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Four Shades of Customer: How Value Flows in Fintech Ecosystems

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Abstract

The financial sector is undergoing a massive transformation, with new technology-driven players challenging established mechanisms and transforming the sector into a fast-moving market. With the gradual transition from a scale economy to a platform-driven network economy, enterprise networks are gaining strategic importance. Despite the growing interest in fintech's, research has so far lacked a conceptualization of value creation in fintech ecosystems. Therefore, this research paper aims to analyze key players, value creation activities, and value streams based on the analysis of the business models of payment services, personal financial management, robo-advisory, peer-to-peer lending, trading, and cryptocurrency. We present a holistic value network for the fintech ecosystem based on structured literature review and analysis of 171 fintech companies. We were able to show that fintech platform orchestrates multiple market sides and that customers take four distinct roles at the center of the ecosystem when using fintech services.

Keywords: Fintech, Ecosystem, Value Modelling, Business Model, Multi-Case Study

Introduction

Fintech is an acronym resembling an amalgamation of finance and technology, comprising the combination of disruptive technologies (Artificial Intelligence, Big Data, Internet of Things, Distributed Ledger Technology, etc.) with established business activities (e.g., payments, investments, financing), resulting in new products, services, and business processes (Imerman and Fabozzi 2020; Puschmann 2017). Additionally, the term fintech also refers to innovators and disruptors in the financial sector who propose more flexibility than established financial services companies through innovative business models by leveraging ubiquitous internet communication and automated information processing (Gomber et al. 2017). Fintech business models recently experienced significant market growth, as reflected in global cumulative investments of $210.1 billion in 2021, with more than half of the investment coming from venture capital ($114.9 billion), more than doubling from 2018 ($53.2 billion) (Ruddenklau 2022).

Consequently, the financial services industry experiences a massive transformation in which emerging technological actors challenge established financial activities and transform the sector into a fast-moving market by changing business functions. New market players, often start-ups, adopt digital business strategies and join forces in corporate networks to create sustainable value (Huebner et al. 2019; Schmidt et al. 2018b). Innovative business models include offerings in payment services, digital wealth, lending, or

capital markets, increasingly expanded by further innovations in the insurance and real estate sectors (i.e., insurtech and proptech) (Huebner et al. 2019; Schmidt et al. 2018a). In particular, new payment providers (e.g., Alipay, Klarna) have gained traction due to rapid developments in mobile technologies, both online and in brick-and-mortar stores, by turning the payment process into a convenient user experience through contactless authentication, alternative "buy-now-pay-later" payment modalities, and novel technologies (especially blockchain) (Deufel and Kemper 2018; Pousttchi 2008; Ruddenklau 2022). This leads to full automation of processes, allowing customers access at any time, from any location, and at any speed (Verbovetska 2019). Thus, fintech companies, leverage their opportunities by designing business models from a customer-centric perspective and offering convenient, accessible, and efficient services to a technology-savvy clientele (Eickhoff et al. 2017; Gomber et al. 2017; Verbovetska 2019). Furthermore, stricter regulations in the financial services market, low interest rates and high cost pressure are noticeably impeding established companies, thus providing opportunities for new, lean and agile companies (Torno et al. 2021).

Using ubiquitous digital technologies within financial services requires the development of new digital business models while considering changing customer behavior and additional ecosystem participants (Eickhoff et al. 2017). Both startups and incumbents seek new ways to realize successful offerings by enhancing or completely transforming the customer experience (Gomber et al. 2018). The accompanying bundling of competencies of different market players leads to significant changes in the business, legal and technological capabilities of individual actors and ultimately to a shift from an economy of scale to a platform-driven network economy (Schmidt et al. 2018b). These emerging fintech ecosystems have strategic relevance and contain numerous interconnections affected by their actors (suppliers, distributors, service providers, etc.) (Iyer and Basole 2016; Schmidt et al. 2018a). Hence, a sound understanding of those ecosystems with independent actors and value flow between them is required with respect to the design and refinement of fintech business models (Gordijn et al. 1999). In the field of fintech research, a few studies address value networks. These papers describe blockchain ecosystems (Riasanow et al. 2018a) or analyze bitcoin mining profitability using value networks (Derks et al. 2018). Riasanow et al. (2018b) compare the traditional with fintech ecosystems emphasizing on innovation patterns. Additionally, multi-sided platforms in the Insurtech sector are examined (Pousttchi and Gleiss 2019) or the ecosystem of emerging financial regulatory reporting systems is analyzed (Floetgen et al. 2020). Riasanow et al. (2021) adopt another viewpoint and examine similarities in digital transformation of different platform ecosystems. Nevertheless, knowledge about value creation in fintech ecosystems is limited and requires further research (Puschmann and Shiba 2021). So far, there is no research that addresses a view from inside fintech platforms to the surrounding ecosystem, while focusing on key value-creation activities. Against this backdrop, we pose the following research question:

How is value created and exchanged within the fintech ecosystem?

To address this research question, we analyze the value network of multiple fintech business models based on a multi-case study with 171 companies operating in the business models of payments, personal finance management, robo-advice, peer-to-peer (P2P) lending, trading, and cryptocurrency by deriving a generic ecosystem map around these platforms. The paper is structured as follows. First, the theoretical background describes the digital transformation of the financial sector, the role of platforms as enablers to new ecosystems, as well as an approach for ecosystem modeling. Second, the research method for conducting the multi-case study and deriving the value network is presented. Afterwards, the value network of the fintech ecosystem is outlined by means of particular platforms, providing insights into the configuration of the roles, value streams and core value activities involved, until finally the entire value network around these platforms is presented. Based on the empirical investigation, key aspects of the value network are then analyzed as well as limitations of the investigation are discussed. Finally, we briefly summarize our results and provide an outlook for further research.

Theoretical Background

Digital transformation of the financial sector

The financial industry has already adapted emerging technologies for core banking systems and opening them up for end customers via self-services (ATM, online banking, etc.) in the early days of the digital age, leading to the industry's status as an IT-savvy sector that rapidly embraces technological innovations

(Beinke et al. 2018; Eickhoff et al. 2017; Huebner et al. 2019). Despite above-average IT investments within the banking sector (Gopalan et al. 2012), the digital transformation of business models and processes in the financial sector has been poorly driven, thus paving the way for the new fintech movement (Alt et al. 2018; Gopalan et al. 2012). In this regard, the fintech movement was driven by four influencing factors: (1) an accelerated adoption of innovative hardware- and software-based IT solutions (smartphones, social media, platform-based software ecosystems, etc.), (2) the emergence of new non-bank companies that brought a creative, dynamic as well as digital mindset to the financial world with a start-up mentality, (3) new expectations of increasingly informed "digital natives" and accompanying changes in bank customers' behavior toward multi-bank relationships, and (4) increasing pressure on traditional financial services companies due to regulatory restrictions as a result of the 2007 financial crisis (Alt et al. 2018; Alt and Puschmann 2012).

In addition, fintech innovation has been driven further by substantial amounts of venture capital, services with value propositions that are distinctly different from traditional banks due to their innovative nature, and business processes accessible without spatial and temporal constraints (e.g., bank business hours) (Gomber et al. 2018). Fintech refers to a revolution of the financial sector based on the congruence of different technologies (artificial intelligence, big data, platforms, distributed ledger, etc.), a customer-centric perspective, new business models, and profound process changes as well as service transformations (Alt et al. 2018; Puschmann and Shiba 2021). Although the term “fintech” aims at different concepts in extant literature, it usually includes the three dimensions innovation object (business model, product/service, organization, process, or system), degree of innovation (disruptive or incremental), and innovation scope (inter- or intraorganizational) (Puschmann 2017). Drawing on Eickhoff et al. (2017, p. 2), we conceptualize fintechs as organizations "*that operate at the intersection of (i) financial products and services and (ii) information technology [and] are usually (iii) relatively new companies (often startups) with (iv) their own innovative product or service offerings*". Fintechs operate digital platform business models to facilitate interactions between actors from two or more previously independent markets (Eisenmann et al. 2006; Langley and Leyshon 2021; Staub et al. 2021). These actors form digital business ecosystems surrounding fintech platforms with the purpose of managing (end) customers’ financial assets (Adner 2017; Floetgen et al. 2021). Although some fintechs have a full banking license (e.g., N26, Klarna), most of these companies offer their services without a banking license and instead partnership with traditional banks or banking-as-a-service provider (e.g., Solarisbank, Railsbank) for providing services that require a full banking license or to access regulatory and risk management expertise (Floetgen et al. 2021; Gimpel et al. 2018).

