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Designing Multi-sided Community Platforms for Local High Street Retail

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Research paper

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Abstract

The continuing rise of online retail comes at the expense of small and medium-sized stores in local high streets. Many cities now experience substantial vacancies and the decline of independent and family-owned stores, impeding citizens' perceived quality of living. In this paper, we design the community platform 'smartmarket²', with which networks of local retailers interact with networks of customers to co-create a physical and at the same time digital customer experience in a high street. The platform connects with retailers' information systems, while interfacing with in-store technologies to connect with potential customers' smartphones. From a theoretical perspective, the platform exemplifies how previous research on value co-creation, multi-sided (engagement) platforms, and retail communities can complement each other to constitute online-offline customer experience. Based on comparing smart-market² with rival IT artifacts, we abstract nascent design knowledge by conceptualizing a design theory for 'community platforms for high street retail' as a new class of IT artifacts. We conclude the paper with identifying how digital services—including cross-promotions, geographical recommender systems, and geospatial analytics—may be offered on the platform to leverage the competitive position of small and medium-sized retailers in local high streets through online-offline customer experience.

Keywords: Community Platform, High Street Retail, Value Co-Creation, Design Science Research

1 Introduction

High street retail lives through significant changes, caused by the digital transformation and changed consumer shopping behavior in favor of digital channels (Brynjolfsson et al., 2013; Verhoef et al., 2015; Hagberg et al., 2016). Around the globe, stationery retail loses market share to online businesses (eMarketer, 2016). In the United States and Germany, for example, online commerce faced continuous double-digit growth rates in recent years (EHI Retail Institute, 2017), while brick-and-mortar turnovers stagnated (Lipsman, 2017). Lately, store closings clearly outstripped new store openings in high streets (Townsend et al., 2017). This phenomenon—termed the "retail apocalypse" (Townsend et al., 2017)—can lead to eroding high streets that impede the quality of living in city centers and urban neighborhoods.

To counteract this development, retailers are innovating on digital customer experience creation (Betzing, Beverungen, et al., 2018). Customer experience comprises a customer's "cognitive, emotional, behavioral, sensorial and social responses"(Lemon and Verhoef, 2016, p. 74) to any direct or indirect contact with the firm during all stages of the customer journey. By introducing in-store technologies to their stores' servicescape, retailers enable customers to interact with them digitally (Betzing, Hoang, et al., 2018). Further, large retail chains are integrating their brick-and-mortar and online businesses

following an omnichannel strategy in which customers can easily switch between channels and receive a consistent experience across all physical and digital points of contact (Herhausen et al., 2015). Conversely, former online pure-players now even open brick-and-mortar showrooms (Bell et al., 2017). However, these innovations have almost exclusively been implemented by large retail organizations. Due to constraints in both their operand and operant resources (Payne et al., 2008), independent small and medium-sized (SME) retailers have mostly remained unable to establish digital relationships with customers (Bollweg et al., 2016) and struggle to retain their market positions (Coca-Stefaniak et al., 2005). However, SME retailers have a locational advantage, are rooted in their local communities, and in many places, are organized in cooperatives and local marketing organizations that act for the common good to foster the attractiveness of local high streets.

We argue that a lateral network of high street retailers can launch a digital platform that enables new forms of digital customer interactions. Similar to smart city initiatives (Cocchia, 2014), this network could use information systems to connect people, infrastructures, information, and local governments to improve "the economic, social and environmental sustainability of a city" (Neirotti et al., 2014, p. 25). Such networks leverage a service ecosystem that spans across the boundaries of single stores and retail branches. As regards diversity of assortments and personalized interactions, this ecosystem might even outperform the digital endeavors of large retail chains, which foster one-to-many relationships.

Building on the dual mission of design science to advance theory while supporting practitioners (Sein et al., 2011), the paper's contribution is twofold. First, we report on the design of smartmarket²—a digital community platform that enables lateral networks of retailers in a high street to co-create online-offline customer experience (Grönroos and Voima, 2013) with their customers. smartmarket² complements the physical touchpoints between local retailers and customers with digital ones, based on interfacing with retailers' information systems and in-store hardware. Second, to advance IS theory, we integrate previous research on the Service-Dominant Logic of Marketing (S-D Logic) (Vargo and Lusch, 2017), value co-creation on engagement platforms (Storbacka et al., 2016), and brand communities and social shopping communities (Muniz and O'Guinn, 2001; Carù and Cova, 2015). Our research goal is to develop nascent design knowledge on *multi-sided community platforms for local high street retail.* Therefore, we compare smartmarket² with rival IT artifacts and conceptualize the platform as a new class of IT artifacts. By demonstrating its general utility and outlining its superior functions and mechanisms in a nascent design theory, we contribute to theory and practice.

Other researchers can build and evaluate advanced digital services, which utilize the core functionality that is provided by smartmarket² as a multi-sided platform. Also, future research can investigate how customer experience is co-created based on the interactions of networks of retailers and networks of customers on the specified class of platforms. Practitioners can design specific platforms for their high streets based on instantiating the class of systems proposed here.

The paper unfolds as follows. In Section 2, we discuss related research on the co-creation of value in service systems, multi-sided (engagement) platforms, and virtual retail communities. In Section 3, we describe and justify our design science research method. In Section 4, we outline how smartmarket² reflects and integrates related research and state-of-the-art information technologies. In Section 5, we compare smartmarket² with rival IT artifacts to conceptualize nascent design knowledge. In Section 6, we sketch how digital services can be designed to extent the core functionality provided by the platform.

