Business Model Framework to Provide Heterogeneous Mobility Services on Virtual Markets

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Keywords: Virtual Market, Virtual Currency, Business Model, Mobility, Incentives.

Abstract: Growing spontaneous mobility and decreasing affinity to automobile ownership in younger generations demand for an integrated service for intermodal mobility. In areas with lacking coverage of traditional public transportation, extending the coverage by integrating alternative services like car sharing, seems promising. Because of the very different nature, the collaboration between traditional public transport and emerging mobility services requires fundamental changes to business models. Current business models are designed under the assumption of separation and competition, which contradicts the idea of collaboration. Therefore, a restructuring of all main pillars of business models under the consideration of mutual interdependencies is required. This work defines such business model pillars and contributes a business model framework for providing different mobility services on centralized virtual markets. Basis is a joint platform which enables collaboration between multiple services to provide a collective intermodal mobility service to the customer.

1 INTRODUCTION

Currently, different means of transportation are usually seen as mutual exclusive alternatives, people travel either by train or by bus. Global trends like decreasing importance of private automobile ownership (Bentenrieder, 2010) and oil peak demand a changing understanding of peoples transportation. To increasing efficiency an integrated view of mobility services is required. E.g, there are regions which are not covered by traditional public transport modes adequately, alternatives like car sharing can close these gaps and, in combination with traditional public transportation, ensure service coverage. To offer a joint service consisting of different modes to customer, an encompassing business model, which sets incentives for users to change their mobility behavior, is required. Because of its big potential concerning mobility service coverage we focus especially on an incentive oriented integration of car pooling.

Information Broker

This investigation prescinds from discussing the advantages and disadvantages of collaborative mobility service provision, but shows the required and optional shifts in business models within this scenario. Thus, the approach is based on the assumption of a collaborating mobility provider network. The basis for collaboration is a joint software system that centrally bundles information of various mobility service providers with diverse modalities. For the following, we call this platform Information Broker (IB). The Information Broker is supposed to be operated by a third party organization which does not offer mobility services itself, to ensure undiscriminated system access. The IB combines the information and services (e.g., train timetables, carsharing sites) of all involved mobility service providers to generate the best possible intermodal itineraries. In terms of technology we assume this is realizable. General distributed architectures, methods for data integration and routing algorithms are well-known. One crucial aspect is the data exchange between IB and mobility service providers. This can be handled by existing protocols, e.g., SIRI[1] a protocol to allow exchange information about public transport services and vehicles, standardized by the CEN (European Committee for Standardization). For sharing modes, e.g. carsharing, IXSI[2] (Interface for X-Sharing Information) has been developed and

[1]http://user47094.vs.easily.co.uk/siri/
[2]http://ixsi-schnittstelle.de

Beutel M., Samsel C., Mensing M. and Krempels K..
Business Model Framework to Provide Heterogeneous Mobility Services on Virtual Markets.
DOI: 10.5220/0005118601450151
In *Proceedings of the 11th International Conference on e-Business* (ICE-B-2014), pages 145-151
ISBN: 978-989-758-043-7

tested in project econnect Germany[3].

There is already a variety of software systems that integrate different modalities (Beutel and Krempels, 2014). 1 illustrates the extent of the IB, which is described in this work compared to the existing software DB Navigator/bahn.de by Deutsche Bahn AG [4]. The IB includes modes like car pooling and additional services, e.g., parking.

Electronic Ticketing

To offer a combined ticket for intermodal travel, a technological realization is required. Currently, multiple standards for electronic tickets have been developed and deployed. Prominent examples are the (((eTicket[5], which is the de facto standard in Germany, and Calypso[6], which is in use in several European cities. Currently a suppose-to-be continent wide standard is being developed under the name IFM Project[7]. Each of them is based on contact-free smart cards. We suppose these electronic tickets are suitable for most, if not all, mobility modes and therefore allow a combined ticket.

