

## Using gamification to transform the adoption of servitization



Victor Guang Shi <sup>a,\*</sup>, Tim Baines <sup>b</sup>, James Baldwin <sup>a</sup>, Keith Ridgway <sup>a</sup>, Panagiotis Petridis <sup>b</sup>, Ali Ziaee Bigdeli <sup>b</sup>, Victoria Uren <sup>b</sup>, Daniel Andrews <sup>b</sup>

<sup>a</sup> Advanced Manufacturing Research Centre, University of Sheffield, Rotherham S60 5TZ, UK

<sup>b</sup> Aston Business School, Aston University, Birmingham B4 7ET, UK

### ARTICLE INFO

#### Article history:

Received 25 March 2015

Received in revised form 14 October 2016

Accepted 20 December 2016

Available online 15 January 2017

#### Keywords:

Servitization

Advanced-service transformation

Emotional mechanics

Gamification

### ABSTRACT

Increasingly, manufacturing organizations compete by developing product-service systems rather than offering products alone. To transform themselves into providers of advanced services, however, product-centric manufacturing firms need to overcome a range of barriers. While previous studies have highlighted the teaching/learning potential of ‘gamification’ (the use of ideas and techniques found in game-playing), the opportunities to harness this approach to help tackle such barriers have yet to be fully realized. Our study extends the debate by integrating established frameworks relating to emotional mechanics of gamification with the adoption of advanced services, arguing that such mechanics can facilitate and strengthen companies’ transformation into advanced-service providers. Based on a systematic analysis of nearly 90 selected publications, we develop six conceptual propositions to explore how gamification can aid the transformation process. Our findings will help both practitioners and researchers apply emotional mechanics of gamification when seeking to address different hurdles hindering the development and provision of advanced services.

© 2016 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

### 1. Introduction

The concept of ‘servitization’ – where firms develop new value propositions by transitioning from product manufacture to provision of integrated solutions incorporating products, functions and services – has attracted considerable attention from the academic community (Cova & Salle, 2008; Lindberg & Nordin, 2008; Matthyssens & Vandembemt, 2008; Raddats & Easingwood, 2010). Striking examples can be found in many industrial sectors and include: machine tool manufacturers beginning to sell tool use instead of the tools themselves (Johnson & Christensen, 2008); manufacturers of industrial chemicals moving away from supplying explosives towards providing ‘rocks on the ground’ (Martinez & Turner, 2011); and manufacturers in the railway sector transforming into providers of ‘transport solutions’, rather than merely producing rolling stock (Gebauer, Paiola, & Saccani, 2013).

A substantial level of servitization has been observed among manufacturing firms globally (Baines, Lightfoot, Benedettini, & Kay, 2009; Bikfalvi, Lay, Maloca, & Waser, 2013; Fang, Palmatier, & Steenkamp, 2008; Neely, 2009). Most European manufacturing companies offer services (Dachs et al., 2014), 58% of US manufacturing firms are adopting servitization strategies (Neely, 2009) and the number of Chinese manufacturers expanding their service strategies is increasing

rapidly, rising from less than 1% in 2007 to 19% in 2011 (Neely, Benedettini, & Visnjic, 2011).

Despite this growing momentum, however, most service offerings from manufacturers remain at the ‘base’ and ‘intermediate’ level; only a few have been successfully transformed into ‘advanced’ service offerings based on product performance or product availability, for example (Fischer, Gebauer, Gregory, Ren, & Fleisch, 2010; Kowalkowski, Windahl, Kindström, & Gebauer, 2015).

Development of advanced services requires significant changes to a firm’s culture, technologies, organizational structure and processes (Baines & Lightfoot, 2013), with Rolls-Royce’s Power-by-the-Hour model representing one example of the overall concept. According to Baines and Lightfoot (2013), some manufacturers build up significant revenues by offering intermediate services, such as condition monitoring, maintenance and repair, while others move towards more advanced services such as MAN’s Pay-per-Kilometre offering. Both types of offering can financially benefit the manufacturer (Baines & Shi, 2015; Bustinza, Bigdeli, Baines, & Elliot, 2015), even though they represent very different transformation pathways (Gebauer et al., 2013; Kindström, 2010; Kowalkowski et al., 2015).

Uncertainties regarding these pathways and the processes of change associated with them often inhibit the transition to advanced services (Brax & Visintin, 2017). Eliminating such uncertainties and creating a secure platform that enables a firm to move successfully towards provision of advanced services requires new working relationships, new knowledge and new forms of information exchange (Salonen, 2011).

\* Corresponding author.

E-mail address: [guang.shi@sheffield.ac.uk](mailto:guang.shi@sheffield.ac.uk) (V.G. Shi).

For example, an advanced service cannot easily be written straight into an exchange contract in the same way as a pre-servitized, product-centric exchange. To reduce managers' uncertainties, then, there is a clear need for an effective emotional engagement, communication and teaching/learning mechanism that can help them proceed with the transformation in the most effective, efficient and reassuring way.

In a range of business activities, 'gamification' has increasingly been harnessed as a means of motivating people (Deterding, Dixon, Khaled, & Nacke, 2011; Hamari & Koivisto, 2015; Hamari, Koivisto, & Pakkanen, 2014; Nicholson, 2012; Stock, Oliveira, & von Hippel, 2015). With gamification defined "as a process of enhancing a service with affordances for gameful experiences in order to support [the] user's overall value creation" (Huotari & Hamari, 2012, p. 19), managers can take games' emotional mechanics (utilitarian, hedonic and social) and tweak them to aid achievement of business objectives (Werbach & Hunter, 2012). For instance, people's enjoyment of playing games can be exploited to convey meaningful messages to them (Bogost, 2007) or to enable intrinsic engagement with external stakeholders when developing radical solutions (Stock et al., 2015). Managers can also harness the utilitarian reward mechanics of gamification to drive efficiency and desired behaviour change (Zichermann & Linder, 2013).

