Electronic Markets and current general research

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Dear readers,

This second issue is the only general research issue in 2018. It includes seven contributions that address current topics and link to existing discussions in *Electronic Markets*. Following the journal's understanding, electronic markets comprise centralized or decentralized "forms of networked business where multiple suppliers and customers interact for economic purposes within one or among multiple tiers in economic value chains" or networks (Alt and Zimmermann 2014b, 162). Besides providing this definition, the same editorial offered a collection of relevant topics in the field of electronic markets, which emerged from a historical perspective starting in the 1970s. It shows three main clusters of topics:

- The advances of information technology (IT), which date back to proprietary communication networks and electronic data interchange (EDI). In rapid succession, various technologies have evolved, including internet protocols, web presences, electronic catalogs, portals, mobile technologies, social media and cloud services as well as big data infrastructures. Of course, these technologies are not mutually exclusive, but often complement each other and converge to offer more capabilities. Over time, local databases and application systems have become accessible for external systems or users, which have enabled bilateral (i.e. 1:1) as well as one-sided (i.e. 1:n, n:1) and two-sided multilateral solutions (i.e. n:1:n, see Fig. 1) with increasing convenience and decreasing "onboarding" costs for the participating parties. Electronic markets mostly followed a centralized model due to a lacking maturity of distributed systems, which

would allow the implementation of decentralized market systems without intermediaries at reasonable conditions (e.g. transaction costs and risks). Recent technological developments, such as open (linked) data and in particular blockchain or - more broadly speaking - distributed ledgers technologies (DLT), are expected to change this. They create technological infrastructures that efficiently replicate data and procedures among many nodes without a centralized database or application logic and enable decentralized blockchain-based electronic marketplaces (Subramanian 2018).

- The advances of business processes, which in the beginning were little formalized and documented even within companies. An important step towards more explicit structures was the introduction of enterprise resource planning (ERP) systems and the definition of document as well as process standards, such as EDIFACT with specific subsets in various industries or CPFR in the consumer goods industry. Electronic marketplaces benefitted from these inter-organizational standards since they facilitated ordering, payment and logistics processes among many organizations. Despite these standards existing early on, they more or less only replaced one-directional physical documentation. Electronic marketplaces were important as intermediaries that created standardized product description structures for making offers in the market comparable as well as formalized allocation procedures. In exchange for this service, the traditional intermediated electronic market business models (e.g. n:1:n) included price premiums, which had to be added to the original product prices. With the rise of technological means for implementing trust, security, and privacy within decentralized economic structures (e.g. n:n), the costs of transaction are expected to be lower and the topology more advantageous from an economic perspective. With an adequate decentralized infrastructure in place, many economic processes that were decentralized by nature (e.g. decentralized production processes) could now occur on a decentral basis as well.

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Fig. 1 Co-evolution of electronic markets topologies

- The advances of methodologies, which address the understanding and the alignment of technological infrastructures and business processes in the occurring digital transformation. On the one hand, this broad field comprises the retrospective analysis of electronic markets regarding their impact on business process performance or customer experience. For example, Reimers et al. (2014) analyzed the evolution of proprietary electronic ordering systems in the Australian pharmaceutical industry towards open ordering systems over a 30-year period. An interesting hypothesis is called “co-evolution”, whereby distributed business processes are enabled by distributed technological infrastructures and vice versa. On the other hand, the prospective view is on making the insights from retrospective analyses available for offering advice in designing future electronic markets. Methodologies for business modeling and service design have emerged in this domain.

The co-evolution hypothesis

The co-evolution hypothesis is an interesting interpretation of the alignment of technological and business topologies. Typical value chains followed a sequential logic that comprised bilateral 1:1 links among companies across various stages (“tiers”) from the raw to the final product (Kumar and van Dissel 1996, p. 287). Each participating business had their own systems in place that reflected proprietary data and process structures. Information passed along the value chain as a set of one-directional bilateral messages between two actors and the missing chain-wide data availability (or visibility) was recognized as a main reason for the bull-whip effect (Tröger and Alt 2017). Providing platforms that linked multiple suppliers or customers in single-sided multilateral topologies (e.g. 1:n, n:1) were often referred to as supplier portals or platforms and enabled one company to link with many business partners via the same system. This mirrored the situation in many industries, where especially larger focal players (e.g. automotive or consumer goods manufacturers) benefitted from a pooling

effect since the same procedures could be used for exchanging information with many external partners. However, actors on the single side had to meet the challenge of interfacing with many supplier portals, which caused coordination efforts for many automotive suppliers and/or logistics service providers. With their n:1:n-topology, electronic markets were typical solutions for this problem. They offered centralized platforms that were often operated by (new) intermediaries, such as the exchanges in the financial and the energy industry (e.g. CBOT, EEX), electronic networks in the financial and the travel industry (e.g. SWIFT, SITA), streaming platforms in the media industry (e.g. Spotify, Netflix) or social networks (e.g. Facebook).