Platforms as enabler of Fintech Ecosystems

Fintech platforms act as intermediaries between multiple participants in fintech ecosystems (Floetgen et al. 2021; Xie et al. 2021). Hence, they connect participants from previously independent markets and allow financial transactions between them exploiting the two-sided market paradigm (Armstrong 2006; Rochet and Tirole 2003, 2006). The reintermediation effects of platform business models in fintech result in consolidation tendencies and a high capitalization of these businesses (Langley and Leyshon 2021). This also involves strong market externalities and winner-takes-all tendencies (Hinz et al. 2020; Parker and Van Alstyne 2005; Rietveld and Schilling 2021). Successful fintech platforms should possess the following characteristics (Dhar and Stein 2018): open access, standardized domain-specific business processes, and technological foundation. The degree of openness determines which participants can use the platform (Benlian et al. 2015). The standardized execution of financial transactions on technological enablers allows for more convenient self-services processes for customers compared to traditional banking (Pousttchi and Gleiss 2019). Dhar and Stein (2018) term platforms with these characteristics “complete” and give electronic exchanges as well as robo-advisors as examples. Also, business models that realize payments or peer-to-peer lending are notably in line with the platform business model, as they mediate multi-sided relationships between their users while coordinating network effects of connectivity (Langley and Leyshon 2021). Because of their flexible and highly customized technological infrastructures, platform business models can quickly scale up with rising demands (Choudary 2015). With the amalgamation of two-sided market business models (i.e., transaction) and technological infrastructure for existing and future markets (i.e., innovation), fintech platforms can be classified as hybrid platforms (Gawer 2021; Schütte and Wulfert 2022).

Value modelling of Ecosystems

The business model aims to bridge the gap between strategy and business processes by describing the dimensions value proposition, value architecture, value network, and value finance while abstracting from real-world companies through conceptualizing business model instances or business model types (Al-Debei and Avison 2010; Osterwalder et al. 2005). The value network is seen here as "*a way in which an organization enables transactions through coordination and collaboration among parties and multiple companies*" (Al-Debei and Avison 2010, p. 366). Focusing on value activities—a core concept of business models—through which value or benefits are generated within the ecosystem facilitates the subsequent formulation of requirements for business processes and system architectures, which require a more elaborate view (Eickhoff et al. 2017; Gordijn et al. 2000; Pousttchi 2008). In this context, numerous modeling languages (e.g., e³-value, Causal Loop Diagram, Strategic Business Model Ontology) exist for modeling value networks with different levels of understanding (John et al. 2017). The e³-value ontology, originally from computer science, is used across domains and hence suited to represent organizational ecosystems in which actors create complementary value to achieve a common goal around a digital platform (John et al. 2017; Pousttchi and Gleiss 2019; Reuver et al. 2018). Although the focus of e³-value is on actors, value objects and value activities as well as associated exchange relationships, in addition to purely network-related aspects—similarly to the geometric-oriented Business Model Canvas—supply-, customer- and finance-related aspects are partly considered as well (Gordijn et al. 2005; Osterwalder et al. 2010). As a result, the e³-value ontology provides a basis for aligning business processes in line with the business model (Solaimani and Bouwman 2012).

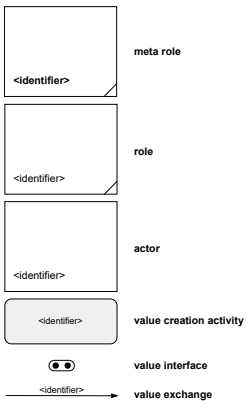
Element	Description	Symbols
Actor	Specific economic entity functioning as a market participant (e.g. actual person, company)	
Role	Symbolic market participant with value-adding activities, where one or more roles can be assigned to an actual market participant.	
Meta-role	Summary of similar roles (for model simplification)	
Value creation activity	A profit- or benefit-increasing activity of an actor or role	
Value interface	Value exchange grouping to an atomic value exchange consisting of at least one input and output value port	
Value exchange	Value link among actors or (meta-)roles	

Table 1. Notation of the role-based e³-value modeling language

The e³-value ontology thus represents a suitable tool for analyzing the value network around fintech platforms (Pousttchi and Gleiss 2019; Riasanow et al. 2018a). To illustrate the value exchange relationships within fintech ecosystems, the notation following Pousttchi (2008) is used, which enables generalization through use of roles. Table 1 indicates elements of the e³-value notation used in this study (Gleiss et al. 2021; Pousttchi 2008). In this context, roles represent a central concept of reference models, as they remain stable across different business model instances, while actors represent independent economic entities acting as market participants (Pousttchi 2008). For abstraction purposes, meta-roles are further used to aggregate similar roles (Gleiss et al. 2021). As mentioned above, value creation activities generate a benefit or added value and can be assigned to an actor or a (meta-)role. Value interfaces, which consist of one or more value ports, act as either an input or an output for an exchange of value, receiving or sending value between entities via the value ports within the value interfaces (Pousttchi 2008). The resulting value exchange provides a link between the or actors or (meta-)roles and delineates the exchanged value (Gordijn et al. 2000).

Research Method

Based on the dynamic and emerging nature of the subject under consideration, we use a mixed-method approach in two stages within the scope of our analysis. We combine a systematic literature search with a multi-case study to derive value networks in the fintech sector. First, we use the systematic literature search, to identify the knowledge anchored in the literature corpus and build a theoretical lens from it for the case study (Niederman and Salvatore 2019). Second, we complement these findings with a multiple-case study that uses comparative analysis to identify relevant components of value networks (e.g., roles, value streams) (Yin 2013). This dual approach we propose is explicitly suited for theory building, as the systematic literature review ensures the incorporation of existing knowledge for theory building (Webster and Watson 2002) , and the multiple-case study complements it through its high "*likelihood of generating new theory*" (Eisenhardt 1989, p. 546).

Systematic literature search: The search is based on the methodological approach of Webster and Watson (2002) in combination with vom Brocke et al. (2015) with the objective of developing a theoretical lens for the multi-case study. With reference to the object under consideration and the objective, the search string *"("Fintech" OR "Financial technology") AND ("taxonomy" OR "classification")*" was used in three well-known databases (i.e., AiSeL, Scopus, IEEE) with initial 418 hits. To ensure an appropriate level of quality, additional quality criteria were added to the search. Non-English language articles, panels and commentaries, purely technical articles and articles with a pure business model focus were excluded. Based on title and abstract as well as the quality criteria, 29 matching publications were identified. The articles were independently analyzed by full text screening and coded. Based on the analysis, 12 final articles were identified, and a forward and backward search was performed to include a broad range of business model types, identifying two more articles, bringing the total number to 14. Following Webster and Watson, the codes were aggregated into six fintech business models in a concept matrix (see Table 2).

Source	Payment	PFM	Robo-Advice	P2P Lending	Trading	Cryptocurrency	Study purpose
Eickhoff et al. (2017)	●		●	●	●	●	Fintech business models archetypes
Gomber et al. (2017)	●		●	●	●	●	Novel and innovative business functions in digital finance
Beinke et al. (2018)	●			●	●	●	Fintech business models archetypes for start-ups using blockchain
Gimpel et al. (2018)	●	●	●	●	●	●	Non-functional characteristics of consumer-oriented fintech start-ups
Gomber et al. (2018)	●	●	●	●	●	●	Forces of innovation, disruption and transformation in fintech
Schmidt et al. (2018a)	●	●		●		●	Collaborative business models in ecosystem of fintechs and banks
Schmidt et al. (2018b)	●	●		●		●	Data-driven business models in fintech
Das (2019)	●	●	●	●	●	●	Primary areas in fintech
Huebner et al. (2019)	●	●	●	●	●	●	Fintechs intermediating functions archetypes
Verbovetska (2019)			●	●			Financial services through the lens of process virtualization theory
Caragea et al. (2020)	●		●	●			Fintech innovations
Imerman and Fabozzi (2020)	●	●	●	●	●	●	Fintech innovations
Puschmann and Shiba (2021)	●		●	●	●		Fintech-driven solutions for sustainability
Torno et al. (2021)		●			●	●	Mobile personal finance applications archetypes

Table 2. Fintech business model types

Multi-Case Study: We explicitly chose a multiple case study because it allows knowledge to be gathered on a broader basis from a set of cases that differ in environmental aspects but share a common phenomenon (Yin 2013). As a result, selecting multiple cases is critical for identifying cross-case patterns and the basis for comparative analysis (Eisenhardt 1989). Furthermore, multiple cases are necessary to go beyond the specificity of each case and to gain generally applicable insights that benefit the artifact class (Gregor and Hevner 2013): Value networks in fintech sector. Based on the theoretical lens developed through the

literature review, a search was conducted on Crunchbase and 171 relevant companies were identified. Referring to the scientific idea and the accumulation of knowledge, we provide the case list (https://bit.ly/3vDrK3u). The analysis of the companies is based on publicly available data sources (e.g., description of the portfolio of offerings, FAQ sections, developer portals, press releases) and was conducted in five phases following Peppard and Rylander (2006) to shape the value network. The starting point of the analysis was the classification of the companies and their business models into corresponding value networks (e.g., Payment, Robot-Advisory) based on the theoretical lens. For the respective business model instances (Osterwalder et al. 2005), the actors with influence on value generation were then identified and abstracted into roles (see Table 4). By using the role concept, a reference model is created that remains stable across the individual use cases (Pousttchi 2008). Subsequently, the value creation activities and the associated vale exchanges were derived for the roles (Peppard and Rylander 2006; Pousttchi 2008) and, based on this, the corresponding value network was modeled for a subdomain. This was repeated for all six subsectors and finally consolidated into a fintech-wide value map (see Figure 1).