Overall, building on psychological research in the field of self-determination theory (Deci & Ryan, 1975), it is apparent that emotional mechanics of gamification can aid efficiency and the exploration of novel aspects of innovative activities (Stock et al., 2015). Our research, however, has focused specifically on the role that application of gamification's utilitarian, hedonic and social mechanics could play in helping managers to overcome barriers relating to their firms' transition to advanced-service provision. A key aim has been to build a stable research framework spanning both servitization and gamification communities, to pinpoint important research challenges for the future.

## 2. Theoretical perspectives

The potential to harness gamification's emotional mechanics in order to accelerate transformation to advanced-service business models has yet to be fully realized. While previous studies have shown that gamification offers many behavioural and attitudinal benefits in a business context (Hamari & Koivisto, 2015; Werbach & Hunter, 2012; Zichermann & Linder, 2010, 2013), as noted above none has systematically examined these emotional mechanics in the context of advanced-service transformation.

In contributing to and developing this debate, our study follows the game design structure proposed by Robson, Plangger, Kietzmann, McCarthy, and Pitt (2015a), whereby heterogeneous actors are involved in gamified experiences involving a game-player perspective and a game-designer perspective – and varying in the extent to which they are actively or reactively involved in the game.

Our study settled on a 'bridge' position incorporating both the perspective of a game-player (i.e. the party adopting advanced services) and the perspective of a game-designer (i.e. the party using emotional mechanics of gamification to achieve their transitional objectives). As

a result, we have been able to merge two previously separate debates and allow servitization scholars to learn about emotional mechanics of gamification, while enabling gamification scholars to learn about advanced-service transformation and what it entails. (Fig. 1).

First, then, we adopted *the game-player's perspective* and developed Research Question (RQ) 1: *What impact have gamification's emotional mechanics had on two types of transitional pathways to advanced-service provision?*

Second, we adopted *the game-designer's perspective* and developed Research Question (RQ) 2: *What opportunities are there for gamification design to accelerate advanced-service transformation?*

In sections below, we follow existing frameworks on the process of transformation to advanced-service provision (proposed by Baines, Lightfoot, Peppard, Johnson, Tiwari, Shebab, & Swink, 2009; Fischer et al., 2010; Kowalkowski et al., 2015) and discuss issues relating to two types of strategy: (i) transition to availability-based growth; (ii) transition to performance-based growth. We then discuss emotional mechanics of gamification in terms of their role in overcoming barriers to the process of transformation/transition in a commercial context.

### 2.1. Transformation to advanced-service provision

A growing body of scholars have tried to explain what is involved in a product-centric manufacturing firm's transformation into an advanced-service provider (Eloranta & Turunen, 2016; Kohtamäki, Partanen, Parida & Wincent, 2013; Gebauer et al., 2013; Baines, Lightfoot, Peppard, et al., 2009; Ulaga & Reinartz, 2011). Product-centric firms need to reposition themselves away from exchange of goods and towards exchange of intangible resources with their business partners (Fischer et al., 2010; Raddats & Easingwood, 2010; Ulaga & Reinartz, 2011), and to remodel their business relationships with suppliers and customers to focus on value co-creation (Vargo & Lusch, 2004; Kohtamäki, Partanen, Parida, et al., 2013; Jaakkola & Hakanen, 2013). According to Kowalkowski et al. (2015), product-centric firms adopt two different transformation pathways: transition to availability-based growth, which involves concentrating efforts on incremental efficiency opportunities offered by capital goods along the primary customer-activity chain; and transition to performance-based growth, which involves concentrating on more radical service opportunities through spatial expansion along an adjacent customer-activity chain (Fischer et al., 2010).

In a *transition to availability-based growth*, where firms exploit their established base of knowledge on their customers' primary activities (Fischer et al., 2010), typical features include the provision of services based on machine availability (i.e. up-time) and yield, rather than the provision of cost-based scheduled maintenance services (Oliva & Kallenberg, 2003).

Here, customer relations focus on exploiting the efficiency of service-delivery operations (Fischer et al., 2010). Spurred on by the development of sensor technologies, which enable real-time information capture on product usage, availability-based growth concentrates on customer processes and asset efficiency (Baines & Lightfoot, 2013), and manufacturers need to develop the capability to generate non-

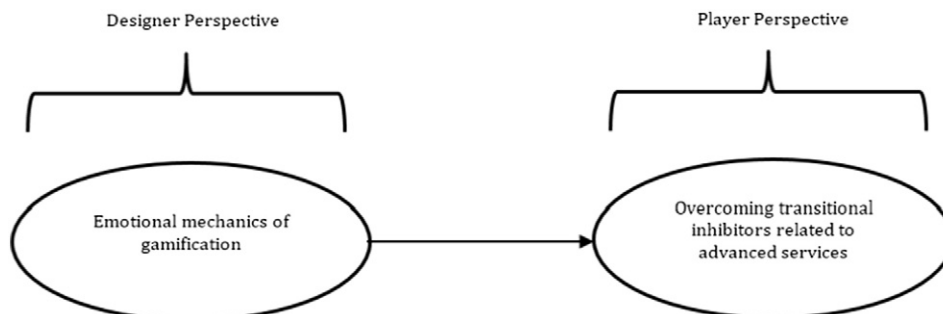


Fig. 1. Theoretical structure.

stop intelligence about customers' expressed needs in the primary activity chain (Kowalkowski et al., 2015). For example, Swedish bearing manufacturer SKF systematically collects customer-use data through condition monitoring and vibration analysis. Fundamentally, product-centric manufacturing firms need to develop their data interpretation capabilities into customer operations that enable them to develop new offerings related to asset optimization (Ulaga & Loveland, 2014).