2 Research Background

The purpose of this paper is to design multi-sided community platforms that enable retailers and customers to co-create online-offline customer experience in a local high street. The design is embedded into three streams of research. First, co-creating customer experience reflects the foundational premises established by S-D Logic. Second, multi-sided platforms are vehicles to facilitate resource integration, enabled by a third party that is not involved in value co-creation directly. Third, service marketing has extensively researched virtual communities to conceptualize customer's offline or online interactions. All three streams of research feature kernel theories that guide and constrain the design of our IT artifact and its subsequent abstraction as a nascent design theory.

2.1 Co-Creation of Customer Experience in Service Ecosystems

As a cornerstone of the Service Science discipline, S-D Logic postulates that value is co-created through the exchange of service (Vargo and Lusch, 2016). That is, value is not captured by exchanging goods against monetary compensation, but by integrating resources possessed by other actors with one's own resources. In the past, service marketing scholars took a dyadic view on value creation, where firms provide value-in-exchange for their customers (McColl-Kennedy et al., 2015). Against the backdrop of S-D Logic, social and economic actors have no predefined roles but can accommodate them differently for each interaction (e.g., the same entity can act both as a provider and customer) (Vargo and Lusch, 2017). Actors integrate their resources and provide service with "the common purpose of value (co)creation" (Vargo and Lusch, 2011, p. 181).

In retail—one of the core research areas of Service Science—special consideration is put on the co-creation of customer experience (Verhoef et al., 2009), a concept that is also known as service experience and shopping experience (Voorhees et al., 2017). Along the customer journey, the customer engages in a series of service encounters with the retailer and other actors through various physical and digital touchpoints. During these episodes of contact, both parties integrate their resources such as the customer's preferences and the retailer's knowledge to provide service to each other. Moderated by the situational context and other determinants (Verhoef et al., 2009), customer experience dynamically emerges from these value co-creation practices. The value-in-use created is "phenomenologically determined by the beneficiary" (Vargo and Lusch, 2017, p. 47). Since customer experience accrues over time and is also co-created with other actors such as other customers in-store, retailers cannot view single service encounters in isolation but have to consider their impact on the overall customer experience creation (Verhoef et al., 2015). Moreover, customer experience is not a product or service that retailers can design for customers to retrieve. Instead, retailers offer value propositions and foster interactions to co-create individual customer experience with their customers (Grönroos and Voima, 2013).

Service ecosystems provide the overarching context for the co-creation of customer experience and are conceptualized as "relatively self-contained, self-adjusting systems of resource-integrating actors connected by shared institutional logics and mutual value creation through service exchange" (Vargo and Lusch, 2016, p. 161). Service ecosystems emerge and continuously adjust themselves based on shared institutional logics, such as actors sharing a common belief system regarding high streets (Thornton and Ocasio, 2008). To join a service ecosystem, actors use touchpoints and realize engagement opportunities (Grönroos and Voima, 2013). Service literature conceptualizes engagement platforms as facilitators of interactions (Frow et al., 2015). They are "physical or virtual touch points designed to provide structural support for the exchange and integration of resources, and thereby co-creation of value, between actors in a service system" (Breidbach et al., 2014, p. 594). Storbacka et al. (2016) add that engagement platforms are multi-sided intermediaries that enable resource integration by facilitating interaction between actors of a service ecosystem, while not being engaged themselves.

The extant literature does not feature any design knowledge that describes how engagement platforms ought to be designed to leverage resource integration and value co-creation in service ecosystems. This lack of design theories demonstrates that up to now, engagement platforms have only been investigated analytically, while their design, implementation, and evaluation has remained opaque.

2.2 (Multi-sided) Platforms

Analogous to the development (from brick-and-mortar to online shops) in retail, the rise of new digital technologies led to change from physical to digital platforms (Yoo et al., 2012) and gave rise to the implementation of mobile digital platforms (Eaton, 2012). Platforms are constructed in a modular fashion and "the fundamental architecture of any platform includes a set of stable core components with low variety, and a set of peripheral components with high variety" (McIntyre and Srinivasan, 2017, p. 150). This structural characteristic allows platforms to evolve and adapt to changes in the environment, such as including new actors or adapt to changing institutional logics (Gawer, 2014). Platform design and governance mechanisms regulate the types of interaction and define decision rights and permissions to modify the platform (Smedlund and Faghankhani, 2015).

High street retail is a multi-sided market, and consequently, a community platform for high street retail takes the form of a multi-sided platform, which is an intermediary that enables direct interaction of two or more actors affiliated with the platform (Armstrong, 2006). As Hagiu and Wright (2015) note, actors "on each side consciously make platform-specific investments that are necessary in order for them to be able to directly interact with each other" (p. 163), such as providing operant resources. A multi-sided platform supports transactions between different actors without possessing the offered services (Hagiu and Yoffie, 2009), and—in most cases—fosters indirect network effects between the different actors (Armstrong, 2006; Yoo et al., 2012; Hagiu, 2014).