Result: Value Creation in Fintech

Understanding the mechanisms of value creation through digital platforms and the underlying exchange relationships within the fintech industry first requires an overview of the relevant participants. The starting point for the multi-case study was the identified market segments and business models from the literature, thus a generic value network was derived for each market segment. According to Peppard and Rylander (2006), the entities relevant for value creation as well as value flows between them were identified (Gleiss et al. 2021). For a more detailed understanding of the market mechanisms, the service portfolio was further analyzed and related value-creating activities were derived (Gordijn et al. 1999; Pousttchi 2008). These generic partial value networks for each fintech sector serve as a foundation for constructing an overall value network spanning the fintech market.

Payment

The first approach to value creation in the fintech market is the analysis of platforms with a service portfolio including payment applications and services in both the online and brick-and-mortar sectors (Eickhoff et al. 2017; Riasanow et al. 2018b). A payment service includes the initiation, authorization, clearing, and confirmation of money transfers, which enables the delivery of goods and services (Zhong 2009). As a multi-faceted platform, the *Payment Service Provider (SP)* typically operates without regulatory restrictions in order to perform its value-added activities relying on existing regulated infrastructures as well as financial products offered by third party market participants holding a banking license (Huebner et al. 2019; Reuver et al. 2018). In line with the purpose of value network modeling, the study aims to capture a comprehensive view of exchange linkages between participants (Gordijn et al. 1999), thus the analysis encompasses a variety of scenarios in the fintech market. Initially, the prerequisite for value creation is the desire of the payer of purchasing goods or using services, making the relationship between *payer* and *payee* a central one. The purchase of products or services on the customer side and the offering on the seller side thus represent central value creation activities that lead to an exchange of goods or services in exchange for payment requiring a payment process (Lowry et al. 2006).

The Payment SP offers mobile applications to perform the transaction, thus unbounding the payment from native environment allowing payment scenarios such as online, in-person, and peer-to-peer payments (Cai et al. 2019; Kazan and Damsgaard 2016). Hence, both *online* and *stationary merchants* with physical points of sale rely on the same payment service, therefore, due to overlapping value streams and for the purpose of generalization, online and stationary merchants are aggregated into the meta-role of payee. Due to multiple driving factors, including fast processing, increased security, and low cost—especially for merchants—in-person payments, which were previously fixed to cash or card payments, are increasingly gaining acceptance (Deufel and Kemper 2018; Li 2018; Moghavvemi et al. 2021). To illustrate the structure of the value network, Table 3 presents example value linkages for fintech payment services.

From entity	Value exchange	To entity
Payment SP	Convenient payment; Expense transparency; Convenient transfer; anonymous payment	Payer
Payer	Debit interest and fees; Transaction; Money; Data; New users through word of mouth	Payment SP
Payment SP	Customer contract	Lender

Table 3. Excerpt from the Fintech market value network

When executing the payment, the payer usually has a number of options, which affect the value flow. Direct payment debits the payer's bank account immediately after the purchase, thus the transaction is an indirect value-add for the payment service provider as he is authorized to process the payment, resulting in a direct added value in form of transaction fee paid by the merchant, receiving in return the outsourced payment process (e.g., Klarna or Revolut). The Payment SP platform thus pursues a multi-sided revenue model in which the payer triggers the transaction and provides the necessary payment data, while the transaction fee is charged to the payee (Schüritz et al. 2017). In case the payer chooses an additional pay later option (payment on account, installment payment, etc.), further value is generated for the Payment SP in terms of interest charges and other fees (account maintenance, late fees, etc.) (e.g., Opy or Zip). The required installment loans are usually realized by a banking partner as a *lender*, since the Payment SP itself does not have any banking license (e.g., Affirm or Opy). Regardless of payment option choice, the payer experience convenient payment processing as a result of the transactions' speed, simplicity, and additional services (Deufel and Kemper 2018; Liu et al. 2016).

To complement the core service, Payment SP issue their customers with a credit card, increasing the platform's customer base—for both in-person and online payment transactions—while leveraging established credit card payment infrastructure as a two-sided market strategy (e.g., Klarna or Revolut) (Gawer 2021). Typically, four actors (payer, payee, card issuer and acquirer) are involved in the processing of a credit card payment (Plateaux et al. 2018), therefore the card *issuer* as well as the *acquirer* are considered in the value network. To ensure positive network effects, this involves subsidizing the payer's side and financing the payment by the payee through a transaction fee charged by the acquirer, who in exchange authorizes payment (Cash and Tsai 2018; Kazan and Damsgaard 2016). An issuer responsible for physical or digital card issuance holds the necessary banking license, has a direct customer relationship with the payer and profits from transaction fees (e.g., Curve or Zilch). Since the card issuance process is fully automated by Payment SP, this also employs virtual one-time-use credit cards, whose validity expires after one transaction (e.g., Zip). Both lender and issuer are combined into a meta-role as a *bank license partner* to allow generalization and specialization.

Payment SPs offer further services, such as peer-2-peer (P2P) money transfer between the digital wallets of the platform participants (e.g., PayPal or Revolut), which increases the number of users on the payer side. As a result, platform attractiveness on the payee side grows, leading ultimately to indirect network effects (Reuver et al. 2018; Staykova and Damsgaard 2021). Further value activities are prepaid offers that enable anonymous online payment by replenishing the payer's digital wallet at the retailer's location and providing the payment SP with its infrastructure (e.g., paysafecard). Moreover, payers receive services to control their expenses (reports, budgets, etc.), which gives them more transparency and control over their expenses, while the Payment SP gains additional customers' data (interests, payment willingness, etc.) (e.g., KakaoPay or Klarna). Lastly, customer loyalty programs (reward offers, vouchers, cashback promotions, etc.) are offered to strengthen customers' engagement with the payment platform ecosystem as well as matching payers and payees (e.g., Klarna, PhonePe or Rakuten).

Personal Finance Management

Personal Finance Management (PFM) services empower customers to plan, monitor and organize their financial resources while increasingly being integrated into online banking portals of financial institutions or offered as dedicated services by platform providers (Laks et al. 2013; Nüesch et al. 2015; Sachse et al. 2012). Due to changing customer loyalty towards utilization of multiple banking providers for different financial purposes, a demand for PFM offerings that aggregate data from different sources using multi-

vendor integration is increasing (Sachse et al. 2012). Value propositions typically include transaction categorization (rent, groceries, entertainment, etc.), budgeting, advanced financial analytics, future forecasting, and advice on lower-priced products (insurance, loans, mobile plans, etc.) based on personal transactions (Alfaro et al. 2019; Torno et al. 2021). Ideally, PFM SP support the optimization of consumers' financial situation by presenting, managing, and optimizing their personal financial and insurance situation (Busch et al. 2022; Fischer 2021).

For realizing the value proposition, the *PFM SP* supplies the customer, acting as *finance manager* in this context, with reports on his financial situation (categorized income and expenses, budget utilization, savings made, etc.) and in some cases combines these with a credit score, which he inquiries from a *national credit agency* (e.g., Credit Karma). To determine the credit score, credit agencies primarily use past loan repayments from various lenders as base data (Liu et al. 2006; Tan and Phan 2016). The PFM SP receives the necessary account and transaction data from credit *card issuers* or *deposit account providers*, aggregated in the *Bank License Partner* meta-role. For this, banks either provide standardized interfaces (e.g., in Europe based on PSD2) or collaborate with the PFM SP to offer a credit card or current account as part of the service to the finance manager (e.g. Deutsche Bundesbank) (Fischer 2021). The PFM SP's service is financed by subscription fees and or by commissions received for intermediating financial products and services offered by partner service providers. In some cases, PFM SPs offer loans that are designed to improve credit scores through regular repayments and a delayed disbursement of the loan amount once the loan is paid off in full (e.g., Brigit or Self). The offering is complemented by reward programs which are implemented by the PFM SP itself (e.g., Verabank) as well as an affiliate *advertising platform* (e.g., Cardlytics for Kora) by providing incentives (cashback promotions, rebates, etc.) for the finance controller to take advantage of beneficial offerings (e.g., Kora or VeraBank).