For 'availability providers', supplier relations focus on exploiting efficiency opportunities presented by supply-chain knowledge and information-sharing (Davies, Brady, & Hobday, 2006; Kowalkowski, Witell, & Gustafsson, 2013; Rolstadås, Henriksen, & O'Sullivan, 2012), while transformation to advanced services requires coordinated activities with external partners in order to be responsive to customer requirements (Baines, Lightfoot, Peppard, et al., 2009). Typically, a mixture of external service facilities are located close to the customer's operation, with communication between different external facilities coordinated through a network structure for information- and knowledge-sharing (Baines & Lightfoot, 2013).

In a *transition to performance-based growth*, product-centric firms often depart from the role of equipment seller and/or availability provider (Kowalkowski et al., 2015). Instead, compensation becomes linked to the customer's value-in-use and business objectives to an even greater extent than before (Salonen, 2011). According to Matthyssens and Vandembemt (2010), performance-based growth adds complexity and risk. Product-centric firms turn towards exploring service opportunities along an adjacent customer-activity chain (Fischer et al., 2010) and, as a result of innovation and learning, come to consider the market structure as endogenous.

To become 'performance providers', manufacturing firms need to educate their customers about performance contracts. Customers might be biased due to: fears that over-dependence on a single supplier may restrict their ability to obtain value for money (Baines & Lightfoot, 2013); perceptions of opportunistic behaviour by the service provider (Brax, 2005); and concerns about losing their business expertise and creating a potential threat to themselves by allowing service providers to encroach on their business territory (Gebauer et al., 2013). According to Gebauer and Friedli (2005), customers afraid of losing their business expertise are unwilling to provide the necessary information about their internal operations.

For performance providers, supply-chain relations often take the form of a flexible, horizontally integrated service network. The firm at the focal point of the network mobilizes various actors to provide a platform of competencies contributing to a solution (Gebauer et al., 2013) and develops 'indirect capabilities' through collaboration with supply-chain partners (Araujo, Dubois, & Gadde, 2003); for instance, it might manage integrated system solutions sourced from multiple vendors (Davies, Brady, & Hobday, 2007), with bundled, complementary products making each individual product more valuable (Purchase, Mills, & Parry, 2011). To take one example, Alstom works with complementary business partners to develop its capabilities in integration services, allowing the company to move beyond the supply of rolling stock into high-value integration services across different value chains (Gebauer et al., 2013).

Providing services for an adjacent customer-activity chain can, however, be far beyond a firm's existing core competencies and it may face many challenges in aligning with supply-chain partners. Furthermore, the service supplier often interacts directly with customers without intervention from the performance provider and opportunistic behaviour by supply-chain partners can reduce the performance provider's influence as well as the overall quality of the service (Li & Choi, 2009; Wynstra, Spring, & Schoenherr, 2015). Managers need to have the right skills to foresee the value, assess the risks and anticipate the changes arising from the exploration of new service opportunities (Gebauer, Pütz, Fischer, & Fleisch, 2009).

The foregoing discussion has identified a range of potential issues and inhibitors relating to a manufacturing firm's transformation into a provider of advanced services, whether these services are availability-

based or performance-based. To help tackle these inhibitors, an effective teaching/learning mechanism that not only communicates ideas but also engages emotions is required to enable managers to conduct the transition process with confidence and retain customer trust.

## 2.2. Emotional mechanics of gamification

Uncertainties about different service transformation pathways and associated change processes can inhibit firms' transition to providing advanced services (Fischer et al., 2010; Kowalkowski et al., 2015). Product-centric firms should therefore tap into different resources and knowledge pools to assist implementation of this transformation (Böhm, Eggert, & Thiesbrummel, 2017).

In many business scenarios, gamification has already been recognized as a powerful tool for removing uncertainties at the transition stage (Werbach & Hunter, 2012). Indeed, for millennia, games have been used to educate, inform and inspire, although often without full realisation of their enormous scope to do so in a diversity of different applications. For example, Ancient Rome introduced gladiatorial combat to inspire admiration of its martial ethics, while also offering a release for aggression (Shelton, 2013); during the Warring State Period in Ancient China, Sun Bin used horse-racing games to teach military strategies to the aristocracy; in modern times, gamification applied to the business world has gained increasing traction in a wide range of fields, from the education sector (Mettler & Pinto, 2015; van der Spek, Wouters, & van Oostendorp, 2011), to marketing (Bittner & Shipper, 2014; Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2015b; Robson et al., 2015a) and the defence industry (Chatham, 2007; Frank, 2012).

Gamification in a commercial context is being studied as part of a broad range of academic traditions, with studies undertaken within their distinct research communities providing unique and complementary perspectives on design and application (Deterding, 2012; Hamari, 2015; Hamari & Koivisto, 2015; Stock et al., 2015). Issues relating to gamification that have received particular attention include design principles (Blohm & Leimeister, 2013; Conaway & Garay, 2014; Robson et al., 2015b), emotional mechanisms (Bittner & Shipper, 2014; Hamari & Koivisto, 2015), social connections (Conaway & Garay, 2014; Mainemelis, 2001; Moncrief, Marshall, & Rudd, 2015; Quinn, 2005), changes in consumer behaviour (Bittner & Shipper, 2014; Insley & Nunan, 2014), innovations (Raasch & von Hippel, 2013; Stock et al., 2015) and political communications (Mayer, 2009). These studies have shown that gamified experiences result in persuasive benefits (Bittner & Shipper, 2014), improved attitudes and greater behavioural change (Conaway & Garay, 2014; Seaborn & Fels, 2015).

To assess the opportunities for using gamification to accelerate advanced-service transformation, our study adopted established theoretical structures of gamification's emotional mechanics – namely, utilitarian, hedonic and social (Gnauk, Dannecker, & Hahmann, 2012; Hamari & Koivisto, 2015; Raasch & von Hippel, 2013; Robson et al., 2015b; Stock et al., 2015).