Research efforts on multi-sided platforms and markets focus especially their economic behavior and market effects. McIntyre and Srinivasan (2017) perform a literature review on platforms that includes research on the economics of industrial organizations, and perspectives on technology and strategic management. IS research takes a twofold perspective. There are numerous papers investigating economic platform effects. Among others, Boudreau and Hagiu (2009) present a basic conceptual framework for interpreting non-price instruments used by multi-sided platforms, Nikou et al. (2014) determine which characteristics of platforms customers prefer most, and Giessmann and Legner (2013) develop business models for Platform-as-a-Service offerings. On the other hand, only a small number of papers develops generalized knowledge on platform design. Schreieck et al. (2016) elaborate on design and governance of platform ecosystems without stating design principles, Kazan and Damsgaard (2016) design and configure payment platforms by conducting multiple case studies, Staykova and Damsgaard (2017) conceptualize platform evolution as a complex, multi-faceted and dynamic process, and Tura et al. (2017) develop a framework of platform design choices (core actors, value proposition, how to attract key stakeholders and gain network effects). These research efforts have in common that no generalized design knowledge is derived that gives advice on how to build (multi-sided) platforms.

Hagiu concludes that "successful multisided platforms are the exception" (Hagiu, 2014), although platforms penetrate all industries and markets at increasing speed. This statement implicitly refers to the need of developing and presenting design knowledge on (multi-sided) platforms that researchers and practitioners can use to set up successful platforms. De Reuver et al. (2017) recognize this issue as well by setting up a research agenda for digital platforms, including the design of platforms as IT artifacts and the abstraction of generalized design theories. In contrast, marketing scholars already investigate (multi-sided) platforms in e-commerce for two decades, since virtual communities emerged in the late 1990s (Hagel and Armstrong, 1997).

2.3 Virtual Communities in Retail

Communities traditionally are defined to be "persons in social interaction within a geographical area and having one or more additional common ties" (Hillery, 1955, p. 111). The Internet since then broke up geographical boundaries and lead to various forms of virtual communities related to retail such as discussion communities, social networks, shopping communities, and online marketplaces such as Amazon, eBay, and Steam (Hagel and Armstrong, 1997; Olbrich and Holsing, 2011). Interaction in virtual communities is not limited to transactional and functional use (exchanging goods and services), but they also provide social and entertainment value. Social shopping features such as ratings, reviews, user-generated recommendations, and joint interaction and consumption are forms of value and experience co-creation (Olbrich and Holsing, 2011; Carù and Cova, 2015). Social shopping communities project the social interactions of shoppers with their acquaintances and other shoppers from the physical servicescape to an online setting (Wang and Zhang, 2012). Users engage in social practices such as advising others and recommending products to them. Interaction with the community becomes part of many peoples' shopping experience. Customers patronizing a particular brand or product engage in brand communities to share their experiences, obtain product information and connect with like-minded users (Muniz and O'Guinn, 2001). Organizations set up brand communities purposefully to establish relationships with their customers, increase their loyalty, get feedback, or to design and co-create new products and services with their customers (Martínez-López et al., 2016). Brand communities are also embedded within social networks as organization-managed pages or fan-made discussion groups (Zaglia, 2013).

So far, most interactions in virtual communities take place between single retailers and multiple customers, as well as between groups of customers. Conversely, interactions between groups of retailers are scarcely documented (Thomas et al., 2013). Furthermore, these communities have a very narrow focus and revolve around particular brands, products, or product categories, such as apparel. Finally, there are little (if any) attempts made in research to establish or study social shopping communities in local high street retail.

A community platform for high street retail reintroduces the geographical context to virtual communities. Such a location-based hybrid community has a structural and socio-cultural dimension, where the community has a sense of shared belonging and values regarding the underlying common theme, which is a particular high street (Porter, 2006). Platform users identify themselves as part of a city or high street and have shared social relationships that are dynamic and evolve over time (Thomas et al., 2013). Interaction and experience co-creation reinforces the institutional logic of the service ecosystem high street.

3 Research Method

In line with the dual mission of design science to advance theory while supporting practitioners by developing innovative IT artifacts (Sein et al., 2011), the paper's purpose is twofold. First, we design smartmarket² as a digital platform that allows networks of retailers in a high street to co-create an online-offline customer experience with networks of customers. Second, we abstract this IT artifact to conceptualize a class of information systems as an IS design theory, which is a theory of design and action that prescribes how instances of a particular class of information systems ought to be designed (Gregor and Jones, 2007). The interplay of these results reflects "the importance of **both** the contributions made in the form of viable artifacts and the contributions at more abstract levels" (Gregor and Hevner, 2013, p. 341, emphasis contained in the text).

Against the backdrop of the knowledge contribution framework proposed by Gregor and Hevner (2013), we position our endeavor as an 'improvement' and apply the associated communication schema to structure the remainder of this paper. The core of an 'improvement' is to design a new solution for a known problem. This means that the IT artifact designed should perform better than rival IT artifacts, while at the same time, the design adds to the body of knowledge by contributing new knowledge on how to solve a particular class of problems with a new class of IT artifacts. As regards design and implementation of the IT artifact smartmarket², our nominal research process was adapted from Peffers et al.'s (2007) Design Science Research Method (Figure 1). The demonstration and evaluation stages were executed subsequently but have been merged in Figure 1 to simplify visualization.