Robo-Advice

Prior to the fintech revolution, investing was a manual process guided by a human advisor assessing a customer's investment goals, investing the customer's money accordingly, and managing his or her portfolio. Robo-advisory is a new, automated way for (private) customers to invest their money (Jung et al. 2018b). *Robo-advisor SP* offer digital financial advisory services that do not require human-to-human interaction, but shift the focus to human-computer interaction by guiding the client through an automated investment advisory process (Jung et al. 2018a). It manages a customer's portfolio automatically without any human intervention exploiting a set of rules and artificial intelligence (Fein 2015). A questionnaire is used to determine the investors' objectives and the responses analyzed through an algorithm, determining and implementing a suitable investment strategy (Beketov et al. 2018; Fein 2015). In addition, the robo-advisor is capable of continuously monitoring and managing the portfolio and either recommending appropriate investments or executing them automatically (Fein 2015; Jung et al. 2018a). In literature, two groups of robo-advisors are described: static and dynamic ones (Jung et al. 2018a). While the former only rebalances the portfolio in the case of deviation of the identified goal, the latter provides the possibility to interfere at any time (Jung et al. 2018a). The client can always adjust his investment strategy which leads to an adjustment of the portfolio (Jung et al. 2018b).

An *investor* participating in a robo-adivsory platform wants to invest his or her money and seeks for a qualitative management of his financial assets. Hence, the customer of a robo-advisor provides customer information and the money for the investments (e.g., M1 Finance). The robo-advisory involves three major value creation activities (i.e., customer assessment, automatic and human portfolio management) (e.g. Nucoro). By exploiting the customer information, the robo-advisor assesses the customer (e.g., by using a questionnaire) to identify a suitable investment category with appropriate assets. This category is used for the automated portfolio management (e.g., Nutmeg). The robo-advisor adds assets provided by an independent *asset provider* to the portfolio of the customer, manages the money transfer and the investments. This management of investments is the main cause for fees of a robo-advisor and can vary in the case of Nutmeg between 0,62 % and 1,02 %. The asset provider manages different asset classes such as real estate, ETFs, art or cryptocurrencies. Further financial services are offered to the customer by the financial institute such as banking or pension and further assets provision by an *asset manager*.

Therefore, a financial institute collaborates with the robo-advisor so the advisor can offer more financial services in exchange of a transaction fees and the *financial institute* can extend its own customer base. A *financial supervisory authority* supervises the robo-advisor and the financial institute. Further, it provides

them with licences, and they pay a fee to the authority (e.g., Liquid is supervised by the BaFin) (Dai 2021). In addition to those identified actors it was noticeable that many B2C companies, such as Nutmeg or M1 Finance, do not offer a robo-advisor service with automatic investment services but instead rely on humans for portfolio management activities. However, B2B provider companies, such as Nucoro or Bambu, provide robo-advisor services, automatically managing customers' portfolios and investing money.

Peer-to-Peer Lending

In a traditional banking context, a borrower who needs money seeks out to a bank or a credit company to ask for a loan. *Peer-2-Peer Lending SP* avoid banks or credit companies and function as intermediaries to match lenders money with borrowers need for money (Berger and Gleisner 2009; Lee et al. 2011). This enables the borrower to receive a loan with a lower interest rate (Herzenstein et al. 2008; Klafft 2008). On the other hand, the lender is able to invest his or her money with a predefined interest rate (Klafft 2008). This also results in lower transactional cost because of the lack of any financial company due to peers exchanging money directly (Klafft 2008; Lee et al. 2011). The lending without the involvement of a financial institute results in a high degree of information asymmetry between lender and borrower that is partially outweight by the P2P platform (Lee et al. 2011; Suryono et al. 2019). To prevent this asymmetry many P2P lending platforms (e.g., Auxmoney) recommend the borrower to provide several information to possible lenders. Such information could be the loans purpose, debts or delinquencies of the borrower (Klafft 2008).

When a customer needs to *borrow* money, he or she registers to a *P2P lending Service Provider* where a credit request has to be filled out by the applicant and then he or she receives a loan offer, which can be accepted or declined by the applicant (e.g., Auxmoney). The platform also checks the received information and can accept or decline the credit. When accepting the loan, the platform offers the loan as investing opportunity to the *lenders* (e.g., Prosper). Those then can decide if they want to invest or lend their money to the borrower. If lenders invest their money into a borrower, the borrower receives the money on his banking account and normally has to pay it back monthly starting from an agreed due date (e.g., Prosper). This money then is received by the lender as return. All financial transactions are handled with the help of a *deposit bank* which provides those services. But they are normally not involved with the loan offering.

Trading

The concept of the neo-broker is comparable to that of neo-broking and describes trading in stocks and shares without a physical presence (Imerman and Fabozzi 2020). Instead, the focus is primarily on digital communication that is handled via smartphone apps or websites (Imerman and Fabozzi 2020). In this new form of stock trading, the customer invests his money through the *Trading SP* in shares, ETFs or other products at the appropriate trading times of the connected *marketplace* (stock exchange, market maker) in a self-determined manner without an advisor (Frölich and Lembach 2021). Particular incentive of this new trading opportunity is, in addition to the independence, the price of the service. In contrast to traditional banks, *investors* are often charged very little or no fees at all (Frölich and Lembach 2021). This is made possible by the principle of payment by order flow, in which a broker specifically settles all customer orders via a market maker or trading venue and receives a corresponding commission for this, which again arises from the spread as the bid/ask spread of the trading venue. Another difference and aspect of the price difference is the banking license, in contrast to classic brokers neo-brokers do not have this, but cooperate with a custodian bank, which provides the settlement accounts and corresponding banking services.

Cryptocurrency

Distributed Ledger Technology (DLT) enables decentralized, digital trust verification by consensus without the involvement of a central party (Gomber et al. 2018; Kannengießer et al. 2019). This is based on the operation of highly available distributed database (ledger) stored on peer-to-peer distributed nodes (i.e., storage and computing devices) and protected against tampering by cryptographic concepts (Sunyaev et al. 2021; Wenke et al. 2022). The most prominent conceptual instance of DLT is blockchain, which comprises a tamper-proof transaction history forming a foundation for transaction transparency (Verbovetska 2019; Wenke et al. 2022). Cryptocurrencies (e.g., Bitcoin, Ethereum) are predominantly an implementation of the blockchain concept and act as a digital representation of a medium of exchange and store of value. Thereby, cryptocurrencies guarantee the transaction flow and the creation of additional currency units

based on cryptography (Eigelshoven et al. 2021; Kannengießer et al. 2019). In contrast to traditional fiat currencies, managed by an institution recognized as trustworthy (e.g., central bank), cryptocurrencies are issued by private developers (Das 2019; Eigelshoven et al. 2021).

Cryptocurrency Exchange SP (e.g., Coinbase, MoonPay) offer trading services for exchange of traditional fiat currencies and cryptocurrencies. From the customer's perspective, the exchange is an investment in a digital asset, with the cryptocurrency portfolio managed in a wallet (Eigelshoven et al. 2021; Jorgensen and Beck 2022). A *miner*, which is part of the DLT system, verifies the transaction on the *blockchain network* and receives a reward (block reward or transaction fee) in return (Eigelshoven et al. 2020). Here, the miner is responsible for validating and storing the distributed data as well as its integrity (Rückeshäuser 2017). Furthermore, specialized hardware (e.g., ASCI miners) and mining pools are often utilized for efficient mining, which requires the provision of appropriate *hardware* and *software* (Eigelshoven et al. 2020; Sedlmeir et al. 2020). Similarly, different hardware and software-based mechanisms (cold and hot wallet) are provided for storing the cryptocurrency (Jorgensen and Beck 2022). Since mining cryptocurrencies and verifying transactions is energy-intensive due to complex calculations (Eigelshoven et al. 2020), miners benefit from discounted electricity rates or partnerships with *power suppliers* to reduce mining costs.

Overview of the Value Network

Building on the above-described sub-ecosystems of fintech platforms, the respective actors were analyzed, aggregated and corresponding value creation activities as well as resulting value flows were summarized into an e³-value value network, which represents the generic corporate ecosystem (see Figure 1).

