

Doctoral Workshop: Orchestrating Service Platforms: An Agent-based Modelling Study on P2P Lending Platforms Research Proposal

Maria Veronica Torres Pena
The University of Melbourne, Australia
mtorres2@student.unimelb.edu.au

Abstract

Digital technologies, and in particular, service platforms, are transforming multiple economic activities like hospitality (e.g., AirBnB) and lending (e.g., Lendingclub.com). Understanding these social and technological phenomena, particularly, the dynamics and functioning of service platforms pose novel challenges for academic research and managerial practice, therefore, requiring new interdisciplinary research methods and approaches. This research draws on complex systems theory and service research (i.e. service-dominant logic), to investigate the complex nature of service platforms, and the role and effects of technology as service orchestrator. First, this study aims to contribute a novel conceptualization of service platforms introducing their complex features, adaptive behaviors and self-organizing practices. Second, this research introduces agent-based modelling (ABM) as a research method, grounded on complex systems theory, to study the intricate nature and dynamics of service platforms. As such, this study contributes with a set of guidelines on how to delineate ABM models of service platforms. This is because ABM enables the study of emerging phenomena, such as value cocreation, by modelling actors' behaviors and interactions. Third, this research investigates the role of technology as service orchestrator and its effects on value cocreation in service platforms. In this way, set in the context of P2P lending, this research proposes a schematization of different levels of digital orchestration; and analyzes the effects of these distinct digital coordination mechanisms through ABMs, with the use of loan transactions data from the P2P lending site, LendingClub.com. Hence, this study advances current theoretical and practitioner thinking about how service platforms enable, transform, and facilitate value cocreation.

Research Summary

Market and societal changes are becoming increasingly frequent, mostly due to current technological advancements such as cloud and mobile technologies, artificial intelligence, blockchain and the Internet of Things (IoT). In particular, the proliferation of service platforms like Airbnb, Uber, and LendingClub are transforming economic activities by introducing innovative value propositions, altering actors' roles, and proposing novel resource integrating patterns. This transformational phenomenon exhorts practitioners to remain relevant by evolving their service offerings, and, at the same time, challenges research to adopt interdisciplinary approaches to further understand service.

The study of service platforms is a growing research area at the intersection of information systems (IS) and service research. Recent studies have investigated service platforms as "engagement platforms" (Breidbach and Brodie 2017), "sharing economy" (Constantiou et al. 2017; Hamari et al. 2016), and "lateral markets" (Perren and Kozinets 2018). Despite the recent scholarly advances (Lusch and Nambisan 2015; Nambisan et al. 2017), there is still very limited understanding on the implications of digital technologies in service ecosystems and on how technology contributes to orchestrating value co-creation in service platforms (Nambisan et al. 2017; Ostrom et al. 2015). First,

this research argues that technology adds to the complexity of service ecosystems and introduces changes to their core characteristics. This is because digital technologies and current platform architectures enable ubiquitous connectivity and computing, and support new forms of actors' interactions (Iansiti and Lakhani 2014), communication methods, and economic practices (Tiwana et al. 2010) in wider, networked systems (Bharadwaj et al. 2013). Second, this complexity of service platforms requires coordination mechanisms that frame and channel actors' interactions while dealing with multiple actors, networks, and settings (Ostrom et al. 2015). However, prior research has been unable to fully disentangle value co-creation processes (Lempinen and Rajala 2014), actors relationships (Rust and Huang 2014), actors roles (Breidbach and Maglio 2016) and technology roles and effects (Storbacka et al. 2016). Particularly, the role of technology as service orchestrator is not fully understood (Nambisan et al. 2017) as prior studies have focused on service orchestration through dedicated frontline employees (Breidbach et al. 2016).

The central motivation of this study is to investigate the complex nature of service platforms, and the role and effects of technology as service orchestrator. In specific, this work addresses the following research questions: (1) investigate if, how, and to what extent service ecosystems, like those of service platforms, can be orchestrated; (2) investigate how human and non-human actors can collectively or independently orchestrate value creation in service platforms; and (3) analyze the effects of coordination mechanisms on value co-creation in service platforms.