The remainder of this paper is structured as follows: 2 gives an overview over the theoretical background and previous work concerning business models and cooperation schemes. 3 defines business model pillars for the context of providing mobility services on virtual markets. Finally, 4 concludes work and gives an outlook on future work.

2 BUSINESS MODEL THEORY

Reviewing the literature about the emergence of business models with focus on e-business and information system implementation, a large variety of different business model frameworks can be observed (Timmers, 1998) (Osterwalder et al., 2005) (Silver, 2007). Most of previous studies focus on the value creation process of Porter's value chain logic and separate this process into "building blocks" (Osterwalder et al., 2005) which can be identified in all organizations. However, (Veit et al., 2014) conclude that business models are dependent on the industry and the context they are applied in. In the case of providing heterogeneous intermodal mobility modes via information systems, existing business models fail to address key aspects in this context. Thus, we concentrate on essential parts of common business models and expand the understanding by introducing new features to the existing logic of e-business models.

The ability to create value for the target customer from products and services depends on the value proposition the organization is willing or able to offer and its ability and capacity to innovate and hence to differentiate. The value proposition correlates with the firms' capability to offer better solutions meeting customer needs in comparison to its competitors (Johnson et al., 2008). Higher value proposition can be achieved by customization of goods, lower prices by reducing costs or provision of superior service to the customer (Osterwalder et al., 2005). To effectively deliver the value proposition offered to the customer, the firm needs to define its geographical extent of the market area, target customers and offered products to delineate the value proposition from its competitors (Afuah and Tucci, 2000). To ensure the delivery of the value to the customer, the firm requires capabilities organized in the value chain like value creating activities, partner networks or resources.

To analyze key activities of companies providing mobility services we refer to the traditional value chain model by (Porter, 1985) as it is the standard tool used in academia and business. The value chain is a method in strategic planning used to identify the competitive advantage of firms. It focuses on the investigation of the critical activities connecting the supply and demand side of organizations and aims at an understanding of their impacts on value and cost of offered products. Activities of the value chain can be organized internally within the firm or externally by partners. The value chain concept also created a framework for a value definition and comprehension about the way value is created (Peppard and Rylander, 2006). The definition of value is simply the willingness to pay for a product which is offered via the value chain to the customer.

(Porter and Millar, 1985) come to the conclusion that information systems "transform" the value chain since they are present at all stages of value creating activities, but not as a potential source of value. (Rayport and Sviokla, 1995) expand the understanding of the role of information systems in value chain modeling by developing the concept of "virtual value chains". Virtual value chains are based on information accessibility. All activities facilitating the gathering, organizing, selecting, synthesizing and distributing of information increase the effectiveness and efficiency of mediating between the traditional value chain activities (Chaffey, 2009). Hence, information

[3]http://www.econnect-germany.de

[4]http://www.bahn.de/p/view/buchung/mobil/dbnavigator.Shtml

[5]http://www.eticket-deutschland.de

[6]http://www.calypsonet-asso.org

[7]http://www.ifm-project.eu

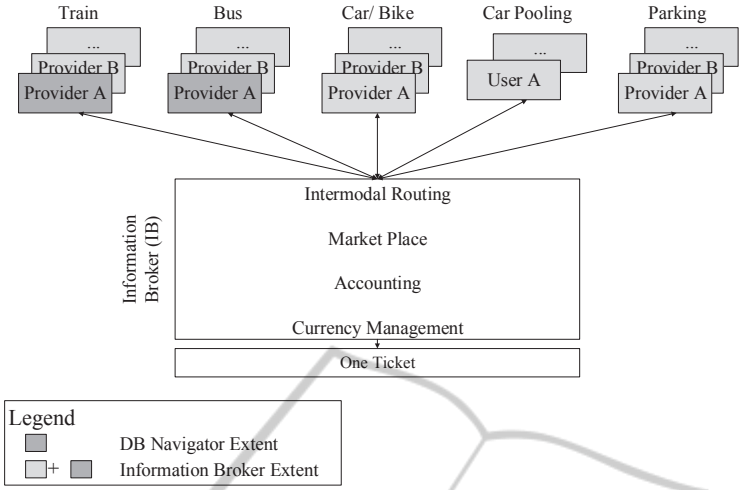

Figure 1: DB Navigator / bahn.de versus Information Broker Software Extent.

systems involving electronic commerce can add value to the internal and external value chain.