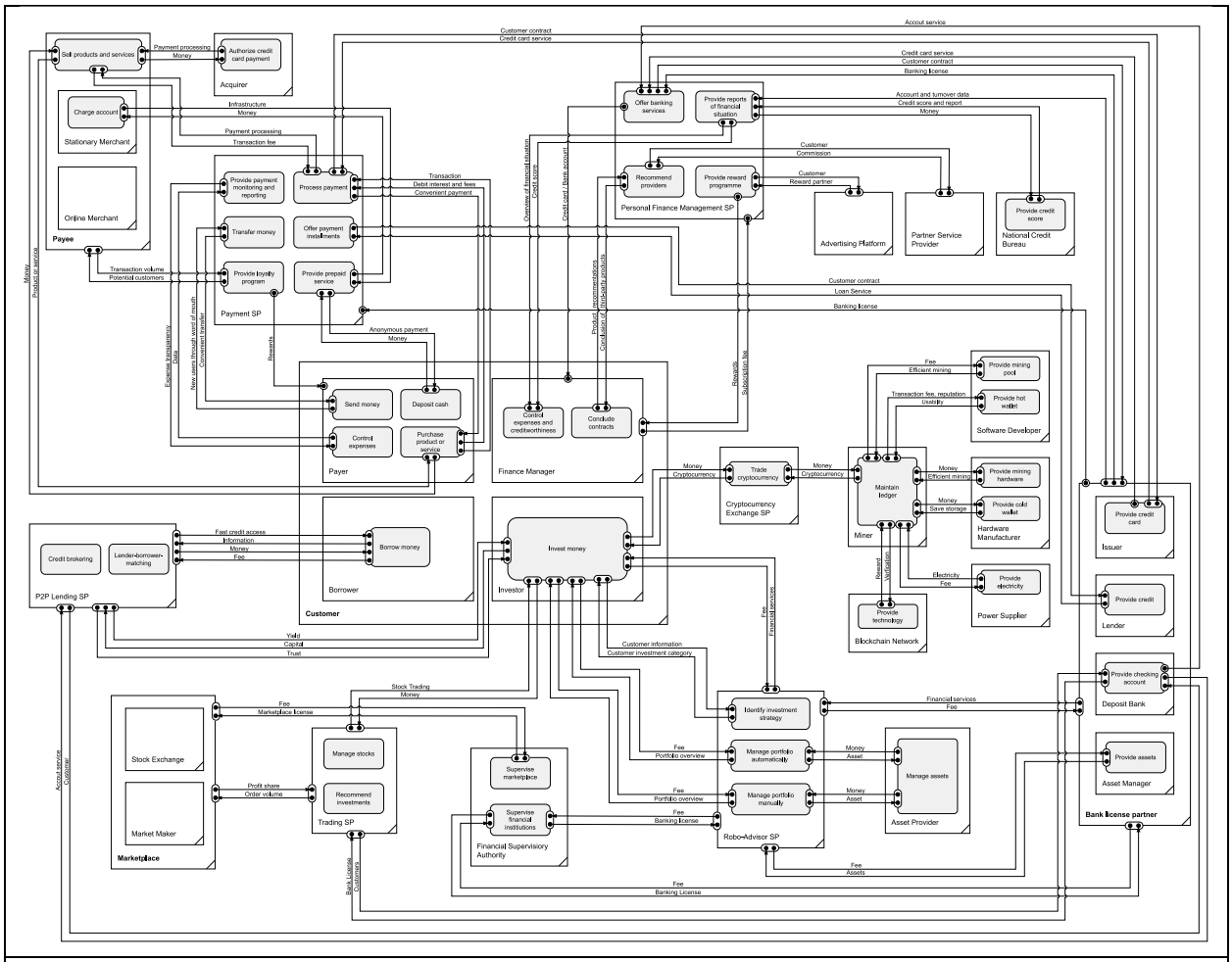


Figure 1. Generic fintech value network

The customer was aggregated into a meta-role fulfilling four different roles (i.e., payer, financial manager, borrower, and investor) within the fintech ecosystem depending on the service used. It also becomes evident that the fintech platforms rely significantly on several bank-licensed partners in order to realize their offerings within the financial market. The aggregated roles and their attribution to the platforms is presented from Table 4 in the appendix.

Discussion

Fintech platforms orchestrate different types of participants from multiple market sides. As multi-sided markets, they are able to benefit from direct and indirect network effects to propel their business (Armstrong 2006). However, platform business models require a proper coordination of the market sides to reach a certain threshold of actors for the network effects to occur (Janiesch et al. 2020; Shapiro and Varian 1998). Our value analysis in fintech ecosystems revealed platforms with three to five different types of roles involved in financial transactions (e.g., payment, robo-advisory). These financial transactions requiring several different actors pose additional coordination requirements for focal platforms. Additionally, the attraction of enough actors on each market side to create enough traction and reach a minimum threshold is already challenging on two-sided markets (Schirrmacher et al. 2017). It gets even more complicated with additional market sides involved demanding proper ignition strategies. Although the customer is at the center of our fintech ecosystems, prior research proved that these strategies usually address the supply side (e.g., asset provider, bank license partners) (e.g., Eisenmann et al. 2006; Parker et al. 2016; Parker and van Alstyne 2016). In addition, the ecosystem shows that fintech business models put the customer at the center and enable them to take on multiple roles due to increasing multi-bank relationships (Alt et al. 2018), which offers entirely new opportunities. For instance, using digital technologies, any customer can easily adopt both the role of borrower and investor, effectively stepping into the role of a bank with little effort.

Despite insights into the value creation of fintech ecosystems, the research has some limitations. The case study is driven by established offerings in the fintech market, bringing platform-based services widely adopted in this sector to the forefront of our analysis. As the example of cryptocurrency demonstrated, emerging technologies such as blockchain or artificial intelligence can disrupt proven business models in the financial sector, resulting in an impact on the value creation network. By automating through smart contracts, blockchain technology also holds potential to reduce necessary trust between business partners, leading to disintermediation where intermediaries are gradually removed from the ecosystem (Beinke et al. 2018; Huebner et al. 2019). Thus, future research projects include an investigation exploring the effects of disruptive technologies on fintech business models (e.g. venture capital, asset securitization) and associated changes in value flows (Chen et al. 2022). Moreover, our multi-case study especially considered multi-sided platforms entering the financial sector. Nevertheless, incumbents increasingly provide digitally supported financial services competing with new entrants. For instance, selected banks offer personal finance management tools as additional services (Gomber et al. 2017). Thus, they are possible interesting objects of investigation. Modeling the value flows we concentrated on external connections between actors in fintech ecosystems and neglected intra-actor value flows. The design of our multi-case study did not reveal any information on intra-value creation and the structure of value creation within case companies selected. In addition, some support services (e.g., fraud detection, debt collection) were excluded from the analysis, since our study aimed to analyze the services from an end customer's perspective. This provides an opportunity for further research and the associated incorporation of a B2B perspective into the ecosystem. Besides, potential connections between Fintech service provider as well as participants from other domains were not considered and therefore topics could be further explored within an interdependency analysis (Adner 2017). In this context, the emerging areas insurtech and proptech, which exhibit overlaps with the fintech industry (Das 2019; Imerman and Fabozzi 2020), may also be analyzed from a value network perspective and integrated into the value network. Furthermore, the derivation and modeling of roles, value creation activities, and value flows is prone to potential modeler bias. Although we tried to balance the level of abstraction, level of value creation, and degree of value flows between actors, the actual model was created subjectively by single persons. The synchronization of abstraction was established in regular meetings among the author team and a final workshop aggregating the overall ecosystem value model.

Conclusion and Outlook

The emergence of fintech technologies companies through ubiquitous digital technologies is transforming the entire financial industry and marks a new era of business models in the financial services sector. Through competence bundling of different market participants, the financial sector is shifting from an economy of scale to a platform-driven network economy, which is why corporate networks are becoming increasingly strategically important. Based on a literature analysis, we identified six major areas in fintech (i.e., alternative payment services, personal finance management, robo-advisory, peer-to-peer lending, trading, cryptocurrency). These areas consist of a focal platform orchestrating independent participants from multiple markets. We identified 28 roles (e.g., customers, service and bank license provider) in a multiple case study approach involving 171 single cases. We also derived major value creation activities (e.g., process payment, recommend providers, manage portfolio automatically) of these actors and the value flows (e.g., money, information, assets) between them. We depicted the overall fintech ecosystem with actors, value creation activities, and value flows using the e^3-value modeling notation. The customer meta-role forms the center of the fintech ecosystem, where the customer can take on four roles in a fintech ecosystem (i.e., payer, finance manager, borrower, investor). Value for the focal customer is created and exchanged through fintech platforms forming multi-sided markets. They provide advanced financial service to the customer by intermediating between the customer and additional fintech actors.

Although we already cover six major areas in our fintech ecosystem map, future research may investigate roles, value creating activities, and value flows in additional fintech areas such as insurance or property as well as further business cases, empowered by DLT. A further evaluation of the customer role in fintech ecosystems could result in principle for customer-centered designs of platforms in this domain with an increased customer experience. Future research might also further detail single actors within fintech ecosystems and their internal value creation activities and value flows. In the same vein, an analysis of incumbent financial companies (e.g., banks, financial advisors) might be worthwhile investigating for providing a more holistic overview on the fintech ecosystem. Considering the multi-sidedness platforms in fintech ecosystems and the number of startups in this sector, future research could also provide dedicated ignition strategies for successfully establishing platforms that reach a minimum threshold of participants. As we focused on the identification of roles and value in fintech ecosystems, an important avenue for future research would be an analysis of the impact of different technologies applied within the six areas or fintech in general on value creation. In conclusion, the paper provides an overall view of the key areas, roles relationships and value flows in the fintech sector and aggregates these into a consolidated value network.