'Utilitarian mechanics' refer to the extrinsic benefit associated with the output/result of activities (Gnauk et al., 2012; Stock et al., 2015). For example, players might receive immediate feedback on their performance and instant access to rewards (Stock et al., 2015), while their emotional drives are related pragmatically to the fulfilment of certain goals (Gnauk et al., 2012). According to Conaway and Garay (2014), gamification typically provides participants with rapid indications of success, instant extrinsic rewards in the forms of financial compensation (Moncrief et al., 2015) and other, non-monetary incentives including a higher level of power, responsibility and leadership (Conaway & Garay, 2014; Palmer, Lunceford, & Patton, 2012).

'Hedonic mechanics' refer to the enjoyment of the task in itself (Stock et al., 2015). This is intrinsic and relates to aesthetic, experiential and pleasure-related benefits (Stock et al., 2015). Hedonic mechanics emphasize psychological well-being and stimulation of individuals (Gnauk et al., 2012), for example through an attractive game-user

interface (Conaway & Garay, 2014) and clear goals, rules and game content incorporating interesting narratives about the 'real world' (Bedwell, Pavlas, Heyne, Lazzara, & Salas, 2012; Bogost, 2007). Users are engaged in problem-solving with the aim of enjoyment (Witt, Scheiner, & Robra-Bissantz, 2011), independent of any value derived from the solutions they reach (Raasch & von Hippel, 2013).

'Social mechanics' refer to the need for relatedness to and acceptance by others (Deci & Ryan, 1975; Hamari & Koivisto, 2015). For instance, gamification technology provides instant connections with social networks and participants can gain a sense of recognition from other users (Conaway & Garay, 2014).

Research on gamification is currently being conducted within many different research communities (Caulfield, Xia, Veal, & Paul Maj, 2011; Harman, Koohang, & Paliszkiwicz, 2014; Pedreira, García, Brisaboa, & Piattini, 2015; Petridis et al., 2015). Although they show that gamification offers multiple business-related opportunities, none of the existing studies has attempted to assess the emotional mechanics of gamification in terms of the potential to help resolve issues associated with transitioning to the provision of advanced services. By providing a lens through which various contributions relating to the emotional mechanics of gamification can be viewed, our study aims to help practitioners take advantage of opportunities to apply these emotional mechanics to overcome barriers and inhibitors related to advanced-service transformation.

### 3. Design/methodology

This section outlines our research method, the processes we applied and our identification of the core literature relevant to the goals of this paper.

#### 3.1. Method

To address our RQs, we integrated established frameworks relating to emotional mechanics of gamification (Deterding, 2012; Hamari & Koivisto, 2015; Nicholson, 2012; Robson et al., 2015a; Stock et al., 2015) and advanced-service transformation (Eloranta & Turunen, 2016; Kohtamäki, Partanen & Möller, 2013; Kohtamäki et al., 2013; Kohtamäki, Partanen, Parida, et al., 2013; Jaakkola & Hakonen, 2013; Baines, Lightfoot, Peppard, et al., 2009; Gebauer et al., 2013). This equipped us with a comprehensive method of assessing gamification's impact on the transitional inhibitors that can affect a firm's transformation to provision of availability-based and performance-based advanced services.

To explore the role of gamification's emotional mechanics as potential remedies capable of solving these transitional issues, we followed the principles and process of the systematic review methodology (Coombes & Nicholson, 2013; Harman et al., 2014; Sandberg & Aarikka-Stenroos, 2014; Seaborn & Fels, 2015; Tranfield, Denyer, & Smart, 2003). This methodology provided us with a viable means to synthesize and organize findings from multiple studies. To address our RQs, we used a largely quantitative and descriptive analysis of publications produced by the relevant research communities.

First, we followed the systematic literature review process: planning and scoping of search terms; execution to select and screen publications; and analysis and reporting of results. This sought to generate an understanding of the research communities' evolution, contributions and interactions. The emphasis was on understanding the positioning and perspective of each paper, and on helping us to understand the impact of gamification's emotional mechanics on the transition to advanced-service provision (RQ1).

We then undertook a more qualitative analysis to identify key themes and to build connections between gamification's emotional mechanics and two types of transitional inhibitors related to advanced services. As a result, we could address the potential opportunities for gamification design to accelerate advanced-services transformation (RQ2).

We refer to the two components of this approach as 'descriptive analysis' and 'thematic analysis', respectively.

#### 3.2. Planning and scoping

We identified relevant data sources covering a wide range of publication formats, including books and peer-reviewed journal articles. Similar to earlier literature studies in the field of gamification (Harman et al., 2014; Seaborn & Fels, 2015), our sampling was conducted via Google Scholar and academic library databases including Web of Science, Scopus, Proquest, Emerald, ABI Inform and Business Source Premier.

One problem is that different scholars tend to use different terms to describe gamification in a business context (Harman et al., 2014; Laine, 2012; Petridis et al., 2015). For example, Harman et al. (2014) collected a sample of all published work from 2010 to 2013 containing the word 'gamification' in the publication title, even though most studies tend to explore gamification from a very general perspective (Deterding et al., 2011; Harman et al., 2014). By contrast, our study focused more specifically on its business applications, to enable us to identify more easily its particular relevance to overcoming barriers related to servitized inter-organizational operations. A wide range of keywords was initially identified, based around three root terms: 'gamification', 'business games' and 'serious games'. These were combined with 'management', 'business', 'product', 'services', 'servitization' and 'marketing' to ensure their relevance to this study. For completeness, an Internet search of Amazon.com book records was conducted using a similar process.

#### 3.3. Execution and preliminary results

Based on this process, 243 publications were identified. An initial screening discounted publications that (i) lacked a clear contribution regarding the psychological attributes of gamification for business purposes and (ii) focused on game theories in operations management. Endnote (version 6) citation management software was used to remove any duplicate records and the titles/abstracts were checked to ensure relevance to the full review. The subsequent pool of core publications was recorded and condensed to a dataset comprising 88 publications; these had 65 different lead authors and were published in 22 journals and 10 books from 2005 through to 2015. As shown in Table 1, we also identified the principal communities contributing to these studies, with the bulk of contributions originating from the business management and ICT & gaming communities. (See Table 2.)