The value chain model so far explained has been a firm and product centric approach to determine the underlying value adding activities of organizations. (Stabell and Fjeldstad, 1998) argue that the traditional value chain analysis cannot be applied to all types of businesses. On the one hand value adding activities in, e.g., the generation of services are fundamentally different from the manufacturing of tangible goods. On the other hand scholars realized that organizations are embedded in complex economic networks (Easton, 1992). Hence, Stabell and Fjeldstad developed the "value network" as an extension of Porter's "value chains" incorporating the above mentioned shortcomings. This approach shifts the investigation perspective away from a resource based view of the focal company to a more holistic view of evaluating resource dependency, transaction costs and actor-network relationships in the network of the industry (Basole and Rouse, 2008). Value networks are composed of connected and interdependent players. These players interact with the other members of the network and their relationships have direct consequences for the whole network performance (Hå kansson et al., 2009). Since the members of the network have different assets and competences their goal is to co-create value by collaboration. Hence, value is created not from one firm but by an efficient interplay of all members of the network (Vanhaverbeke and Cloodt, 2006). In contrast to the value chain logic competitive advantage is no longer created at the single focal company but originates from the constellation of the available value of the network partners (Gomes-Casseres, 1994). The inter-firm relationships can manifest in several forms, including alliances, equity investment, partnerships, joint ventures, consortia, marketing agreements, licensing, supply agreements and manufacturing agreements (Gulati et al., 2000), (Podolny, 1998). The decision to agree to one of the above mentioned relationships is strategically (Doz and Hamel, 1998). Motives to join several relationships are: access to new markets, technology and knowledge they need to innovate (Ahuja, 2000), the reduction of external risk (Pfeffer and Nowak, 1976) or regulatory requirements (Oliver, 1990). However, collaboration can has its own risks, since all players in the value network can act opportunistic, thus sharing not the goal to maximize the overall value. Trust is the fundamental condition for effective collaboration in value networks (Faber et al., 2003). Earning the trust of the costumer is another fundamental pillar of the business model ontology proposed by (Osterwalder et al., 2002). They refer to it as relationship capital. Trust is especially important for service industries which operate in virtual spaces. (Jones et al., 2000) developed trust requirements for e-business on the foundation of the parameters of trust and dependability. Fulfilling these requirements leads to customer satisfaction and hence to customer loyalty which is the foundation of every customer relationship (Chaffey, 2009). Moreover most Frameworks involve a product related block into their constructs (Osterwalder et al., 2005). This element refers to the overall value proposition offered by a company towards their customers.

In fact there are manifold additional elements of business model frameworks stated in the current literature, which have not crucial importance for this setting. Against the special background of providing het-

erogeneous mobility modes on a centralized virtual marketplace, it can be concluded that existing frameworks doesn't fit exactly to these conditions. This implies the need to develop a new framework especially for this context.

3 HETEROGENEOUS MOBILITY MODE INTEGRATION BASED ON INCENTIVE ORIENTED BUSINESS MODELING

Information technology offers extensive strategic and economic possibilities. It is creating new opportunities for margin enhancement, increased customer satisfaction, capital efficiency, and agile organizational behavior (Kagermann et al., 2010). Decision makers have to consider new technological solutions that reshape existing business models (Teece, 2010). Particularly, the integration of diverging mobility modes via information systems reshapes existing business models. The following part explains the shifts in companies business models and refers to related consolidation projects.