Appendix

Role	Meta-role	Explanation	Payment	PFM	Robo-Advice	P2P Lending	Trading	Cryptocurrency
Payment SP	-	Platform providing convenient and fast payment transaction as part of on-line or face-to-face purchase process, offering multiple payment options and complementary services (e.g., Klarna, Zip Co).	•					
PFM SP	-	Platform offering services for automated tracking and analysis of financial situation with a primary goal to achieve transparency and optimize the financial situation through add-on services (e.g., Credit Karma, Self Financial, Kora).		•				
Robo-Advisor SP	-	Platform with intelligent user assistance components that match asset providers and clients who invest capital in automatically selected assets (e.g., Stash, Nucoro, Bambu).			•			
P2P SP	-	The platform matching borrowers with lenders where borrowers present their investment project and the lender can choose from the presented projects for their investment (e.g., Auxmoney, Prosper).				•		
Trading SP	-	Company offering to invest the customers money in different stocks, ETFs or other funds. The company forwards the money to a market maker (e.g., Scalable Capital, Trade Republic).					•	
Cryptocurrency Exchange SP	-	Platform providing services for exchanging fiat currencies and cryptocurrencies and allowing investors to hold cryptocurrencies without participating in the blockchain network (e.g. Coinbase, MoonPay).						•
Payer	Customer	Paying (end) customer with an intention to purchase a product or service from a stationary or online retailer resp. service provider.	•					
Finance Manager		End customer with purpose to improve his financial situation through transparency and use of complementary services. Transparency is achieved by providing the customer with reports about his financial situation.		•				

Borrower		Legal entity borrowing money by presenting the purpose of the borrowed money. After an agreed time, the borrower pays back the money.				•		
Investor		Legal entity intended for investing money (e.g. through automated recommendations for the purpose of cost savings or a Broking Provider). The investment can take on various forms (e.g., stocks, art, lending money, buy cryptocurrency).			•	•	•	•
Stationary Merchant	Payee	Store/service organization with a physical point of sale. Here a customer can purchase services or goods physically and the customer can be advised in the store (e.g., IKEA, Walmart).	•					
Online Merchant	Payee	Business, marketplace, or service provider with online sales channel (e.g., Codecademy, Zara Home).	•					
Issuer	Bank License Partner	Banking licensed organization that issues a credit card for flexible payment to an (end) customer. The organization profits from arising transaction costs (e.g., Monavate, Klarna Bank AB, PFS Card Services).	•	•	•			
Lender	Bank License Partner	Banking licensed organization that grants credit required for installment payments on behalf of the Payment SP (e.g., Cross River Bank, CBW Bank).	•		•			
Deposit Bank	Bank License Partner	Banking licensed organization that offers money deposit accounts (checking account, demand deposit account, etc.) and ensures seamless transaction processing (Trading) or Monitoring (PFM) between the customer and the service provider (e.g., Virgin Money, Baader Bank, HSBC).		•	•	•	•	
Acquirer	Bank License Partner	An organization contracted by the payee to process transactions between the payer's and payee's bank accounts, ensuring a secure and seamless transaction process (e.g., First Data, Worldline).	•					
Asset Manager	Bank License Partner	Rhe asset manager provides additional assets for investment to robo-advisors (e.g., Green Dot Bank, Credit companies).			•			
Stock Exchange	Market-place	Here the money of a customer is invested into stocks by a Market Maker (e.g., Frankfurt Stock Exchange).					•	
Market Maker	Market-place	The Market Maker places the received money of the customer and places it on the Marketplace. Here the Market Maker invests the money in different stocks (e.g., Unicredit, Market Wizard).					•	
Blockchain Network		Interconnection of distributed nodes managing a tamper-proof transaction history in a decentralized manner, enabling transaction flow and creation of additional currency units of a cryptocurrency.						•
Miner		Participant in the blockchain network responsible for validating and storing transaction data as well as creating new currency units.						•
Hardware Manufacturer		Manufacturers of specialized hardware required for operating the blockchain network (e.g., dedicated mining hardware, cold wallets)						•
Software Developer		Providers of specialized software for operating the blockchain network (e.g., mining pool software, hot wallets).						•
Power Supplier		Utilities providing power needed for mining and thus operation of the blockchain network.						•
National Credit Bureau	-	Organization that provides credit score reporting services by collecting and aggregating information on borrowers' utilized credit from various sources (e.g., Equifax, Transunion).		•				
Partner Service Provider	-	Service provider (insurance company, bank, etc.) offering services through the PFM platform to improve the financial situation of the financial manager (e.g., Metromile, Santander).		•				
Asset Provider	-	Provides different kind of assets (real estate, funds, art, etc.) for investment. An investor can choose from the provided assets for the investment (e.g., Green Dot Bank, Yieldstreet).			•			
Financial Supervisory Authority	-	Legal authority that supervises organizations (e.g., robo-advisor, financial institutes) to monitor their business activities while ensuring the compliance with legal guidelines (e.g., Bundesamt für Finanzdienstleistungsaufsicht).	•	•	•	•	•	

Table 4. Roles in the Fintech Ecosystem

References

Adner, R. 2017. "Ecosystem as Structure," *Journal of Management* (43:1), pp. 39-58.

Al-Debei, M. M., and Avison, D. 2010. "Developing a unified framework of the business model concept," *European Journal of Information Systems* (19:3), pp. 359-376.

Alfaro, E., Bressan, M., Girardin, F., Murillo, J., Someh, I., and Wixom, B. 2019. "BBVA's Data Monetization Journey," *MIS Quarterly Executive* (18:2).

Alt, R., Beck, R., and Smits, M. T. 2018. "FinTech and the transformation of the financial industry," *Electronic Markets* (28:3), pp. 235-243.

Alt, R., and Puschmann, T. 2012. "The rise of customer-oriented banking - electronic markets are paving the way for change in the financial industry," *Electronic Markets* (22:4), pp. 203-215.

Armstrong, M. 2006. "Competition in two-sided markets," *The RAND journal of economics* (37:3), pp. 668-691.

Beinke, J. H., Nguyen, D., and Teuteberg, F. 2018. "Towards a Business Model Taxonomy of Startups in the Finance Sector using Blockchain," *ICIS 2018 Proceedings*.

Beketov, M., Lehmann, K., and Wittke, M. 2018. "Robo Advisors: quantitative methods inside the robots," *Journal of Asset Management* (19:6), pp. 363-370.

Benlian, A., Hilkert, D., and Hess, T. 2015. "How open is this Platform? The Meaning and Measurement of Platform Openness from the Complementers' Perspective," *Journal of Information Technology* (30:3), pp. 209-228.

Berger, S. C., and Gleisner, F. 2009. "Emergence of Financial Intermediaries in Electronic Markets: The case of Online P2P Lending," *Business Research* (2), pp. 39-65.

Busch, J., Sengewald, T., and Haag, S. 2022. "Identifying Customer Values of B2C-Fintech Services in the Area of Personal Financial Management," *Wirtschaftsinformatik 2022 Proceedings*.

Cai, X., Qi, C., and Li, C. 2019. "From traditional payment to mobile payment – Examining the antecedents and consequences of Hongkonger's mobile payment habit," *PACIS 2019 Proceedings*.

Caragea, D., Chen, M., Cojoianu, T., Dobri, M., Glandt, K., and Mihaila, G. 2020. "Identifying FinTech Innovations Using BERT," in *IEEE International Conference on Big Data*, Wu X., Jermaine C., Xiong L., Hu X.T., Kotevska O., Lu S., Xu W., Aluru S., Zhai C., Al-Masri E., Chen Z. and Saltz J. (eds.), pp. 1117-1126.

Cash, A., and Tsai, H.-J. 2018. "Readability of the credit card agreements and financial charges," *Finance Research Letters* (24), pp. 145-150.

Chen, X., Zhang, Q., Zhang, L., Jia, X., Zheng, P., and Yang, X. 2022. "Standardization of Financial Blockchain: Technologies, Challenges, and Future," in *2022 IEEE 9th International Conference on Cyber Security and Cloud Computing (CSCloud)/2022 IEEE 8th International Conference on Edge Computing and Scalable Cloud (EdgeCom)*, pp. 30-35.

Choudary, S. 2015. *Platform Scale. How a New Breed of Startups Is Building Large Empires with Minimum Investment*, New York: Platform Thinking Labs.

Dai, W. 2021. "Development and Supervision of Robo-Advisors under Digital Financial Inclusion in Complex Systems," *Complexity* (2021), pp. 1-12.

Das, S. R. 2019. "The future of fintech," *Financial Management* (48:4), pp. 981-1007.

Derks, J., Gordijn, J., and Siegmann, A. 2018. "From chaining blocks to breaking even: A study on the profitability of bitcoin mining from 2012 to 2016," *Electronic Markets* (28:3), pp. 321-338.

Deufel, P., and Kemper, J. 2018. "Online Payment Method Selection: The Habitual Choice of Deferring Payment," *ICIS 2018 Proceedings*.