The interdisciplinary approach of this research project integrates two previously disconnected theories; service-dominant logic (SD logic) and complex systems theory, for conducting this research. First, complex systems theory focuses, in the broadest sense, on the study of systems comprising many interacting parts showing emerging structures and functioning (Haken 2006). It has offered multiple advancements when intersecting with other disciplines like physics (Haken 1977), computer science (Musil et al. 2015), management (Coleman 1999), and social sciences (Fuchs 2006). Second, service science, in particular, SD logic, contributes with the narrative and foundations for value co-creation (Vargo and Lusch 2017). Special attention has been placed to Axiom 5 from SD logic which states that institutions (e.g. rules, norms, and practices), and institutional arrangements are actor-generated and coordinate value co-creation (Vargo and Lusch 2016).

First, this study develops a conceptualization of service ecosystems as self-organizing systems which refers to their complexity, emergent behaviour from local interactions, adaptiveness and self-organizing practices. This conceptualization mainly emphasizes on the internal ability of the service ecosystem to determine how to function, co-create value and act upon the environment. For our purpose, service platforms refer to platform-enabled service ecosystems that create value by facilitating actors' interactions and service exchanges. This conceptualization will serve as the analytical lens framing this present study of the orchestration of value cocreation in service platforms.

Second, this study introduces agent-based modelling (ABM) as a research method to study the intricate nature and dynamics of service platforms. ABM has already proved fruitful at studying complex systems in fields like biology (Walker et al. 2004), physics (Michopoulos et al. 2004), management (North and Macal 2007), and marketing (Rand and Rust 2011). Because of ABM's bottom-up approach, this tool enables capturing and analyzing fundamental systemic properties like self-organization and pattern emergence (Helbing 2012), like value cocreation, by modelling actors' behaviors and interactions. Here, the aim is also to provide guidelines on how to delineate ABM models of service platforms, using P2P lending as a context.

Third, this research develops agent-based modelling (ABM) simulations to study the orchestration of value cocreation in service platforms. The focus is on how digital technologies orchestrate interactions between economic actors in service platforms, and on assessing the implications of distinct

coordination mechanisms on service. For this purpose, the ABMs are set in the P2P lending context using data from P2P lending sites like LendingClub.com.

This research project offers three meaningful contributions. First, it advances the understanding of the core nature of service ecosystems by placing their self-organizing practices in the spotlight. As such, this study contributes a novel conceptualization of service platforms as service ecosystems, displaying complex features, adaptive behaviors and self-organizing practices. Second, we introduce agent-based modelling (ABM) as a research method to study the intricate nature and dynamics of service platforms, in general, and the role and effects of technology, in particular. As such, this study contributes with a set of guidelines introducing and demonstrating the applicability of ABM for the study of value co-creation in service platforms. Third, this work contributes with a schematization of levels of service orchestration and with initial results showing the effects of different digital orchestration mechanisms on actors' interactions, resource integration, and service ecosystem performance, in the context of P2P lending.

Overall, this study advances current theoretical and practitioner thinking about how service platforms enable, transform, and facilitate value cocreation. Future investigations can use this as a starting point to investigate the challenges of guiding value cocreation in service platforms. Empirical studies could explore digital orchestration of service platforms in settings different from P2P lending platforms. This research also prompts calls for understanding the role of service orchestration across different stages of the service platform lifespan.