3.1 Involvement

Actors can provide their mobility services on a centralized platform with different degree of involvement. (Buchinger et al., 2013a) distinguished between an "independent partner scenario", "intervening partner scenario" and an "open service platform scenario". The degree of involvement influences all constitutive business model pillars in major part.

3.2 Activity Configuration

Activities to provide products or services are a major part of business model concepts. In this context, the IB influences activities, that are logistically essential for delivering services to the customer in major part. (Buchinger et al., 2013a) showed the influence of an open software system scenario on infrastructure of vehicle sharing providers activities. They distinguished between service and infrastructure providers and included a data layer. More precisely, they showed that activities like user *registration, reservation, billing, clearing and authentication* can be outsourced to an information system. This system basically aggregates the data.

3.3 Distribution Model

The product related aspects are a central part of business models (Osterwalder et al., 2002) (Osterwalder et al., 2005). This pillar is closely connected to this topic, but the exact meaning is different. The distribution model is the way, how mobility services can be purchased by the customer on the information system. The distribution method can be designed in several ways: For example, the European project SUPERHUB[8] develops an open source platform to combine heterogeneous mobility offers altogether in real time. Additionally, the offering is going to be provided on an mobile app. SUPERHUB enables customized multimodal routing and presents the combined offering within a flexible best price solution. In contrast to this, Seatz[9] travel network assistant offers a distinction between the greenest, cheapest and fastest traveling alternative. Moreover an IB offers new possibilities for cooperation. The construct is inspired by contracts in the telecommunication sector: based on frame contracts between participating mobility providers, the system enables the offering of combined multimodal ticket products. These product bundles support the intention of integrating different mobility modes and set strong incentives towards customers to get in touch with alternative mode options. Because of the significant heterogeneity of modes, it is difficult to establish a non restrictive "flat rate model" for all modes. Therefore, a new portfolio of products bundles has to be designed. The basis for all product bundles form subscription contracts for the usage of public transport modes. In addition this basis has to be extended through subscriptions of commercial vehicle sharing. In fact this creates a new ticket, which sets incentives for intermodal travel behavior.

However, the integration of modes like car pooling into this concept is challenging. These modes usually are paid by cash money. This circumstance requires a solution based on information technology, which facilitates a centralized organization and enables the integration of car pooling - a virtual currency based payment mechanism.

3.4 Virtual Payment Mechanism

Virtual currencies originally are designed as loyalty programs to bound customers to in-house services. A modified strategy is the cooperation scheme, also defined as coalition loyalty or cross loyalty, which describes the facilitation of loyalty cards at multiple, possibly competing, retailers (Buchinger et al.,

[8]http://www.superhub-project.eu

[9]http://http://www.seatznetwork.com/home/

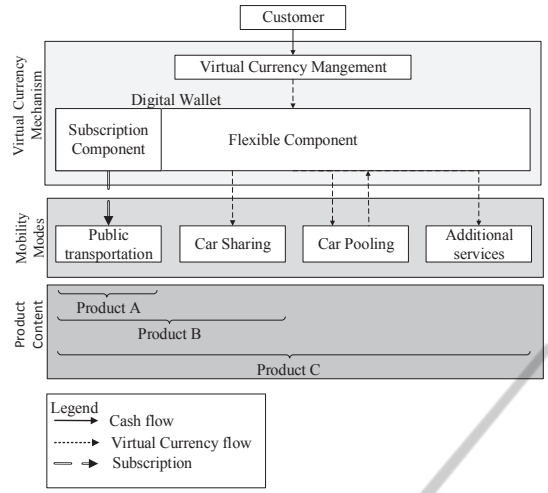

Figure 2: Information Broker Business Model Pillar Connection.

