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The Repercussions of the Digital Twin in the Automotive Industry on the New Marketing Logic

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Abstract

Rapid development of virtual and data acquisition technology makes Digital Twin Technology (DT) one of the fundamental areas of research, while DT is one of the most promissory developments for the achievement of Industry 4.0. 48% percent of organisations implementing the Internet of Things are already using DT or plan to use DT in 2020. The global market for DT is expected to grow by 38 percent annually, reaching $16 billion by 2023. In addition, the number of participating organisations using digital twins is expected to triple by 2022. DTs are characterised by the integration between physical and virtual spaces. The driving idea for DT is to develop, test and build our devices in a virtual environment. The objective of this paper is to study the impact of DT in the automotive industry on the new marketing logic. This paper outlines the current challenges and possible directions for the future DT in marketing. This paper will be helpful for managers in the industry to use the advantages and potentials of DT.

Keywords: digital twin, automotive, marketing, industry 4.0

JEL-Classification: M31

Introduction

1 x 1074 is the variance of possible configuration for a Mercedes E-Class in 2020. In order to market these deviations, a model of exchange is inherited. In the period before 1900, a dominant logic was used, based on the exchange of industrial goods. The focus was on material resources, embedded values and transactions. Despite this, new horizons have emerged in recent decades, focusing on intangible resources, the common creation of assets and mutual relations. A new dominant marketing logic has emerged in the 21st century, where the delivery of services rather than goods is

crucial to economic interchange (Vargo & Lusch, 2004). This new logic is called Service Dominant (S-D) Logic.

It was designed by Stephen Vargo and Robert Lusch and first published in 2004 in the Journal of Marketing under the title "Evolving to a New Dominant Logic for Marketing". To understand S-D Logic, the essay follows a simple example: The car manufacturer does not sell a product, but provides a service through the product, which the customer pays for in return by providing money. The aim of this essay is to review the connection of the digital twin (DT) to the article *"Evolving to a New Dominant Logic for Marketing"* (Vargo & Lusch, 2004). In addition to the scientific examination of DT, a connection to the new dominance logic is being prepared, which is intended to show DT's influence on marketing. To this end, the effects, impact and relevance of DT will be analysed.

Digital Twin - Theory of digital transformation and state-of-the-art

The digital transformation is becoming the most important topic for the industry. Companies that are unable to adapt to the digital world will undoubtedly fall victim to *"digital Darwinism"*. Established companies will disappear and only the most adaptable companies that respond to technological trends will survive. (Ismail, Khater, & Zaki, 2017; Schwartz, 2001).

The digital transformation requires an organisation to develop a wide range of skills that vary in importance depending on the business context and specific organisational needs. (Gonçalves dos Reis, Melao, Amorim, & Matos, 2018). McDonald and Rowsell-Jones depict that *"[…] Digital Transformation goes beyond merely digitizing resources and results in value and revenues being created from digital assets"* (McDonald & Rowsell-Jones, 2012). Westerman et al. recognized "*Digital Transformation […] as the use of technology to radically improve performance or reach of enterprises"* (Westerman, Calméjane, Bonnet, Ferraris, & McAfee, 2011).

Stolterman and Fors defined *"Digital Transformation [as] the changes that digital technology causes or influences in all aspects of human life"* (Stolterman & Fors, 2004). The digital transformation is even changing the value creation of industries where value is created solely through physical materiality, most visibly in the automotive industry (Yoo, Henfridsson, & Lyytinen, 2010). Digital innovations such as self-propelled cars, connectivity and large amounts of data are revolutionising the automotive industry (Riasanow, Galic, & Böhm, 2017).

Over the last decades, simulation has developed from a technology largely restricted to computer experts and mathematicians to a standard tool that is used by engineers every day to answer a wide range of design and engineering questions. Individual application simulation has been limited by experts, e.g. the mechanics in the 1960s, to very specific topics. Since 2015, DT simulation has been a core functionality along the entire life cycle, e.g. supporting operation and service with direct links to operating data (Boschert & Rosen, 2016).

"The vision of the Digital Twin itself refers to a comprehensive physical and functional description of a component, product or system, which includes more or less all information which could be useful in all - the current and subsequent - lifecycle phases" (Boschert & Rosen, 2016).

With the rapidly developing virtual and data acquisition technology, DT technology has emerged as one of the most significant research areas and one of the core competencies for the realisation of Industry 4.0. For example, 48% of organisations implementing the Internet of Things are already using DT or planning to do so by 2020. The global market for DT is expected to grow by 38% annually, reaching $16 billion by 2023. In addition, the number of participating organisations using DTs will triple by 2022 (Boschert & Rosen, 2016).

Hence, digital transformation and digital twin offer the possibility to support the new dominant logic and to provide digital services through IoT, large-scale data analysis and AI. The relevance of the article can be demonstrated by Mercedes-Benz AG's vision of the transformation from car manufacturer to mobility service provider (Mercedes-Benz AG, 2015).

New dominant logic – Theory and current state of affairs

The S-D logic promotes a perspective from which services are the fundamental basis of economic trade and postulates a goods-dominant logic (G-D logic) as a counter-image. According to G-D logic, companies produce units of goods. Value is bound and destroyed by consumption. From the perspective of S-D logic, goods only serve as assets for the transport of services, which are provided by applying the goods and thereby develop their value. A distinction is made between the exchange value and the utility value, which is determined by the customer. Accordingly, value is no longer created solely from within the company, but always together with the customer (co-creation).

