are involved.

(10) Be aware of a need for cultural change in the organization.

(11) Be transparent to customers and involve them to enhance adoption and use.

(12) Use customer data to personalize offerings, predict future behavior and improve the customer journey for every touchpoint.

Best practices for Lean CEM implementation

1) Review the goals for the product or service.
2) Gather Voice of Customer (VOC) and research data, by customer interviews, contextual inquiry, customer surveys, customer support logs, web analytics, social media and competitive intelligence.
3) Map the Customer Journey as a timeline, where Awareness, Research, Options, Delivery and Follow up categories are illustrated and analyzed. Ordering and Production are captured by the Delivery part.
4) Analyze the previous categories into detailed tasks/steps, which are performed by the customer or needed to be performed.
5) List and illustrate customer touchpoints and the channels where they occur, for example pay bill and channels are pay via mail, pay online or pay in person.
6) Empathy map, create it in each touchpoint, depicts the various facets of a persona in a given scenario, how does a customer feel? What a customer says, thinks, does, feels? Find the root causes of the patterns to understand the customer.
7) Illustrate the Customer Journey Map as a Value Steam Map (VSM), where tasks / steps are shown.
8) Identify value and non value-added steps.
9) Capture, calculate and illustrate the time spent in each value and non value-added steps.
10) Identify and illustrate bottlenecks and other types of waste on the VSM according to Lean Management.

11) Identify and illustrate where the pains - Empathy map - and where the negative emotions are or can be created in the whole Customer Journey. Failure Modes and Effects Analysis (FMEA) from LSS methodology can also be used to identify what can go wrong.
12) Brainstorm to come up with KAIZEN ideas and capture improvement opportunities. The goal is to eliminate or reduce the aforementioned in points 8-11 everywhere in Customer Journey.
13) Affinity diagram to organize, group and score KAIZEN ideas by cost benefit, PICK-Chart and other prioritization analysis and techniques.
14) Design the Future Customer Journey, gather all effective, efficient and applicable ideas and get creative.
15) Refine the Customer Journey by establishing flow, so the whole Customer Journey flows in time without interruptions, errors, negative emotions or pains.
16) Refine the Customer Journey by establishing pull, so the whole Customer Journey is smoothly levelled, not blocked, stuck or hindered. Kanban Board tool for process management can be used.
17) Digitize where possible.
18) Share with zeal.
19) Perfection through a sustainable continual or continuous improvement culture and management system. Methods like DMAIC; Plan, Do, Check, Act/Adjust (PDCA), and Process Management and Control can be used.

Figure 1. Best practices for Lean CEM implementation

3.4.2 Digitization (AI) and Lean CEM: pitfalls and failures

Non-exhaustive pitfalls and failures for Digitization (AI) and Lean CEM are concluded from sections 3.1.2, 3.2.2 and 3.3.2 [111]:

(1) Wrong organizational model for where AI and analytics capabilities should reside inside the organization.

(2) Wrong technology to digitize customer experience.

(3) Human bias and lack of clean data to improve customer experience.

(4) Failure to consider data privacy, integrity, ethics, and job security.

(5) Suboptimization of the Customer Journey during the Lean CEM's best practices implementation. "Seeing the whole" is needed as a strategy when implement the Lean CEM's best practices.

(6) Digitize a non-Lean Customer Journey. Digitization (AI) and Lean CEM should transform Customer Journey together.

(7) Lack of Top Management involvement and commitment is another important condition.

(8) Under-qualified and non-experienced resources, who implement Digitization (AI) and Lean CEM, is another condition for unsuccessful collaboration.

4. Conclusion and future research

In the end, it is found that Lean CEM can be a promising management concept, which requires a thoughtful and thorough approach in ways of a protocol or guide. Design propositions can be formulated for the design of this protocol or guide, which will be the following research step. Digitization, enhanced by AI, is a tool and Lean Management is a Philosophy with principles and tools, although some practitioners may disagree. Digitization and AI can enhance Lean Management tools to design, control and manage a process or a system. The success factors and conditions as well pitfalls and failures for collaborations between Digitization (AI) and Lean Management, Digitization (AI) and CEM, and Digitization (AI) and Lean CEM through a literature review, Internet research, author's observations, and personal experience are addressed. The research activity will continue with observations in order to understand as many conditions as possible. The goal is to create the framework for a successful Digitization (AI) and Lean CEM collaboration and find a way to measure and control this collaboration through a success measurement model.

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