With the advent of decentralized technologies, a possible evolution path towards n:n-topologies might be expected. This, however, requires that the functionalities that are typically performed by intermediaries will be assumed by these systems as well. Among these functionalities is the facility for matching buyers and sellers, the facilitation of transactions itself and the provision of an institutional infrastructure (Bakos 1998). Although networking protocols, in particular the internet protocol (TCP/IP), are existing examples for working decentralized networks, there is an important difference: protocols, such as IPv4 or IPv6, provide technological specifications for a secure data exchange in decentralized networks without specifying any business-related information. Enabling transactions in a decentralized setting means that all actors need to agree on the general structure of data (i.e. the transactions included in blocks or datasets) that is shared across many databases (“ledgers”) and the application logic embedded in the DLT software. This applies to many of the typical intermediary functionalities, such as matching, transactions and regulation. More leeway for individual agreements is available since the syntax and semantics of transactions as well as the application logic - for example, included in smart contracts - may be agreed upfront between the participating parties. Contrary to technological standards, industry- and sometimes even company-specific conventions prevail on this level, which at the same time is much closer to design issues that determine a business’s competitiveness in the market. With a potentially higher likelihood for conflict and lower incentives for agreeing on joint standards, the necessary

business standards are more difficult to achieve. However, the move towards decentralization is supported by several factors:

- First, the EDI standards mentioned above may be reused. Among the examples are the standards of the global GS1 organization, which include the areas identification (e.g. GTIN), capture (e.g. barcodes, electronic product code) and data exchange (e.g. master data, EDI, event data) (GS1 2018). In particular, data and message standards have seen a broad adoption in some industries (e.g. automotive, logistics, retail) and could be used for the formalization of transactions in DLT systems. Standards for matching, planning and transaction processes, which represent business rules that could be implemented in smart contracts, are more difficult and limited to some industries (e.g. Rosettanet in the electronics industry and CPFR in the consumer goods industry). Clearly, industries with a high degree of widely accepted standards (e.g. financial and energy trading) are in a better position for decentralization since the shared understanding on a formalized level is already available.
- Second, the evolution towards increased decentralization may see a variety of configurations. Despite DLT still being at an early stage of development, different concepts have emerged that allow stronger forms of decentralization even in existing business networks or (centralized) electronic markets. A well-known typology of blockchain types (Zheng et al. 2017) distinguishes between public blockchains (e.g. Bitcoin, Ethereum, Litecoin), consortium blockchains (e.g. B3i, Corda, EWF, R3) and private blockchains (e.g. Hyperledger, Monax, Ripple). Main differences are between public types on the one hand and consortium as well as private types on the other. The former are open for all participants ("permissionless") and completely decentralized in nature, the latter are closed ("permissioned") with elements of centralized control. This makes consortium and private types applicable within existing business network. Although these DLT implementations still have to prove their advantages against existing database architectures, they could advance networking and foster higher degrees of decentralization.
- Third, another interesting movement is work on the interoperability of various DLTs. This stream recognizes the coexistence of many future DLTs and aims at implementing cross-DLT transactions. Simple solutions have been (centralized) electronic markets, so-called blockchain exchanges where currencies could be traded (e.g. bitcoins for ether). These platforms were viable solutions for payment and investment purposes, but have seen trust as well as security problems (e.g. the bankruptcy of Mt.Gox). Another solution is integration, such as pursued by the "Blockchain Interoperability Alliance".

These approaches aim at defining protocols that link various DLTs (e.g. Wang et al. 2017). Although these are still in their infancy, they accept that diversity is often desired in the business world and stems from the need for differentiation in the marketplace.