Taking a user-centred approach, we assessed three archetypes of gamification's emotional mechanics: utilitarian, hedonic and social

**Table 1**  
Academic communities producing studies on gamification.

| Examples of highly cited publications                   | No. of articles | Generic field of study |
|---|-----------------|------------------------|
| JPIM, MISQ, IJIM, DSS, CACM, Technovation, R&DM, MITSMR | 30              | Information systems    |
| HBR, BH, ACR, JME, JRCS, JCM, MSQ, EJC, HCI             | 14              | Marketing              |
| IEEE TEM, IJHCS, IMD                                    | 3               | Operations             |
| CHB, EC, C&E, S&G, HCI                                  | 31              | ICT & Gaming           |
| Books   | 10              |                        |
| Total number of core articles                           | 88              |                        |

JPIM: Journal of Product Innovation Management; MISQ – MIS Quarterly; IJIM – International Journal of Information Management; DSS – Decision Support Systems; CACM – Communications of the ACM; R&DM – R&D Management; MITSMR – MIT Sloan Management Review.

HBR – Harvard Business Review; BH – Business Horizons; ACR – Advances in Consumer Research; JME – Journal of Marketing Education; JRCS – Journal of Retailing and Consumer Services; JCM – Journal of Consumer Marketing; MSQ – Managing Service Quality; EJC – European Journal of Communication.

IEEE TEM – IEEE Transactions on Engineering Management; IJHCS – International Journal of Human-Computer Studies; IMDS – Industrial Management and Data Systems.

CHB – Computers in Human Behaviour; EC – Entertainment Computing; C&E – Computers and Education; S&G – Simulation and Gaming; HCI – Human Computer Interaction.

**Table 2**  
Mapping of emotional mechanics against contextual dimensions (Numbers relate to individual publications identified).

| Advanced-Service Transformation                           | Utilitarian benefit   | Hedonic benefit  | Social benefit   | Opportunities   |
|---|---|--|--|---|
| Availability-based transition<br>Customer relations       | * Offer interactive reward<br>10,68   |  | * Social competition<br>* Play to win<br>* 10, 30, 57, 73  | Amplify user adoption and correct usage of inter-organizational ICT communication                     |
| Supplier relations  | * Real job promotion and bonuses<br>* Real-time feedback with financial reward<br>* Recognition and reward through corporate-sponsored virtual currency<br>* Exchange point for tangible reward<br>8, 9, 55, 67, 85, 88 |  | * Competitions<br>* Play to win<br>67, 73, 85, 86, 88  | Amplify supply-chain partner knowledge-sharing culture  |
| <b>Performance-based transition</b><br>Customer relations |   | * Virtual reality<br>* Interactive game design<br>* Immersive virtual plant environment<br>* Aesthetics and content create enjoyable user experience<br>29, 31, 32,33, 47, 53,56, 72, 74, 76, 87, 88                               | * Social interactions<br>* Online communities<br>* Forums<br>* Idea competitions<br>13, 19, 34, 49, 50, 53, 73, 80 | Amplify trusting relationships with customers and co-create value with customers                      |
| Supplier relations  |   | * Interactive game design<br>* Incorporating 3D graphics<br>* Virtual 'avatars' with clear goals, feedback and difficulty<br>* Graphic-intensive aesthetic design<br>* Content-rich<br>11,15, 20, 22, 28,64, 65, 71, 77, 79,82, 88 |  | Amplify inter-organizational coordination such as gain-sharing activities among supply-chain partners |

(Conaway & Garay, 2014; Moncrief et al., 2015; Nicholson, 2012; Palmer et al., 2012; Raasch & von Hippel, 2013; Sakamoto, Nakajima, & Alexandrova, 2012; Seaborn & Fels, 2015; Stock et al., 2015). We then mapped these against the following four types of contextual dimension relating to advanced-service transformation (Eloranta & Turunen, 2016, Kohtamäki et al., 2013, Kohtamäki, Partanen, Parida, et al., 2013, Kowalkowski et al., 2013, Jaakkola & Hakanen, 2013, Baines, Lightfoot, Peppard, et al., 2009, Gebauer et al., 2013):

1. Availability-based customer relations: involving information-sharing with the customer around service delivery and focused on the product used by the customer.
2. Availability-based supplier relations: involving information/knowledge-sharing with supply-chain partners.
3. Performance-based customer relations: involving the development of trusting relationships with customers and the gaining of insights into customer processes to co-create value with customers.
4. Performance-based supplier relations: involving the development of collaborative supply-chain learning to explore 'gain-sharing' opportunities.

#### 4. Emotional mechanics of gamification: impact on the transition towards advanced services

This section provides a qualitative assessment of each of the themes emerging from the systematic literature review, with the aim of developing potential research propositions relating to emotional mechanics of gamification and their role in overcoming inhibitors affecting transition to advanced-service provision.

##### 4.1. Gamification's impact on availability-based customer relations

Availability-based service providers exploit their customers' technical and business needs throughout the entire life-cycle of the equipment

in question, starting with development, design and construction and ending with the product usage phase (Gebauer et al., 2013). Successful transition towards providing such a service will require many ICT-related changes being built into service delivery, with a focus on allowing the manufacturer visibility of their product while it is functioning within the customer's operation (Baines, Lightfoot, Peppard, et al., 2009, Baines & Lightfoot, 2013, Ulaga & Reinartz, 2011). According to Baines and Lightfoot (2013), ICT architecture can incorporate data capture and monitoring capabilities enabling the transmission, storage and analysis of data; General Electric, for instance, services power turbines used by major utilities through remote monitoring and diagnostics. These technologies enable the service provider to deploy their technicians ahead of failure (Allmendinger & Lombreglia, 2005) and to advise customers on the most efficient mode of machine utilization (Azarenko, Roy, Shehab, & Tiwari, 2009).