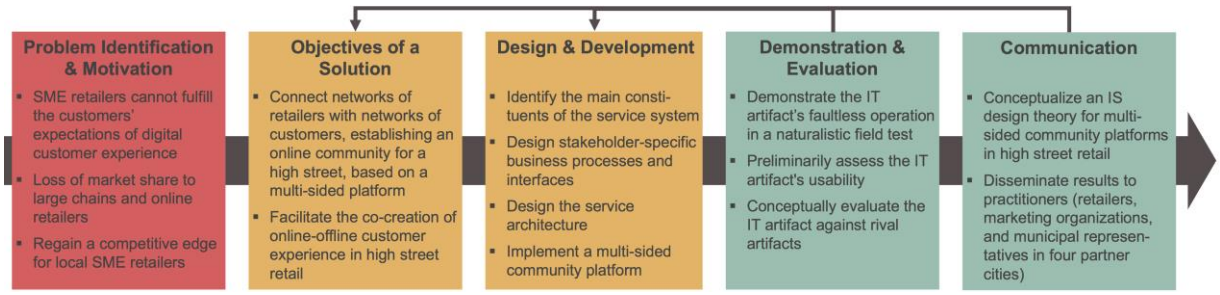

Figure 1. Research process to create the IT artifact smartmarket² (adapted from Peffers et al. 2007).

We took a problem-centered approach to initiate this process. The identified problem is rooted in the frequent observation that small and medium-sized stores in high streets—many of which have been family-owned for more than one generation—keep losing market share to big online retailers and large retail chains. This development could cause cities to fall into decline and eventually impedes the (perceived) quality of living in city centers. Restoring a competitive edge for local stores is, therefore, an important endeavor to preserve lively high streets in our cities.

Objectives of a solution comprise designing, implementing, and launching a digital multi-sided platform based on which retailers in a particular city center can co-create online-offline customer experience with

their customers. This IT artifact would make the benefits of the digital transformation—which up to now have predominantly enabled the business models of large retail store chains—accessible to SME retailers, ranging from local stores to stands on farmer's markets. With the platform, lateral networks of retailers in a high street could offer their customers unique value propositions that might even compete against the competitive advantage of large online retailers and chains. The design of this IT artifact is rooted in different kernel theories—including S-D Logic, multi-sided platforms, and online retail communities—and conversely, integrates these theories in an innovative way.

Building on these kernel theories, we identified a set of design principles to guide the design of the platform (Betzing, Beverungen, et al., 2018). Subsequently, a distributed team of 18 software engineers, business analysts, and information systems scholars at two universities designed and implemented smartmarket² in spring and summer 2017 in an agile fashion. We extensively reviewed the IT artifact and demonstrated its correct operation and utility (Venable et al., 2016). Students and other researchers enacted the roles of retailers, customers, and the platform operator in a prototyping approach that successfully simulated a digital high street using our platform.

As regards evaluation, we conceptually evaluated smartmarket² against rival artifacts, to frame how it differs from and conceptually extends existing solutions. This analysis showed "how and why the new solution differs from current solutions" (Gregor and Hevner, 2013, p. 346), while we reflected kernel theory to make the reasons for the improvement explicit. Based on this analysis, we abstracted the developed IT artifact to conceptualize an IS design theory that frames IT artifacts that local retailers can use to co-create online-offline customer experience with their customers. This is a 'mid-range design theory' (Gregor and Hevner, 2013) that abstracts our IT artifact to a class of systems. Beyond developing the IS design theory, evaluating the improved IT artifact to extend the kernel theories themselves was outside the scope of this paper and is open to subsequent research.

The class of systems described by the design theory provides core functionality to networks of retailers and customers on a local high street. On top of this functionality, other researchers can design, engineer, and evaluate more specific digital services to digitalize customer experience further. Some exemplary services that can be implemented on the platform include location-aware recommender systems, geospatial analytics, and cross-promotions that adapt association rule mining to a high street setting.

4 Design and Implementation of the Community Platform

4.1 Actors

smartmarket² is a multi-sided platform that enables different groups of actors to co-create online-offline customer experience, based on establishing a community for local high street retail. Retailers and customers interact in the front-stage both digitally via the platform and face-to-face while in store. Every interaction between the customer and one or more actors co-creates customer experience. Municipal representatives and local operators act in the back-stage of the service system to analyze the condition of a high street and advance its competitive edge. A platform provider is the intermediary that governs the platform to facilitate the interactions of other stakeholders in the sense of an engagement platform. However, the platform provider does not participate in the exchange itself (Storbacka et al., 2016).

Customers strolling their high street can partake in the local community using their mobile devices. By browsing stores and products relative to their current location and by receiving individual promotions, they interact with nearby retailers. Customers collaboratively add to the community by rating and reviewing stores and products, and by giving dedicated feedback to retailers. Customers can share their experience and give recommendations also by taking photos of products and points of interest at the high street, tag retailers, and share them on the platform. A stream of pictures taken nearby invites other local customers to interact with each other and discuss their experience.

Local retailers present their businesses by adding general information such as opening hours, store pictures, and addresses to the platform. Interactions with customers are fostered by making contact channels such as phone, e-mail, and social media profiles available to the members of the community. Retailers also manage product data and promotions, which enable further interaction scenarios.

The *platform provider* develops and operates the overall smartmarket² platform. smartmarket² has multi-client capabilities. Systems and services are provided as infrastructure or blueprint. While core functions such as user management, data collection and analysis, and the main interfaces have low variety, peripheral functions such as linking local information (e.g., news and events) or custom add-ons have high variety (Gawer, 2014). Consequently, the platform must be instantiated for the use in a particular city and a local high street. Due to this local focus, one instantiation of the platform cannot contain retailers from different city centers.