Articles of present issue

All three factors might spur a development towards more decentralization. In any case, more research is much-needed in this area and Electronic Markets currently has special issues on machine learning and blockchain underway. For the present issue, Table 1 maps the seven papers of this general research issue against the three clusters and lists links to prior research published in Electronic Markets. The simple overview shows that each paper addresses a business process and methodology topic. All papers may also be embedded in threads of earlier publications. Remarkably, the technological focus is underrepresented in this small sample of seven papers since only two papers follow a technology-push argumentation. Again, more research in this regard can be expected in upcoming special issues.

The first paper of this issue provides "A framework to identify factors affecting the performance of third-party B2B e-marketplaces" from a seller's perspective. For this purpose, the authors Wiyada Thitimajshima, Vatcharaporn Esichaikul, and Donyaprueth Krairit (Thitimajshima et al., 2018) have established a conceptual model that measures the performance of third-party B2B electronic markets, such as Alibaba and other marketplaces in Thailand, with the metrics "customer loyalty" and "trading volume". Four factors (business, market service, transaction and infrastructure view) serve to capture the technological and business designs. The authors conclude that the marketplace's reputation, the trust in the market makers, transaction cost reductions and website usability had the largest impact on customer loyalty. While only website reliability had positive effects on the trading volume, the relative advantage and number of buyers were positively related to customer loyalty as well as to trading volume. Thus, this research is further advancing the understanding of centralized electronic markets.

The second article addresses the area of business models, which has become a main research stream in Electronic Markets. Business model research in Electronic Markets dates back to the seminal paper in issue 8/2 (Timmers 1998) and has seen two dedicated special issues and many articles on the topic since. The present contribution adds a new aspect, which focusses on "Achieving agility using business model stress testing" and was authored by Harry Bouwman, Jukka Heikkilä, Marikka Heikkilä and Carlo Leopold (Bouwman et al. 2018). Contrary to existing research, which discussed various forms ("typologies") and elements ("building blocks") of business models as well as methodologies for

Table 1 Papers of present issue

Papers in present issue	Clusters			Prior research (volume/issue)
	Technological infrastructure	Business processes	Methodology	
Thitimajshima et al. (2018)		B2B marketplaces	Performance of electronic marketplaces, customer loyalty	Special issue on B2B in 12/2
Bouwman et al. (2018)		Health, logistics	Business models, performance	Special issues on business models in 11/1, 24/4
Ting (2018)		Banking	Customer satisfaction	Special issue on banking 22/4
Helm et al. (2018)		Media	Consumer behavior	Special issue on media industry 27/1
Harviainen et al. (2018)		Gaming	Service design, business/pricing models	Special issue on media industry 27/1
Mero (Järvinen (2018)	Real-time messaging	Retailing	Customer satisfaction	Special issues on customer-interaction 26/3
Stróżyńska et al. (2018)	Open data	Logistics	Data selection framework	Special issues on logistics/supply chain management 27/2

designing business models (Alt and Zimmermann 2014a, 233), this article conceives business models themselves as objects of change. The proposed methodology serves in continuously assessing the long-term viability and feasibility of an existing business model. Case studies from the health as well as from the logistics domain illustrate how the methodology identifies (potential) vulnerabilities of existing and future business models.

The third article is titled “Modeling the customer satisfaction function: a two-country comparison” and authored by Ding Hooi Ting (Ting 2018). It contributes to the large body of (empirical) research on the determinants of customer satisfaction by studying online banking in Malaysia and Singapore. Using a model that measures the relationship among repurchase intention, satisfaction, and trust, the author shows how a country’s economic development influences customer satisfaction. Along the lines of the previous article and the co-evolution hypothesis, he also points at the importance of business model design and that business models require change when the underlying technology changes.

The fourth paper presents research on “Consumer interpretations of digital ownership in the book market” and was authored by Sabrina V. Helm, Victoria Ligon, Tony Stovall, and Silvia Van Riper. In view of the fundamental digital transformation of the media industry, the authors compare physical and electronic books regarding the perception of ownership. Based on focus group research with U.S. consumers, six main themes are derived which “suggest that the conceptualization of digital ownership is distinct from that of traditional material ownership.” (Helm et al. 2018). The article includes a variety of surprising observations, which are helpful in designing future solutions. For example, the authors find lending and borrowing electronic books to be either unknown or impractical and suggest to improve the “lendability” of ebooks, e.g. via

social sharing. Thus, the authors are successful in offering (prospective) guidance in adapting existing business models in the (electronic) book industry.