Advanced-service providers can face difficulties in terms of obtaining/providing information from/to the customer (Storbacka, 2011). For example, insufficient adoption and incorrect usage of advanced ICT systems by the customer at the transitional stage can create a management challenge for advanced-service providers (Bhakoo & Choi, 2013; Brax, 2005). Typically, advanced-service providers place their manufactured property in the hands of a customer without transferring ownership (Baines & Lightfoot, 2013), and customers using advanced ICT systems may provide inaccurate, incomplete and out-dated information (Kagermann, Osterle, & Jordan, 2011).

According to Brax (2005), opportunistic 'moral hazard' issues may occur when the user is removed from ownership of the assets. For instance, customers may intentionally stop using ICT systems if they are not convinced of their value (Baines & Lightfoot, 2013). As a result, information can be inconsistent and fragmented, resulting in frequent service calls, work overloads and increased service-delivery costs (Baines & Lightfoot, 2013; Brax, 2005).

Gamification offers a powerful tool to drive information-sharing with customers (Blohm & Leimeister, 2013; Platt, Rowe, & Wall,

2013). Gnauk et al. (2012) show that embedding scoring and social competition (Robson et al., 2015a) into a game-user interface results in higher user acceptance and the potential to enhance user participation. Similarly, Blohm and Leimeister (2013) argue that gamification can systematically support the adoption of new information systems and facilitate the adaptation of habitual behaviour.

Instead of developing fully-fledged games, the goal of gamification is to add game elements into a system in order to produce game-like applications that can provide secondary support to the main system functionality (Liu, Alexandrova, & Nakajima, 2011). For example, energy service company Opower uses gamification to drive energy savings for their utility customers; instead of providing additional energy consumption data to customers, the firm offers interactive reward games to encourage them to adopt energy-efficient behaviour (Platt et al., 2013).

These considerations have led us to develop:

**Proposition 1.** During the transition towards availability-based growth, gamification technologies' emotional mechanics (utilitarian and social) have the potential to help amplify desired changes in customer behaviour.

#### 4.2. Gamification's impact on availability-based supplier relations

Product-centric manufacturing firms making the transition to becoming availability providers can encounter difficulties in sharing inter-organizational knowledge (Kohtamäki et al., 2013), which is crucial to creating new offerings for their customers (Fischer et al., 2010; Storbacka, 2011). Alignment of multiple external partners with a customer's operation creates a challenge for availability providers, as partners' facilities are often decentralized and far-removed from traditional organizational-level hierarchical control (Baines, Lightfoot, Benedettini, et al., 2009). Information- and knowledge-sharing can be difficult among autonomous external partners, in particular; for example, when a project based on a collaborative solution comes to an end, knowledge associated with the customer's processes may also dissipate (Hayes, 2005; Kagermann et al., 2011).

Studies show that specific emotional mechanics of gamification – namely, utilitarian (i.e. reward-based incentives) and social (i.e. competition) – can help to promote partner knowledge-sharing across different industries (Blascovich & Bailenson, 2011; Reeves, Malone, & Driscoll, 2008):

- NTT Data, one of the biggest IT service and business process outsourcing consultancies in the world, developed the 'Go Leadership' game to share innovative client knowledge among disparate long-term consultants who are traditionally isolated and divorced from the activities of their employers. Supported by senior management, this game challenges both internal and external consultants with complex client relationship issues (Robson et al., 2015a; Werbach & Hunter, 2012); achievement in terms of performance in the game is rewarded with a real job promotion and bonuses (Zichermann & Linder, 2013).
- In the highly distributed call-centre environment, Live-Ops developed a game that uses points, badges and real-time feedback with financial rewards to reinforce positive agent behaviour. It involves 20,000 completely autonomous independent agents, who interact with the company to learn skills and hit performance targets for their clients (Paharia, 2013).
- In the field of consulting, Deloitte has applied game elements to the design of the 'WhoWhatWhere' messaging system. A leader-board tracks consultants' communications with clients, with the leaders gaining recognition and reward through a corporate-sponsored virtual currency, consequently creating an efficient knowledge-sharing platform across the organization (Werbach & Hunter, 2012).
- Salesforce.com developed a sales-force automation (SFA) system designed to help the company's highly distributed sales professionals

manage over 100,000 customer relationships worldwide. The game enables salespeople to earn points for closing deals, collaborating and managing high-quality data, and these points can then be exchanged for tangible rewards. The game drives independent salespeople to focus on campaigns, while it also promotes knowledge-sharing with respect to their sales techniques.

Our findings have led us to develop:

**Proposition 2.** During the transition towards availability-based growth, gamification technologies' emotional mechanics (utilitarian and social) have the potential to help amplify supply-chain knowledge-sharing.

#### 4.3. Gamification's impact on performance-based customer relations

The transition to becoming a performance provider requires stable, long-term and trusting interactive relationships with customers (Baines, Lightfoot, Peppard, et al., 2009; Raddats & Burton, 2011; Sheth & Sharma, 2008); firms also need to acquire insights into their customers' pains and gains (Baines & Lightfoot, 2013; Storbacka, 2011). For example, value-sharing contracts can aim to lower the cost of the initial product purchase, with the customer agreeing to a set of value metrics and with payments partly based on efficiency savings made during the operational life of the contract (Baines & Lightfoot, 2013).

Firms can find it difficult to introduce advanced services if their customers do not see the value of entering into an advanced-service contract (Brax, 2005). Customer relations can also run into trouble if customers perceive advanced-service offerings getting too close to the sphere of their own core competencies (Baines & Lightfoot, 2013). Furthermore, customers can be biased as a result of: perceptions of opportunistic behaviour by the service provider (Brax, 2005); fear of becoming overly dependent on a single supplier and therefore finding their ability to obtain value for money restricted (Choi & Linton, 2011); or concerns about losing their business expertise Kagermann et al. (2011). As a result, customers can be unwilling to share the necessary information about their internal operations (Gebauer & Friedli, 2005). In some cases, there can even be conflict within the customer's operation, with headquarters seeing the benefit of an advanced-service contract but facing resistance from local management. Collaboration is especially difficult if local managers perceive the advanced-service provider to be a threat to their jobs (Brax, 2005; Stremersch, Wuyts, & Frambach, 2001).