Local operators such as marketing organizations or cooperatives license smartmarket² and run their instances customized to the particularities of their local high street. These 'local heroes' conduct marketing campaigns, govern their local users and are responsible for getting retailers and customers on board. For retailers and customers using the instantiated platform, the local operator constitutes a single point of contact. The local operator also equips retailers with the in-store hardware required to perform digital interactions with customers.

We further identified *municipal representatives* as a relevant stakeholder group, since smartmarket² can yield insights regarding customer behavior in city centers and high streets (e.g., hotspots, customer trajectories, and flows), which can be valuable to advanced smart city initiatives (Bellini et al., 2017).

Actors in the service system are not limited to a single role but can adjust their role according to different contexts. For example, the local operator might also run a local store and might want to browse the high street as a customer, too.

4.2 Platform Architecture

smartmarket² consists of multiple loosely-coupled components, which are integrated by middleware. Figure 2 depicts the platform's implemented service-oriented architecture. Mobile services are customer-facing, whereas web-based services are used by retailers, local operators, municipal representatives, and the platform administrator. Backend services do not provide graphical user interfaces but run business logic in the back-stage. The platform uses open standards and open-source software wherever possible. The server-side components are all hosted on the Google Cloud Platform, which provides a scalable infrastructure. We further leverage Firebase, a state-of-the-art cloud development platform, which provides cross-service support functions such as central user management, a content delivery network for static files, push-messaging for the mobile channel, and performance monitoring.

Figure 2. smartmarket² platform components and service architecture.

The data layer is separated by concerns: Master data on customers and retailers are stored in a document-oriented NoSQL Mongo database that allows for powerful horizontal scaling, high throughput, and low latencies. Transactional and analytical data traverse a message queue and are then persisted in a SAP HANA in-memory database for real-time reasoning (e.g., to calculate recommendations). ArcGIS, a geospatial database and information system is used for trajectory analyses.

The business layer consists of a central NodeJS-based middleware component that hides the complexity of multiple interoperating backend parts behind a consistent API. This component links all databases and cloud services, handles authentication and authorization, and runs the server-side business logic.

The presentation layer is comprised of various interfaces that are tailored to the different actors' needs. The platform provider, local operators, municipal representatives, and retailers use a responsive web app that is built with the JavaScript-based front-end web application framework Angular 5. Depending on the current user's role, the range of available features and views varies. The platform provider can access all information. Local operators monitor and administer their instances and manage the hardware they provide to their associated retailers. Municipal representatives analyze geospatial information, whereas retailers manage their master data, products, and promotions, and gain insights on their performance. Retailers can use an open API to link product data from their information systems.

Figure 3 shows some of the stakeholder-specific interfaces. On the left-hand side is a heat map, which local operators use to monitor the frequency of digital interactions in their high street in real-time. In the middle, an excerpt of the retailer interface is depicted, which provides retailers with comprehensive insights. A dashboard shows key performance indicators regarding the retailer's digital interactions with its customers. Further views contain, among others, how customers review their experience with the retailer, and how many customers saved the store as a favorite. Various charts visualize historical trends.

Customers use mobile apps for Google Android and Apple iOS to access smartmarket² on their smart devices without temporal or spatial restrictions (see right-hand side of Figure 3). smartmarket² makes use of the devices' inbuilt location features such as GPS and Bluetooth as contextual information to adapt to the user's situation (Betzing, Beverungen, et al., 2018). The apps receive Bluetooth Low Energy (BLE) signals from Beacons while passing retailers in the high street.

Beacons are matchbox-sized, battery-powered transmitters that can autonomously send low-range signals (approx. 10-20m distance) for years without maintenance (Statler, 2016). During development, we experimentally tested the reliability of different Beacon standards. Difficulties regarding signal quality and detection rates surfaced. Being most reliable, we settled for *iBeacon*. The Beacons broadcast a Universal Unique Identifier (UUID), which identifies our Beacons as part of smartmarket², as well as individual major and minor integer values.

Figure 3. Interfaces to the smartmarket² platform.

The platform provider registers the Beacons at the platform and distributes them to the local operators, which, in turn, assign Beacons to retailers by defining the individual major and minor values. Lastly, retailers install the Beacons in their stores and configure their locations in the web app.

With the consent of the customer, we identify when a customer's device receives a Beacon signal that carries the smartmarket² UUID and record an approximation of the device's distance to the Beacon. From collected data, we can infer a customer's trajectory in the high street, the stores visited, and the time spent in-store. As opposed to continuous tracking using GPS, which might intrude the customer's

private space, we only record the customer's store visits. We further analyze the customers' behavior regarding in-app interactions with stores, promotions, and products to personalize their experience. Customers can then receive individual location-based promotions and recommendations while walking the high street or visiting a store.

smartmarket² follows the requirements brought forth by EU General Data Protection Regulation (GDPR) (European Union, 2016). The app will not collect any personal information without the user's consent to each particular purpose of data processing. A privacy self-service enables customers to learn about the privacy policy, set their individual privacy preferences, examine (and delete) collected personal data, revoke previously given permissions, and configure the app to fit their needs.

4.3 Platform-Facilitated Interaction

Our community platform enables several interaction scenarios between the actors of the local high street ecosystem, which can foster customer experience co-creation. Browsing stores and products in the app is an intuitive form of customer-initiated interaction with the retailer. From a Service Science perspective, a resource integration comprising the customer's device and the retailer's information takes place.

As soon as a customer's smart device picks up a retailer's Beacon signal, a retailer-initiated machine-to-machine interaction takes place. In turn, a more complex interaction scenario unfolds, which is depicted in Figure 4 using Business Process Model and Notation 2.0 (BPMN).