The fifth article also originates from the media industry, albeit not the book, but the gaming industry. In their research on “Customer preferences in mobile game pricing” the authors J. Tuomas Harviainen, Jukka Ojasalo, and Somasundaram Nanda Kumar present a case study based on the design of freemium games. The combination of “free” and “premium” denotes a business model that includes a well-designed pricing model consisting of freely available functionality on the one hand and content that requires payment on the other. At the same time, both options should not infer “playability problems or poor game experiences” (Harviainen et al. 2018). Using customer journey mapping of typical freemium games that were developed in various service design workshops, the authors derive design choices for new monetization options. These are transferred into a business model canvas to develop an alternative pricing model. Again, this research may be conceived as a piece that advances business modeling in the context of gaming and freemium pricing models.

The sixth contribution discusses “The effects of two-way communication and chat service usage on consumer attitudes in the e-commerce retailing sector”. Joel Mero (Järvinen) investigates how real-time messaging technologies that allow two-way communications are helpful in customer service processes, where customers have “live chats” with customer service agents. Based on a large empirical survey in Finland, the author concludes that these messaging technologies positively impact the trust and satisfaction with the electronic retailer and the repurchase intention. It was also found that two-way communication had “the greatest effect on consumers’ intentions to share positive WOM of the e-retailer” (Mero (Järvinen 2018) and that

electronic commerce solutions should therefore include this interpersonal means of communication.

Another research that also represents a technological push motivation is titled “A framework for the quality-based selection and retrieval of open data - a use case from the maritime domain” and was authored by Milena Stróżyńska, Gerd Eiden, Witold Abramowicz, Dominik Filipiak, Jacek Małyszko, and Krzysztof Węcel. In view of the growing population of open databases, this paper proposes a framework for identifying, assessing and selecting open data sources based on a set of six quality criteria. Using an illustrative case from the logistics industry, the authors show how open data (e.g. weather, ship classification data) may enhance existing internal data (e.g. vessel data) and how this data may be combined/fused. The three-step framework also represents an advancement regarding research on enhancing data in electronic markets with data from various external sources.

2017 Awards

Finally, as every year, the second issue gives us the opportunity to present the results of the two annual Electronic Markets awards. First, the “EM Outstanding Reviewer Award” honors reviewers that repeatedly provided exceptional reviews in the past year. The nominees were determined from all reviewers that served in 2017 (see Alt and Zimmermann 2018) via a quantitative assessment of the reviewer ratings in the editorial manager system and a qualitative assessment of the respective reviews along the guidelines of Electronic Markets. The four colleagues that convinced the editorial team with thorough, detailed and always constructive reviews in 2017 were Frédéric Georges Thiesse, Thomas Hess, Christopher Patrick Holland and Mathias Klier. Second, the “Paper of the Year Award” aims to qualify papers that were outstanding among the articles published in 2017. For this purpose, the number of citations and downloads were calculated for all articles published in Electronic Markets in 2016. This led to five papers, which were subsequently shared with the Senior and Associate Editors to obtain a voting on the top two papers taking into consideration the papers’ fit to the journal’s scope, its methodological rigor, and the contribution to theory as well as to practice. The papers that succeeded were “Social commerce - state-of-the-art and future research directions” by Catherine Baethge, Julia Klier and Mathias Klier (Baethge et al. 2016) and “Big data analytics in E-commerce: a systematic review and agenda for future research” by Shahriar Akter and Samuel Fosso Wamba (Akter and Fosso Wamba 2016). We wish to congratulate all nine colleagues for their achievement and thank all reviewers as well as editors that were involved in the present issue!

Your EM-team.