Utilizing the hedonic mechanics of gamification, however – with real-world scenarios turned into a game – a company can demonstrate its capabilities to (and develop trust with) its customers (Zichermann & Linder, 2013). To take one example, NTT Data has developed a virtual game environment enabling customers to visualize and gain insight into the firm's efforts to protect user-activity data, e.g. in situations involving a total computer meltdown (Burke, 2014).

These hedonic mechanics also help potential customers to learn about the benefits of advanced-service offerings. For instance, Siemens developed the 'Plantville' game where participants need to find ways to optimize energy usage and boost safety records in a realistic virtual plant environment. This enables Siemens to build customer confidence in their energy-saving servo motors and automated systems, in terms of improving efficiency, productivity and sustainability (Hugos, 2012). Similarly, IBM's 'CityOne' game allows people to address urban sustainability issues, e.g. relating to energy and water infrastructures. During the game process, players learn about IBM's product and service offerings designed to help build a better city (Hugos, 2012).

To become a performance provider, product-centric firms also need to emphasize their customer-centricity and develop offerings tailored to creating value for their customers (Baines, Lightfoot, Peppard, et al., 2009; Miller, Hope, Eisenstat, Foote, & Galbraith, 2002; Storbacka,

Windahl, Nenonen, & Salonen, 2013). The focus of value propositions is no longer simply on product functionality but on the total customer experience.

The hedonic attributes of gamification can also help servitized manufacturers understand their customers' processes (Laine, 2012), with product design and development teams learning about the 'humanistic' side of the market and co-creation of value with customers (Humphreys, 2008; Robson et al., 2015a). New product development can benefit from these hedonic attributes by promoting user enjoyment through participation in the value co-creation process, in addition to the reputational gains that customers achieve as a result of making high-quality contributions via a gaming scenario (Conaway & Garay, 2014; Raasch & von Hippel, 2013). As a result, the structural role of internal research staff and external user communities can be transformed, with internal employees taking care of mundane tasks (e.g. documentation) and customers/contributors having a rewarding, enjoyable and creative experience (Raasch & von Hippel, 2013).

Furthermore, Ribeiro, Farinha, Pereira, and Mira da Silva (2014) suggest that, in terms of promoting social interactions, gamification can help to improve the process of requirement engineering by enabling better collaboration between different, distant stakeholders. The benefits of integrating user engagement into value chains, from user-led innovation to user-generated content, can be significant (Deterding, 2015). For example, SAP adopts gamification to connect their corporate clients across the globe and so harness customer feedback and disseminate innovative product applications across multiple industries. SAP's gamified online community network encourages user-generated content and customers can earn points and badges, for instance, while creating research opportunities that can facilitate development of next-generation products (Zichermann & Linder, 2013).

Our research in this field has led us to develop:

**Proposition 3.** During the transition towards performance-based growth, gamification technologies' emotional mechanics (hedonic and social) have the potential to help amplify value co-creation with customers.

#### 4.4. Gamification's impact on performance-based supplier relations

Advanced-service providers move from traditional product-oriented, vertically-integrated supplier-buyer relationships to further downstream in supply chains (Gebauer et al., 2013). Extending responsibilities downstream often involves a relationship-style contract with the provider's upstream suppliers (Baines & Lightfoot, 2013). According to Baines et al. (2009), advanced-service providers need to work with subsystem suppliers and distributors to ensure they stay on top of technology developments and shifts in demand (Choi & Linton, 2011). For example, BAE Systems supplies whole-aircraft availability contracts to the UK Ministry of Defence (MoD), establishing multi-organizational supply-chain partnerships where spare components and systems are provided by both BAE Systems and its sub-tier supply organizations to ensure a lower overall service cost for the Royal Air Force (Purchase et al., 2011).

During the move towards performance-based growth, suppliers and distribution partners might not necessarily be working towards the same objectives as the performance provider, as they could also be offering services based on another company's products or services (Naudé & Buttle, 2000). According to Eloranta and Turunen (2016), to meet complex and diverse customer needs, product-centric manufacturing firms need to reduce the complexity of their inter-firm configurations, requiring agility and broad network involvement. Advanced-service providers require tools to demonstrate to their supply-chain partners that the overall value of an advanced-service contract is worth more than the value that would be secured by selling individual products (Purchase et al., 2011).

When individuals are intrinsically motivated, they engage in activities for the inherent satisfaction of doing so, rather than to gain some outcome separate from the activity (Mainemelis, 2001; Shelton, 2013). Turning to the hedonic mechanics of gamification, then, interactive game design interfaces that are content-rich and graphics-intensive can help businesses to communicate collaborative narratives to their supply-chain partners (Bogost, 2007; Chatham, 2007; Garris, Ahlers, & Driskell, 2002; Hemp, 2006; Hemp, 2008; Kohler, Matzler, & Füller, 2009). For instance, General Electric developed the 'Patient Shuffle' game to demonstrate complex administrative processes for healthcare professionals and the challenges of running an emergency room (Zichermann & Linder, 2013). Doctors and nurses can use it to experience the complexity of patient care, from admission to discharge. This facilitates a meaningful understanding of the roles of operational processes in different parts of healthcare supply chains (Zichermann & Linder, 2013).

Gamification using interactive game design, incorporating 3D graphics, virtual 'avatars', clear goals and feedback mechanisms into business processes (Mainemelis, 2001; Mettler & Pinto, 2015; Quinn, 2005; van der Spek et al., 2011), can help supply-chain partners learn how systems work. For example, IBM developed the 'Innov8' game to shape understanding about processes and resource requirements in business operations (Balzert et al., 2012). The game adopts immersive virtual design to simulate real or fantasy business process issues, such as customer services, traffic flow and supply chains, where players can explore different business process functions and the relationships between these processes (Zichermann & Linder, 2013).