If the Beacon event matches pre-defined conditions, the platform generates a personalized promotion or recommendation for the customer, which is then push-messaged to the customer's device and saved in a list of received promotional offers. Recommendations are based on products and stores the customer has previously interacted with or saved as favorites. Following a push message, an interaction commences when a customer opens the message. Further interactions occur when a customer visits the recommended store or redeems a personalized promotion.

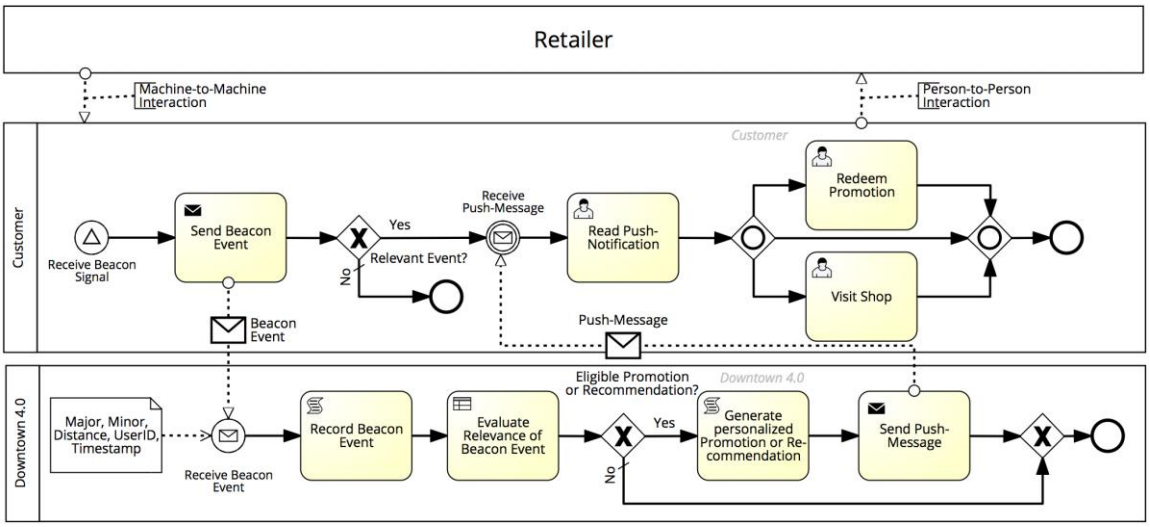

Figure 4. Beacon-initiated interaction between customers and retailers.

Retailers can use conditions to precisely target their promotions, where the conditions are based on the analyzed Beacon data. For example, a customer that recurrently visits a retailer's store three times in the same month might receive a small present as a form of loyalty promotion. Since networks of retailers work together in smartmarket², in an upcoming design cycle we will implement additional touchpoints between retailers to enable cross-promotions that affect more than one retailer.

Writing reviews on products and retailers, posting pictures of shopping trips, and commenting on other users' content constitute interactions among customers. On the one hand, the core smartmarket² platform makes the channels and interfaces between actors available to use in future add-ons and interaction scenarios. On the other hand, the platform mechanisms reflect the shared institutional logics of the service ecosystem high street and foster the co-creation of customer experience through interaction.

5 Multi-sided Community Platforms for Local High Street Retail

To design a new class of IT artifacts called *multi-sided community platforms for local high street retail*, we evaluated the smartmarket² artifact in three steps. First, we applied a quick & simple strategy, as proposed by Venable et al. (2016), to evaluate the initial prototype. Second, in a summative evaluation, we checked the platform's internal validity and demonstrated its applicability. We tested smartmarket² in different scenarios to evaluate its key functionalities, such as handling large amounts of transaction data, which is supported by the selected database technologies and cloud architecture. Subsequently, we performed a series of user acceptance tests (UAT) with students and researchers, based on simulating a high street with several stores that use Beacons to issue personalized promotions. Test customers were asked to stroll through this high street and watch out for push notifications issued by the platform in response to the retailers' Beacon signals. The test was successful and confirmed that the designed community platform works as expected. Nevertheless, we also identified some technical issues and dysfunctional behavior of the platform, e.g., receiving Beacon push notifications highly depended on the type of users' smart devices. These issues were resolved in a second version of the prototype, reflecting the properties of design as a search process (Hevner et al., 2004). Third, since we position our research as an 'improvement' (Gregor and Hevner, 2013) to design a new solution for a known problem, we conceptually compared smartmarket² with rival IT artifacts. While the corresponding class of IT artifacts has not been conceptualized in extant literature, some related approaches have recently been developed in practice. These artifacts constitute instantiations of the following three classes of systems.

White label solutions for digital business directories span across an individual brand or a single store. These platforms can be licensed and individually instantiated for a specific geographical area such as a high street. "Localpioneers" is a German IT provider, whose solution is currently instantiated in more than 25 cities. A local licensee administers content and attracts retailers to become part of the platform. Customers use a mobile app and a web frontend to access a news stream, map and navigation functionalities, retailer profiles, information about events, and a job board. Beacons are used to inform customers about discounts via push message. The Localpioneers artifact constitutes a digital business card for retailers and is limited to dyadic interactions between customers and retailers. Moreover, the app users remain anonymous and no personalization takes place. So far, the platform neither enables interaction scenarios between networks of customers nor networks of retailers.