References

- Akter, S., & Fosso Wamba, S. (2016). Big data analytics in E-commerce: A systematic review and agenda for future research. *Electronic Markets*, 26(2), 173–194. <https://doi.org/10.1007/s12525-016-0219-0>.
- Alt, R., & Zimmermann, H.-D. (2014a). Electronic Markets and business models. *Electronic Markets*, 24(4), 231–234. <https://doi.org/10.1007/s12525-014-0178-2>.
- Alt, R., & Zimmermann, H.-D. (2014b). Electronic Markets on general research. *Electronic Markets*, 24(3), 161–164. <https://doi.org/10.1007/s12525-014-0163-9>.
- Alt, R., & Zimmermann, H.-D. (2018). Electronic Markets on networked media. *Electronic Markets*, 28(1), 1–6. <https://doi.org/10.1007/s12525-018-0291-8>.
- Baethge, C., Klier, J., & Klier, M. (2016). Social commerce—State-of-the-art and future research directions. *Electronic Markets*, 26(3), 269–290. <https://doi.org/10.1007/s12525-016-0225-2>.
- Bakos, Y. (1998). The emerging role of electronic marketplaces on the internet. *Communications of the ACM*, 41(8), 35–42. <https://doi.org/10.1145/280324.280330>.
- Bouwman, H., Heikkilä, J., Heikkilä, M., Leopold, C., & Haaker, T. (2018). Achieving agility using business model stress testing. *Electronic Markets*, 28(2). <https://doi.org/10.1007/s12525-016-0243-0>.
- GS1 (2018). GS1 system architecture document. Release 7.0. https://www.gs1.org/docs/architecture/GS1_System_Architecture.pdf, accessed May 5, 2018.
- Harviainen, J. T., Ojasalo, J., & Nanda Kumar, S. (2018). Customer preferences in mobile game pricing: A service design based case study. *Electronic Markets*, 28(2), 1–13. <https://doi.org/10.1007/s12525-018-0285-6>.
- Helm, S. V., Ligon, V., Stovall, T., & van Riper, S. (2018). Consumer interpretations of digital ownership in the book market. *Electronic Markets*, 28(2), 1–13. <https://doi.org/10.1007/s12525-018-0293-6>.
- Kumar, K., & van Dissel, H. G. (1996). Sustainable collaboration: Managing conflict and cooperation in interorganizational systems. *MIS Quarterly*, 20(3), 279–300. <https://doi.org/10.2307/249657>.
- Mero (Järvinen), J. (2018). The effects of two-way communication and chat service usage on consumer attitudes in the e-commerce retailing sector. *Electronic Markets*, 1–13. <https://doi.org/10.1007/s12525-017-0281-2>.
- Reimers, K., Johnston, R. B., & Klein, S. (2014). An empirical evaluation of existing IS change theories for the case of IOIS evolution. *European Journal of Information Systems*, 23(4), 373–399. <https://doi.org/10.1057/ejis.2013.7>.
- Stróżyńska, M., Eiden, G., Abramowicz, W., Filipiak, D., Małyszko, J., & Węcel, K. (2018). A framework for the quality-based selection and retrieval of open data - a use case from the maritime domain. *Electronic Markets*, 28(2), 1–15. <https://doi.org/10.1007/s12525-017-0277-y>.
- Subramanian, H. (2018). Decentralized blockchain-based electronic marketplaces. *Communications of the ACM*, 61(1), 78–84. <https://doi.org/10.1145/3158333>.
- Thitimajshima, W., Esichaikul, V., & Krairit, D. (2018). A framework to identify factors affecting the performance of third-party B2B e-marketplaces: A seller’s perspective. *Electronic Markets*. <https://doi.org/10.1007/s12525-017-0256-3>.
- Timmers, P. (1998). Business models for electronic markets. *Electronic Markets*, 8(2), 3–8. <https://doi.org/10.1080/10196789800000016>.
- Ting, D. H. (2018). Modeling the customer satisfaction function: A two-country comparison. *Electronic Markets*, 28(2), 1–13. <https://doi.org/10.1007/s12525-018-0286-5>.
- Tröger, R., & Alt, R. (2017). Design options for supply chain visibility services: Learnings from three EPCIS implementations. *Electronic Markets*, 27(3), 141–156. <https://doi.org/10.1007/s12525-016-0231-4>.

- Wang, H., Cen, Y., & Li, X. (2017). Blockchain router: A cross-chain communication protocol. Proceedings 6th International Conference on Informatics, Environment, Energy and Applications (IEEA'17), ACM, New York (NY), pp. 94–97. <https://doi.org/10.1145/3070617.3070634>.
- Zheng, Z., Xie, S., Dai, H., Chen, X., & Wang, H. (2017). An overview of blockchain technology: architecture, consensus, and future trends. Proceedings 6th International Congress on Big Data, IEEE, 557–564. <https://doi.org/10.1109/BigDataCongress.2017.85>.