References

- Bharadwaj, A., El Sawy, O., Pavlou, P., and Venkatraman, N. 2013. "Digital Business Strategy: Toward a Next Generation of Insights.," *MIS Quarterly* (37:2), pp. 471-482.
- Breidbach, C. F., Antons, D., and Salge, T. O. 2016. "Seamless Service? On the Role and Impact of Service Orchestrators in Human-Centered Service Systems," *Journal of Service Research* (19:4), pp. 458-476.
- Breidbach, C. F., and Brodie, R. J. 2017. "Engagement Platforms in the Sharing Economy: Conceptual Foundations and Research Directions," *Journal of Service Theory and Practice* (27:4), pp. 761-777.
- Breidbach, C. F., and Maglio, P. P. 2016. "Technology-Enabled Value Co-Creation: An Empirical Analysis of Actors, Resources, and Practices," *Industrial Marketing Management* (56), pp. 73-85.
- Coleman, J., H.J. 1999. "What Enables Self-Organizing Behavior in Businesses," *Emergence* (1:1), pp. 33-48.
- Constantiou, I., Marton, A., and Tuunainen, V. K. 2017. "Four Models of Sharing Economy Platforms," *MIS Quarterly Executive* (16:4).
- Fuchs, C. 2006. "The Self-Organization of Social Movements.," *Systemic practice and action research* (19:1), pp. 101-137.
- Haken, H. 1977. *Synergetics: An Introduction Nonequilibrium Phase Transitions and Self-Organization in Physics, Chemistry and Biology*. Berlin, Heidelberg: Springer Berlin Heidelberg.
- Haken, H. 2006. "Information and Self-Organization: A Macroscopic Approach to Complex Systems ". Berlin, New York: Springer.
- Hamari, J., Sjöklint, M., and Ukkonen, A. 2016. "The Sharing Economy: Why People Participate in Collaborative Consumption," *Journal of the association for information science and technology* (67:9), pp. 2047-2059.
- Helbing, D. 2012. *Social Self-Organization - Agent-Based Simulation and Experiments to Study Emergent Social Behavior*. Springer Berlin Heidelberg.
- Iansiti, M., and Lakhani, K. R. 2014. "Digital Ubiquity: How Connections, Sensors, and Data Are Revolutionizing Business.," *Harvard Business Review* (92:11), pp. 90-99.
- Lempinen, H., and Rajala, R. 2014. "Exploring Multi-Actor Value Creation in It Service Processes," *Journal of Information Technology* (29:2), pp. 170-185.
- Lusch, R. F., and Nambisan, S. 2015. "Service Innovation: A Service-Dominant Logic Perspective," *MIS Quarterly* (39:1), pp. 155-176.
- Michopoulos, J., Tsompanopoulou, P., Houstis, E., and Joshi, A. 2004. "Agent-Based Simulation of Data-Driven Fire Propagation Dynamics," in: *International Conference on Computational Science*. Springer, Berlin, Heidelberg, pp. 732-739.
- Musil, J., Musil, A., and Biffl, S. 2015. "Introduction and Challenges of Environment Architectures for Collective Intelligence Systems," in: *Agent Environments for Multi-Agent Systems IV* Springer.
- Nambisan, S., Lyytinen, K., Majchrzak, A., and Song, M. 2017. "Digital Innovation Management: Reinventing Innovation Management Research in a Digital World," *MIS Quarterly* (41:1).

- North, M. J., and Macal, C. M. 2007. *Managing Business Complexity: Discovering Strategic Solutions with Agent-Based Modeling and Simulation*. Oxford University Press.
- Ostrom, A. L., Parasuraman, A., Bowen, D. E., Patricio, L., and Voss, C. A. 2015. "Service Research Priorities in a Rapidly Changing Context," *Journal of Service Research* (18:2), pp. 127-159.
- Perren, R., and Kozinets, R. V. 2018. "Lateral Exchange Markets: How Social Platforms Operate in a Networked Economy," *Journal of Marketing* (82:1), pp. 20-36.
- Rand, W., and Rust, R. T. 2011. "Agent-Based Modeling in Marketing: Guidelines for Rigor," *International Journal of Research in Marketing* (28:3), pp. 181-193.
- Rust, R. T., and Huang, M. H. 2014. "The Service Revolution and the Transformation of Marketing Science," *Marketing Science* (33:2), pp. 206-221.
- Storbacka, K., Brodie, R. J., Böhmman, T., Maglio, P. P., and Nenonen, S. 2016. "Actor Engagement as a Microfoundation for Value Co-Creation," *Journal of Business Research* (69:8), pp. 3008-3017.
- Tiwana, A., Konsynski, B., and Bush, A. A. 2010. "Platform Evolution: Coevolution of Platform Architecture, Governance, and Environmental Dynamics (Research Commentary)," *Information Systems Research* (21:4), pp. 675-687.
- Vargo, S. L., and Lusch, R. F. 2016. "Institutions and Axioms: An Extension and Update of Service-Dominant Logic.," *Journal of the Academy of Marketing Science* (44:1), pp. 5-23.
- Vargo, S. L., and Lusch, R. F. 2017. "Service Dominant Logic 2025," *International Journal of Research in Marketing* (34:1), pp. 46-67.
- Walker, D. C., Southgate, J., Hill, G., Holcombe, M., Hose, D. R., Wood, S. M., Mac Neil, S., and Smallwood, R. H. 2004. "The Epitheliome: Agent-Based Modelling of the Social Behaviour of Cells. ," *Biosystems* (76:1-3), pp. 89-100.