Online (retail) communities link their services back to the physical world. Facebook has introduced "place tips" for businesses as an extension of their pages. By using Beacon technology, retailers can connect with customers online, while they are in a store. Users browsing Facebook in-store will find information on the retailer at the top of their newsfeed. Latest news and upcoming events are paired with user-generated content such as comments, recommendations, and check-ins from friends. While Facebook links a retailer with its customers, and customers with each other, the means of interaction are limited to and mediated by Facebook. There is no local focus and no interaction among retailers. No central local operator manages this ephemeral social community.

Mobile shopping companion apps extend the personal service and e-service of retailers by a mobile channel that links the physical servicescape to the retailer's digital presence. Their focus is on strengthening the customer's relationship to the retailer. Interactions between networks of customers hardly take place and other retailers are not part of the solution. For our comparison, we settled with the ZARA app, which is one of the best reviewed, internationally available shopping companion apps. The app enables customers to find the nearest ZARA store, browse products, receive additional information and recommendations for complementary products, and to order products for home delivery.

In a criteria-based analysis, we conceptually compared smartmarket² with these three classes of rival artifacts (Table 1). As criteria, we referred to the co-creation of customer experience, to the mechanisms of multi-sided platforms, and to the properties of retail communities. While all artifacts provide digital touchpoints, the extent of interaction scenarios varies considerably. Localpioneers most closely resembles a multi-sided platform that adapts to a local high street but falls short as an engagement platform for co-creating customer experience. Facebook place tips combines the largest online social network with digital touchpoints to foster the co-creation of customer experience in-store.

Aspect	smartmar-ket²	Local-pioneers	Facebook place tips	ZARA
Co-Creation of Customer Experience				
Digital touchpoints	App, Beacons	App, Beacons	App, Beacons	App, (Barcodes, QR-Codes)
Customer-to-Customer interaction	Yes	No	Yes	No
Retailer-to-Retailer interaction	Partially	No	Not explicitly	No
Customer-to-Retailer interaction	Yes	Yes	Yes	Yes
"Local hero" as point of contact	Yes	Yes	No	No
Integration of local actors	Yes	Yes	No	No
Platform provider is a mediator	No	No	Yes	Yes
Multi-Sided Platform				
Platform provider's revenue stream	Licensing	Licensing	Advertising	Selling products
Commercial operation	No	Yes	Yes	Yes
Extensibility	Yes	Partially	No	No
API for product data integration	Yes	No	No	n/a
Multi-client capability	Yes	Yes	No	No
Adaption to local high street	Yes	Yes	No	No
Analytics on retailer level	Yes	No	Yes	n/a
Analytics on city/high street level	Yes	Yes	No	n/a
Retail Community				
Location-based information (pull)	Yes	Yes	Yes	Yes (Store finder)
Location-based information (push)	Yes	Yes	Yes	No
Review retailers	Yes	No	Yes	No
Review products	Yes	No	No	No
User-generated local content	Yes	No	Yes	No
Set favorites	Yes	Yes	Yes (Like button)	Yes (Wishlist)
Navigation to retailer	Yes	Yes	Yes	Yes
Personalized promotions	Yes	No	No	No
Store and product recommendations	Yes / Yes	No / No	No / No	No / Yes
Customer account	Yes	No	Yes (FB profile)	Yes
Focus on local information	Yes	Yes	No	No

Table 1. Conceptual comparison of smartmarket² with rival IT artifacts.

However, the Facebook solution neglects the peculiarities of local high streets and each retailer acts for its own good. All data are controlled by Facebook, which also mediates all interactions subject to their rules. ZARA provides digital touchpoints to their customers that augment their physical service but does not include other actors in their ecosystem, nor sets up an online-offline brand community. All rival artifacts limit the scope of their own offerings, and no interfaces are made available for third parties or individual operators to enhance the platform with additional services. To sum up, our platform overlaps with rival artifacts but clearly is an improvement regarding the co-creation of customer experience within and across multiple actors in local high streets as a service ecosystem.

Based on comparing our artifact with rival artifacts, we showed that smartmarket² conceptually is a unique solution. To abstract the design knowledge behind the instantiated artifact, we conceptualize a design theory to frame a new class of IT artifacts—*multi-sided community platforms for local high street retail*—that is—best to our knowledge—the only platform explicitly conceptualized and instantiated with respect to the theoretical knowledge on engagement platforms in Service Science literature and,

therefore, introducing this knowledge in the Information Systems discipline. We formulate the design theory based on Gregor and Jones' (2007) eight components (Table 2).