Dhar, V., and Stein, R. M. 2018. "Complete and incomplete FinTech platforms," *Journal Of Investment Management* (16:2), pp. 4-16.

Eickhoff, M., Muntermann, J., and Weinrich, T. 2017. "What do FinTechs actually do? A Taxonomy of FinTech Business Models," *ICIS 2017 Proceedings*.

Eigelshoven, F., Ullrich, A., and Bender, B. 2020. "PUBLIC BLOCKCHAIN – A SYSTEMATIC LITERATURE REVIEW ON THE SUSTAINABILITY OF CONSENSUS ALGORITHMS," *ECIS 2020 Research Papers*.

Eigelshoven, F., Ullrich, A., and Parry, D. 2021. "Cryptocurrency Market Manipulation – A Systematic Literature Review," *ICIS 2021 Proceedings*.

Eisenhardt, K. M. 1989. "Building Theories from Case Study Research," *The Academy of Management Review* (14:4), p. 532.

Eisenmann, T., Parker, G., and Van Alstyne, M. W. 2006. "Strategies for Two-Sided Markets," *Harvard Business Review* (84), pp. 92-101.

Fein, M. L. 2015. "Robo-Advisors: A Closer Look," *SSRN Electronic Journal*.

Fischer, M. 2021. *Fintech business models*: *Applied canvas method and analysis of venture capital rounds*, Berlin, Boston: De Gruyter.

Floetgen, R., Gomm, S., Böhm, M., and Krcmar, H. 2020. "Implications of Emerging Financial Regulatory Reporting Frameworks for Digital Platforms Boundary Resources," *AMCIS 2020 Proceedings*.

Floetgen, R. J., Mitterer, N., Urmetzer, F., and Böhm, M. 2021. "Platform Ecosystem Structures: Leveraging Platform-based Technology and the Finance Ecosystem for the New Normal,"

Frölich, L., and Lembach, J. 2021. "Fachartikel - Was Neo-Broker versprechen – und halten," available at https://www.bafin.de/SharedDocs/Veroeffentlichungen/DE/Fachartikel/2021/fa_bj_2106_Neo_Broker.html, accessed on May 3 2022.

Gawer, A. 2021. "Digital platforms' boundaries: The interplay of firm scope, platform sides, and digital interfaces," *Long Range Planning* (54:5), p. 102045.

Gimpel, H., Rau, D., and Röglinger, M. 2018. "Understanding FinTech start-ups – a taxonomy of consumer-oriented service offerings," *Electronic Markets* (28:3), pp. 245-264.

Gleiss, A., Kohlhagen, M., and Pousttchi, K. 2021. "An apple a day – how the platform economy impacts value creation in the healthcare market," *Electronic Markets* (31:4), pp. 849-876.

Gomber, P., Kauffman, R. J., Parker, C., and Weber, B. W. 2018. "On the Fintech Revolution: Interpreting the Forces of Innovation, Disruption, and Transformation in Financial Services," *Journal of Management Information Systems* (35:1), pp. 220-265.

Gomber, P., Koch, J.-A., and Siering, M. 2017. "Digital Finance and FinTech: current research and future research directions," *Journal of Business Economics* (87:5), pp. 537-580.

Gopalan, S., Gaurav, J., Gaurav, K., and Jessica, T. 2012. "Breakthrough IT banking," McKinsey & Company (ed.).

Gordijn, J., Akkermans, H., and van Vliet, H. 1999. "Business Modelling Is Not Process Modelling," in *Conceptual Modeling for E-Business and the Web*, G. Goos (ed.). 2000, Berlin/Heidelberg: Springer, pp. 40-51.

Gordijn, J., Akkermans, H., and van Vliet, H. 2000. "Value based requirements creation for electronic commerce applications," in *Proceedings of the 33rd Annual Hawaii International Conference on System Sciences*, 10 pp. vol.1.

Gordijn, J., Osterwalder, A., and Pigneur, Y. 2005. "Comparing Two Business Model Ontologies for Designing e-Business Models and Value Constellations," in *18th Bled eConference: eIntegration in Action, Bled, Slovenia, June 6-8, 2005*, p. 15.

Gregor, S., and Hevner, A. R. 2013. "Positioning and Presenting Design Science Research for Maximum Impact," *MIS Quarterly* (37:2), pp. 337-355.

Herzenstein, M., Andrews, R. L., Dholakia, U. M., and Lyandres, E. 2008. "The Democratization of Personal Consumer Loans? Determinants of Success in Online Peer-to-peer Lending Communities," *Bulletin of the University of Delaware* (15:3).

Hinz, O., Otter, T., and Skiera, B. 2020. "Estimating Network Effects in Two-Sided Markets," *Journal of Management Information Systems* (37:1), pp. 12-38.

Huebner, J., Vuckovac, D., Fleisch, E., and Ilic, A. 2019. "FINTECHS AND THE NEW WAVE OF FINANCIAL INTERMEDIARIES," *PACIS 2019 Proceedings*.

Imerman, M. B., and Fabozzi, F. J. 2020. "Cashing in on innovation: a taxonomy of FinTech," *Journal of Asset Management* (21:3), pp. 167-177.

Iyer, B. R., and Basole, R. C. 2016. "Visualization to understand ecosystems," *Communications of the ACM* (59:11), pp. 27-30.

Janiesch, C., Rosenkranz, C., and Scholten, U. 2020. "An Information Systems Design Theory for Service Network Effects," *Journal of the Association for Information Systems* (21), pp. 1402-1460.

John, T., Kundisch, D., and Szopinski, D. 2017. "Visual Languages for Modeling Business Models: A Critical Review and Future Research Directions," *ICIS 2017 Proceedings*.

Jorgensen, K. P., and Beck, R. 2022. "Universal Wallets," *Business & Information Systems Engineering* (64:1), pp. 115-125.

Jung, D., Dorner, V., Glaser, F., and Morana, S. 2018a. "Robo-Advisory," *Business & Information Systems Engineering* (60:1), pp. 81-86.

Jung, D., Dorner, V., Weinhardt, C., and Pusmaz, H. 2018b. "Designing a robo-advisor for risk-averse, low-budget consumers," *Electronic Markets* (28:3), pp. 367-380.

Kannengießer, N., Lins, S., Dehling, T., and Sunyaev, A. 2019. "What Does Not Fit Can be Made to Fit! Trade-Offs in Distributed Ledger Technology Designs," in *52nd Hawaii International Conference on System Sciences (HICSS 2019),* Maui, Hawaii, USA,. January 8-11, 2019 (doi: 10.24251/HICSS.2019.848).

Kazan, E., and Damsgaard, J. 2016. "Towards A New Market Entry Framework For Digital Payment Platforms," *Communications of the Association for Information Systems* (38:1), pp. 761-783.

Klafft, M. 2008. "Online Peer-to-Peer Lending: A Lenders' Perspective," *SSRN Electronic Journal*, pp. 371-375.

Laks, E., Even, A., and Parmet, Y. 2013. "Usage Patterns of Internet-Based Banking and BI Services," *AMCIS 2013 Proceedings*.

Langley, P., and Leyshon, A. 2021. "The Platform Political Economy of FinTech: Reintermediation, Consolidation and Capitalisation," *New Political Economy* (26:3), pp. 376-388.

Lee, E., Lee, B., and Chae, M. 2011. "Herding Behavior In Online P2P Lending: An Empirical Investigation," in *PACIS 2011*.

Li, Y. 2018. "The Strategic Decision on Mobile Payment: A Study on Merchants' Adoption," *AMCIS 2018 Proceedings*.

Liu, J., Abhishek, V., and Li, B. 2016. "The Impact of Mobile Adoption on Customer Omni-Channel Banking Behavior," *ICIS 2016 Proceedings*.

Liu, K., Land, L., and Edwards, V. 2006. "Knowledge Sharing in Financial Credit Reporting: An Exploratory Case Study in an Australian Context," *PACIS 2006 Proceedings*.

Lowry, P. B., Wells, T. M., Moody, G., Humpherys, S., and Kettles, D. 2006. "Online Payment Gateways Used to Facilitate E-Commerce Transactions and Improve Risk Management," *Communications of the Association for Information Systems* (17:1).

Moghavvemi, S., Mei, T. X., Phoong, S. W., and Phoong, S. Y. 2021. "Drivers and barriers of mobile payment adoption: Malaysian merchants' perspective," *Journal of Retailing and Consumer Services* (59), p. 102364 (doi: 10.1016/j.jretconser.2020.102364).

Niederman, F., and Salvatore, M. 2019. "The "Theoretical Lens" Concept: We All Know What it Means, but do We All Know the Same Thing?" *Communications of the Association for Information Systems* (44), pp. 1-33.

Nüesch, R., Alt, R., and Puschmann, T. 2015. "Hybrid Customer Interaction," *Business & Information Systems Engineering* (57:1), pp. 73-78.