2013a). There are preceding considerations of implementing a virtual payment mechanism as a part of business models for this context (Buchinger et al., 2013b). In contrast to these intentions of virtual currency mechanisms, it has the function to virtualize the payment process of car pooling and integrate the mode into the system. To foster the usage of car pooling, this virtual currency mechanism has to be constructed with consideration of user preferences and product conditions (Beutel and Krempels, 2014). It allows to earn virtual currency amounts by providing vehicle sharing capacity and spend it towards other transport modes under consideration of ticket product portfolio characteristics and customer preferences. Hence, the virtual currency mechanism concentrates all mobility related transactions onto the information broker. This projects the fundamental idea of coalition loyalty towards the collaborating mobility provider base and creates additional value for the customers. As described before, the establishment of a virtual currency based payment mechanism is essential to integrate mobility modes like car pooling. The cash payment of car pooling can be replaced by a virtual currency payment to integrate the related transactions into the IB system. Moreover, this payment mechanism allows to extend the collaborative product portfolio due to car pooling services. The "flat rate" products can now be extended through quantitatively limited virtual currency amounts. 2 illustrates the mechanism and possible product variations. Product C is supposed to have the highest mode integration as well as strongest incentive effect for mode switching. Crucially important for the mechanism design is the implementation of a central wallet, which allows to execute offline authentications with car pooling users (Beutel and Krempels, 2014).

3.5 Financial Model

Applying an adequate and effective financial model, consisting of a revenue model and a cost model, results in a sustainable flow of revenue, which guarantees the future engagement in all above described activities. The revenue model describes the various ways the company generates cash flow by "translating the value it [the organization] offers to its customers into money" (Dubosson-Torbay et al., 2002). The cost structure refers to the sum of all resulting cost needed to perform the activities required to create and deliver the value proposition to the target customer (Osterwalder et al., 2005). (Silver, 2007) refers to them as the "capital requirements" needed to execute the business model.

4 CONCLUSION

We contributed a business model framework for providing heterogeneous mobility services on an open virtual marketplace, see 3. Business model frameworks can be used for analyzing, understanding, sharing, managing and patenting of business models (Osterwalder et al., 2005). In addition, its importance is growing in a cooperative scenario of platform consolidation: Insecurity, new environmental challenges and transparent market conditions require a guide lining framework for orientation.

Fundamentally, all components of the business models are going to be determined by the degree of involvement into the Information Broker system. The main pillars are activity configuration, distribution model, virtual payment mechanism and the financial model. These pillars in turn, can be individually specified in more detail, as described before.

It is crucially important for business model design, to consider the mutual interdependencies of the components. For example, virtual payment design influences the distribution model, as well as the activity configuration.

Future Work

Constitutive on this framework, concrete business models have to be developed in the future, to enable an efficient providing of heterogeneous mobility services on a centralized software system. During this work, it is possible to expand the framework due to new insights. Moreover, it would be interesting to

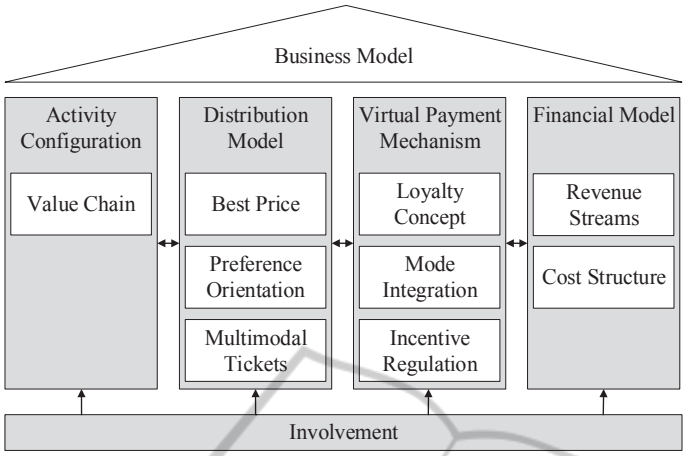

Figure 3: Business Model Framework.

quantify the financial outcomes of the construct and calibrate the business model accordingly.

ACKNOWLEDGEMENTS

This work was founded by German Federal Ministry of Economics and Technology for project Mobility Broker (01ME12135A).

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