"Marketing thought leaders are moving away from tangible output with embedded value, where the focus was on activities that were focused on discrete or static transactions. In turn, they are moving towards dynamic exchange relationships involving the execution of processes and the sharing of skills and/or services where value is created together with the consumer (Vargo & Lusch, 2004). In 2004, the focus is shifting away from Goods-Centered Model of Exchange (4P), towards Service-Centered Model of Exchange (8P), such as skills, information, and knowledge, and towards interactivity and connectivity and ongoing relationships (Vargo & Lusch, 2004). Table 1 summarize the fundamental premises of the article.

Table 1: Fundamental premises - 8P Method

FPs	Foundational premise	Comment
FP 1	Service is the fundamental basis of exchange	The application of the operant resources, the service, as defined in the S-D logic, is the basis for any interchange. Service is substituted for service.

FP 2	Indirect exchange masks the fundamental unit of exchange	Since services are rendered through complex combinations of goods, money and institutions, the service base of exchange is not always evident.
FP 3	Goods Are Distribution Mechanisms for Service Provision	Goods (both durable and non-durable) derive their value through use – the service they provide.
FP 4	Knowledge Is the Fundamental Source of Competitive Advantage	The capacity for comparison to bring about desired changes fuels a competitive environment.
FP 5	All Economies Are Services Economies	Service is becoming clearer as a result of increasing specialisation and externalisation.
FP 6	The Customer Is Always a Co-producer	Implies value creation is interactional.
FP 7	The Enterprise Can Only Make Value Propositions	Companies can offer their applied resources to add value and, after the acceptance of value propositions, jointly (interactively) generate value, but they cannot independently provide and/or deliver value.
FP 8	Service-Centered View is Customer Oriented	Since service is understood and shaped in terms of customer-determined benefits, it is by nature customer-oriented and relationship-oriented

Source: Own figure, modified and derived from relationships (Vargo & Lusch, 2004)

In Table 2 Vargo and Lutsch added two new perspectives in 2008 (Vargo & Lusch, 2008):

Table 2: Fundamental premises – 8P + 2P Method

FP 9	All social and economic actors are resource integrators	Organisations are in place to incorporate micro-specialised skills and convert them into complex services in response to market requirements.
FP 10	Value is always uniquely and phenomenological determined by the beneficiary.	Value is idiosyncratic, experience-based, contextual and meaning-filled.

Source: Own figure, modified and derived from 2008 (Vargo & Lusch, 2008)

Digital Twin - Benefit and use case for the new dominant logic

Due to the change from a goods-centred to a service-centred model, the creation of DT's real products leads to continuous customer loyalty. The DT is not a mere depiction, but rather an evolving digital signature, reinforced by historical, current and projective patterns of physical object behaviour that create new levels of value.

Digital twins measure practically everything, from operating performance, temperatures and heat generation to wear and tear. By assessing real-time data from their assets and applying machine learning techniques, the industry can collaborate with their customers to anticipate required maintenance, reduce unplanned downtime and schedule profitable improvements (Hackworth, 2019). The

importance and benefits of the digital twin for the customer is are listed below (Murphy, 2018):

- Lower maintenance costs by predicting maintenance issues before breakdowns occur,
- Improved customer service as customers can remotely configuring customized products and
- Improved product quality, and enhanced insight into the performance of products.

1 x 1074 is the variance of possible configuration for a Mercedes E-Class in 2020, which makes the variance too complex for a customer to grasp. Virtual paths through the model jungle - DT helps to select the Mercedes E-Class model variety and visualises it through virtual reality applications, the DT makes innovations visible and explains them clearly.

Digital twin makes suggestions for configuration - The customer specifies his budget limits and the model variety of the Mercedes E-Class. Based on these parameters, DT makes suggestions on how the vehicle could be configured.

During configuration, every detail of the car can be changed and the effects are displayed. Everything is done with one click - but it is possible that no dealer has the configured Mercedes E-Class in stock. DT then queries the existing vehicles and suggests the models that come closest to the customer's configuration. With just one click, the customer can see what vehicle equipment is available and then decide.

Conclusion – Impact of the DT for the new marketing logic

The automobile manufacturer does not sell a product, but provides a service through the product, which the customer in return pays through the provision of monetary resources. Therefore, the service offered from automobile manufacturer is the DT.

The DT can be directly connected to the service-centered model in marketing, as it provided intangibles assets e.g. information about car and give the customer the possibility of interactivity and connectivity due to connected and analyzed data, which leads to ongoing relationships.

The main Effect and impact of DT for the marketing logic, which will have a positive impact on the consumer behavior and loyalty. Through the use of IoT, involving the use of advanced large data analysis and AI, DT is in touch with customer demands and thus the service is customer driven.

By analyzing the relevance of the DT for the S-D logic, it came up that consumer solutions can be offered predictively. As a result, offers and advertisements will look more appealing and meaningful and will foster deeper customer bonds based on enhanced levels of loyalty. When it comes to providing a better overall customer experience, physical objects paired with DT technology are a perfect match and meet

the exact shift from tangible to intangibles asset in marketing logic. Therefore, the digital twin is indispensable for the new dominant logic and for the automotive industry.

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