Osterwalder, A., Pigneur, Y., and Clark, T. 2010. *Business model generation*: *A handbook for visionaries, game changers, and challengers*, Hoboken, N.J.: John Wiley & Sons.

Osterwalder, A., Pigneur, Y., and Tucci, C. L. 2005. "Clarifying Business Models: Origins, Present, and Future of the Concept," *Commun. Assoc. Inf. Syst.* (16), p. 1.

Parker, G., and van Alstyne, M. 2016. "Platform Strategy," in *The Palgrave Encyclopedia of Strategic Management*, M. Augier and D. J. Teece (eds.), London: Palgrave Macmillan UK, pp. 1-9.

Parker, G., van Alstyne, M., and Choundary, S. 2016. *Platform revolution: how networked markets are transforming the economy and how to make them work for you*, New York: W. W. Norton & Company.

Parker, G. G., and Van Alstyne, M. W. 2005. "Two-Sided Network Effects: A Theory of Information Product Design," *Management Science* (51:10), pp. 1494-1504.

Peppard, J., and Rylander, A. 2006. "From Value Chain to Value Network," *European Management Journal* (24:2-3), pp. 128-141 (doi: 10.1016/j.emj.2006.03.003).

Plateaux, A., Lacharme, P., Vernois, S., Coquet, V., and Rosenberger, C. 2018. "A comparative study of card-not-present e-commerce architectures with card schemes: What about privacy?" *Journal of Information Security and Applications* (40), pp. 103-110.

Pousttchi, K. 2008. "A modeling approach and reference models for the analysis of mobile payment use cases," *Electronic Commerce Research and Applications* (7:2), pp. 182-201.

Pousttchi, K., and Gleiss, A. 2019. "Surrounded by middlemen - how multi-sided platforms change the insurance industry," *Electronic Markets* (29:4), pp. 609-629.

Puschmann, T. 2017. "CATCHWORD," *Business & Information Systems Engineering* (59:1), pp. 69-76.

Puschmann, T., and Shiba, S. 2021. "Developing a Taxonomy for Sustainable Digital Finance," *ICIS 2021 Proceedings*.

Reuver, M. de, Sørensen, C., and Basole, R. C. 2018. "The Digital Platform: A Research Agenda," *Journal of Information Technology* (33:2), pp. 124-135.

Riasanow, T., Burckhardt, F., Setzke, D. S., Böhm, M., and Krcmar, H. 2018a. "The Generic Blockchain Ecosystem and its Strategic Implications," *AMCIS 2018 Proceedings*.

Riasanow, T., Flötgen, R. J., Setzke, D. S., Böhm, M., and Krcmar, H. 2018b. "The Generic Ecosystem and Innovation Patterns of the Digital Transformation in the Financial Industry," *PACIS 2018 Proceedings*.

Riasanow, T., Jäntgen, L., Hermes, S., Böhm, M., and Krcmar, H. 2021. "Core, intertwined, and ecosystem-specific clusters in platform ecosystems: analyzing similarities in the digital transformation of the automotive, blockchain, financial, insurance and IIoT industry," *Electronic Markets* (31:1), pp. 89-104.

Rietveld, J., and Schilling, M. A. 2021. "Platform Competition: A Systematic and Interdisciplinary Review of the Literature," *Journal of Management* (47:6), pp. 1528-1563.

Rochet, J., and Tirole, J. 2003. "Platform competition in two-sided markets," *Journal of the European Economic Association* (1:4), pp. 990-1029.

Rochet, J., and Tirole, J. 2006. "Two-sided markets: a progress report," *The RAND journal of economics* (37:3), pp. 645-667.

Rückeshäuser, N. 2017. "TYPOLOGY OF DISTRIBUTED LEDGER BASED BUSINESS MODELS," in *25th European Conference on Information Systems (ECIS 2017),* Guimarães, Portugal. June 5-10, 2017, pp. 2202-2217.

Ruddenklau, A. 2022. "Pulse of Fintech H2'21," KPMG.

Sachse, S., Puschmann, T., and Alt, R. 2012. "Towards customer-oriented electronic markets – A survey among digital natives in the financial industry," *BLED 2012 Proceedings*.

Schirrmacher, N. B., Ondrus, J., and Kude, T. 2017. "Launch strategies of digital platforms: Platforms with switching and non-switching users," in *25th European Conference on Information Systems (ECIS 2017),* Guimarães, Portugal. June 5-10, 2017, pp. 658-673.

Schmidt, J., Drews, P., and Schirmer, I. 2018a. "CHARTING THE EMERGING BUSINESS ECOSYSTEM OF FINTECHS AND BANKS: SEVEN TYPES OF COLLABORATIVE BUSINESS MODELS," *ECIS 2018 Proceedings*.

Schmidt, J., Drews, P., and Schirmer, I. 2018b. "Charting the Emerging Financial Services Ecosystem of Fintechs and Banks: Six Types of Data-Driven Business Models in the Fintech Sector," *Hawaii International Conference on System Sciences 2018 (HICSS-51)*.

Schüritz, R., Seebacher, S., and Dorner, R. 2017. "Capturing Value from Data: Revenue Models for Data-Driven Services," *Hawaii International Conference on System Sciences 2017 (HICSS-50)*.

Schütte, R., and Wulfert, T. 2022. "Digital platforms and trading companies: the evolution of traditional business ecosystems to integrated digital business ecosystems," in *Handbook on Digital Business Ecosystems: Technolgies, Markets, Business Models, Management, and Societal Challenges*, S. Baumann (ed.), Cheltenham, UK: Edward Elgar Publishing, pp. 215-232.

Sedlmeir, J., Buhl, H., Fridgen, G., and Keller, R. 2020. "The Energy Consumption of Blockchain Technology: Beyond Myth," *Business & Information Systems Engineering* (62:6), pp. 599-608.

Shapiro, C., and Varian, H. R. 1998. *Information rules: a strategic guide to the network economy*, Boston, Mass.: Harvard Business Press.

Solaimani, S., and Bouwman, H. 2012. "A framework for the alignment of business model and business processes," *Business Process Management Journal* (18:4), pp. 655-679.

Staub, N., Haki, K., Aier, S., and Winter, R. 2021. "Taxonomy of Digital Platforms: A Business Model Perspective," *Hawaii International Conference on System Sciences 2021 (HICSS-54)*.

Staykova, K., and Damsgaard, J. 2021. "How Digital Platforms Compete Against Diverse Rivals," *MIS Quarterly Executive* (20:4).

Sunyaev, A., Kannengießer, N., Beck, R., Treiblmaier, H., Lacity, M., Kranz, J., Fridgen, G., Spankowski, U., and Luckow, A. 2021. "Token Economy," *Business & Information Systems Engineering* (63:4), pp. 457-478 (doi: 10.1007/s12599-021-00684-1).

Suryono, R. R., Purwandari, B., and Budi, I. 2019. "Peer to Peer (P2P) Lending Problems and Potential Solutions: A Systematic Literature Review," *Procedia Computer Science* (161), pp. 204-214.

Tan, T., and Phan, T. 2016. "Social Media-Driven Credit Scoring: the Predictive Value of Social Structures," *ICIS 2016 Proceedings*.

Torno, A., Werth, O., Nickerson, R. C., Breitner, M. H., and Muntermann, J. 2021. "More than Mobile Banking – A Taxonomy-based Analysis of Mobile Personal Finance Applications," *PACIS 2021 Proceedings*.

Verbovetska, A. 2019. "The Impact of Financial Technology on Customer Intention to Use Financial Services through the Lenses of Process Virtualization Theory," *ICIS 2019 Proceedings*.

vom Brocke, J., Simons, A., Riemer, K., Niehaves, B., Plattfaut, R., and Cleven, A. 2015. "Standing on the Shoulders of Giants: Challenges and Recommendations of Literature Search in Information Systems Research," *Communications of the Association for Information Systems* (37).

Webster, J., and Watson, R. T. 2002. "Analyzing the Past to Prepare for the Future: Writing a Literature Review," *MIS Q* (26).

Wenke, C., Lang, F., and Buschle, M. 2022. "Distributed Ledger Technology in the Financial Industry: Managerial, Organizational, and Technological Challenges," in *30th European Conference on Information Systems (ECIS 2022),* Timişoara, Romania. June 18-24, 2022, pp. 1-15.

Xie, J., Ye, L., Huang, W., and Ye, M. 2021. "Understanding FinTech Platform Adoption: Impacts of Perceived Value and Perceived Risk," *Journal of Theoretical and Applied Electronic Commerce Research* (16:5), pp. 1893-1911.

Yin, R. K. 2013. *Case Study Research*, Newcastle: SAGE Publications.

Zhong, J. 2009. "A Comparison of Mobile Payment Procedures in Finnish and Chinese Markets," *BLED 2009 Proceedings*.