#	Component	Explanation
1	*Purpose and scope*	The purpose of multi-sided community platforms for local high street retail is to facilitate interactions between networks of retailers and networks of customers to co-create online-offline customer experience. This class of IT artifacts can be instantiated for every city's local high street. Beyond its core functionality, the platform can be augmented with digital services to further benefit high streets as service ecosystems.
2	*Constructs*	Service, customer experience, co-creation of value, engagement platform, multi-sided platform, online community
3	*Principles of form and function*	The community platform will enable local communities of retailers and customers to co-create online-offline customer experience; retailers can design, change, and delete products, send promotions (via Beacons) as well as enable customers to be informed about, review, and favor products, retailers, or promotions. Also, customers receive recommendations for products and retailers, enabled by analyzing (personal/behavior/location) data, subject to data privacy laws. Additional actors can view and analyze data from the platform to analyze the status of and to further advance high street retail.
4	*Artifact mutability*	The IT artifact is mutable to account for the properties of individual cities and high streets at design time. As a platform, it allows designing and implementing additional digital services that build on the functionality provided by the platform. At runtime, user-generated content will let each instance of the design theory emerge differently.
5	*Testable propositions*	The community platform can serve to test and extend the kernel theories based on which it was designed, including: (1) The customer experience co-created by networks of retailers and networks of customers is superior to the experience co-created by single customers and single retailers (as in current high street retail) or the omnichannel experience co-created by one retailer with networks of customers (as in online retail). (2) Customer experience is a multi-sided construct that must be extended beyond the dyadic view taken in current literature [co-creation of customer experience]. (3) The platforms enable actors to design and implement additional digital service, based on the core functionality of the platform [multi-sided platforms]. (4) Extant theory on virtual retail communities must be extended with hybrid online-offline communities [virtual retail communities].
6	*Justificatory knowledge*	Kernel theories include the foundational premises posited by S-D Logic, multi-sided platforms/engagement platforms, and virtual communities in retail. This knowledge is integrated with each other and extended to frame an IS design theory.
7	*Principles of implementation*	The platform is instantiated for any local high street in five steps. (1) Identify all relevant stakeholders of the high street (retailers, and local operator); (2) the local operator customizes the platform to adapt it to the specific instantiation (high street ecosystem); (3) retailers place general information, products, and promotions; (4) Beacons are initialized on platform and installed in participating stores; (5) the mobile app is promoted and distributed to customers free of charge.
8	*Expository instantiation*	With smartmarket², we provide an instantiation that exposes the class of artifacts' form and function and demonstrates its operation for stakeholders to experience.

Table 2. An IS design theory of multi-sided community platforms for local high street retail.

Our design theory is rooted in authoritative kernel theories of Service Science, including value co-creation, multi-sided (engagement) platforms, and virtual communities in retail. By integrating all three theories with an instantiated IT artifact, the design theory combines these theories for the setting of local high street retail. Implementing and testing IT artifacts instantiated from the design theory can reflect back on the kernel theories themselves. Amongst others, it remains to be analyzed if customer experience needs to evolve into a multi-dimensional construct (beyond dyads of retailers and customers), if the proposed type of online-offline experience is superior to omnichannel strategies of single retailers, and what digital services can be implemented based on the core functionality of the platform.

6 Contribution and Outlook

Customers' expectations towards digital customer experience in retail have almost exclusively been addressed by large retail organizations, leaving SME retailers behind. We propose that with multi-sided community platforms for their local high street, SME retailers can regain a competitive edge.

The contribution offered by this paper is twofold. First, informed by kernel theories from S-D Logic, value co-creation on multi-sided platforms (or engagement platforms), and virtual communities in retail, we designed and implemented the IT artifact smartmarket², which is a multi-sided digital community platform on which local retailers and customers co-create online-offline customer experience. As demonstrated in a criteria-based analysis, the solution differs from existing IT artifacts, since it is the only solution that consequently builds on the properties of all three kernel theories. Also, IT artifacts that foster value co-creation of online-offline customer experience in retail have not been described in extant literature. On that account, we propose a new class of IT artifacts—*multi-sided community platforms for local high street retail*.

Our research is, nonetheless, subject to certain limitations—especially regarding the remaining evaluation. In subsequent steps, we will start a holistic evaluation following Venable et al.'s (2016) human risk & effectiveness evaluation strategy. Starting with a series of formative evaluations in an artificial setting, we can ascertain the platform's general utility and improve its touchpoints, processes, and service delivery mechanisms. With increasing platform maturity, we will conduct naturalistic real-world summative evaluations on high streets—especially to gain insights on the socio-technical impact digital touchpoints make to a high street ecosystem and its actors. Further, the platforms customer acceptance is limited by data privacy concerns. Despite providing users with account and privacy management in accordance with the EU GDPR, it remains unclear whether they are willing to provide their contextual and location-based information, and how incentives can influence their privacy decision calculi.

Regarding the proposed design theory, we will test the propositions developed in this paper to enhance the identified kernel theories. Albeit the class of IT artifacts is particularly designed for high street retail, its adaption for other scenarios such as shopping malls is conceivable. Moreover, the high street ecosystem is not limited to retailers in the narrow sense but can also include other high street service providers such as hairdressers or restaurants.

As a multi-sided platform, smartmarket² provides a set of core features that enable the involved actors to co-create online-offline customer experience. On the one hand, we will further conceptualize how this co-creation of value works, and design constructs to make the value-in-use facilitated by our platform measurable. Given the large variety of conceivable customer journeys on high street level, we will investigate, how the interplay of digital and physical touchpoints attributes to the overall customer experience for different archetypal customer journeys. On the other hand, the platform's core features enable retailers and platform operators to design and implement their own digital services, to further enhance their customers' experience. Amongst others, these services could comprise retailer-to-retailer interactions that implement cross-promotions among different stores (e.g., people who bought new shoes also bought a new scarf), an application of association rule mining that is frequently used in online shops but has remained unavailable on local high streets. As a form of indirect customer-to-customer interaction, future digital services could benefit from the wisdom of the crowd by applying collaborative filtering techniques to geospatial data. Based on the customers' physical locations in and trajectories through a high street, stores could be recommended, that a customer usually not considers but might like. For any particular high street, data exploration might even be done in a virtual reality or augmented reality environment, exploring the data with a head-mounted display or smart glasses. In subsequent research, we plan to design and evaluate these and other digital services in more detail.

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