Based on our investigation into this topic, we have developed:

**Proposition 4.** During the transition towards performance-based growth, gamification technologies' emotional mechanics (hedonic) can help to amplify collaborative supply-chain learning about gain-sharing.

#### 4.5. Theoretical model

Section 4.4 comprised a qualitative analysis of different aspects of gamification's emotional mechanics and their potential impacts on a firm's transition to availability-based and performance-based growth. In this section, we propose a theoretical model (see Fig. 2) covering the design of gamification to facilitate the transition to advanced-service provision. Specifically, we use the model to develop theoretical propositions relating to the use of different levels of gamification's emotional mechanics to overcome transitional barriers.

Our study shows that both customer and supplier relations can benefit from behaviour-related outcomes, such as customer adoption of information-sharing technologies (Gnauk et al., 2012; Robson et al., 2015a) and the sharing of commercial knowledge across supply chains (Paharia, 2013; Werbach & Hunter, 2012; Zichermann & Linder, 2013). Our research also suggests that managers attempting to harness gamification to facilitate the transition to availability-based growth should take into account both utilitarian (reward) and social (competition) mechanics, which are likely to play more important roles than hedonic (enjoyment) mechanics.

This has led us to develop:

**Proposition 5.** To facilitate the transition to availability-based growth, gamification should be applied with a focus on providing utilitarian rewards and promoting social competition. ('Level-one amplification' – see Fig. 2.)

Securing the benefits associated with attitude-related outcomes revolves around the application of hedonic mechanics (e.g. rich content, graphic-intensive aesthetic design, interactive processes) and social mechanics to build trust in customer relations and promote supply-chain learning, for instance (Bogost, 2007; Gatautis & Medziausiene,

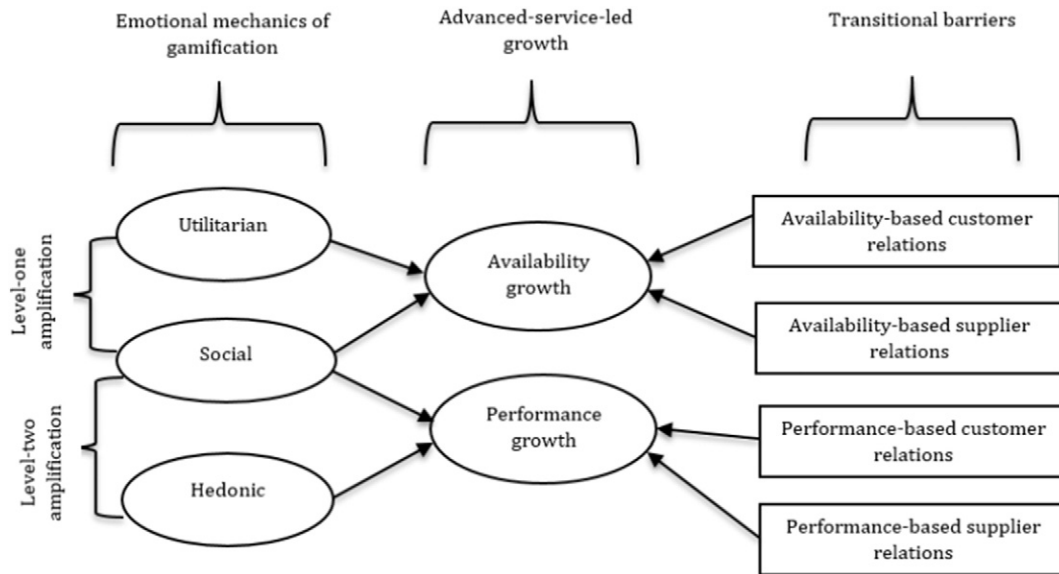


Fig. 2. Proposed theoretical model.

2015; Zichermann & Linder, 2013). Consistent with previous theoretical suggestions regarding the potential conflict between utilitarian and hedonic motivations, it might be necessary to decouple utilitarian mechanics in order to sustain the hedonic mechanics of gamification (Robson et al., 2015a; Zichermann & Linder, 2013).

Based on these considerations, we have developed:

**Proposition 6.** To change attitudes and create value through performance-based growth, emotional mechanics of gamification should be decoupled by adopting hedonic and social mechanics and removing utilitarian rewards. ('Level-two amplification' – see Fig. 2.)

## 5. Conclusions

Using established analytical frameworks, this study has reviewed the role of gamification's emotional mechanics in overcoming transitional barriers to availability-based and performance-based growth generated by advanced services. It highlights two important implications for academic enquiries in the industrial marketing domain.

First, previous studies that underline the importance of gamification's emotional mechanics revolve around indistinguishable business benefits. Our study proposes a more specific and relevant examination of different emotional mechanics of gamification and their amplification effect in overcoming transitional barriers to advanced-service-led growth. Taking the game-player's perspective, we set out to answer RQ1: what impact have gamification's emotional mechanics had on two types of transitional pathways to advanced-service provision? We developed five research propositions assessing the positive impact of different emotional mechanics of gamification in terms of overcoming transitional barriers. Specifically, we presented a new perspective aiming to unlock different forms of emotional mechanics in the context of advanced-service transformation, which has not been undertaken previously.

Second, related to decisions underlying the design of gamification to benefit advanced-service transformation (Raddats & Easingwood, 2010; Ulaga & Reinartz, 2011), we took the gamification designer's perspective and explored opportunities to use gamification's emotional mechanics to accelerate advanced-service transformation, in order to answer RQ2: what opportunities are there for gamification design to accelerate advanced-service transformation?

We developed a theoretical model to propose two levels of gamification design, involving gamification design for availability-based growth and gamification design for performance-based growth. We have suggested that deliberate decoupling of utilitarian from hedonic emotional mechanics can help to avoid potential conflict and overcome transitional barriers to performance-based growth. Future research can build on our conceptual proposition to carry out more empirical studies in this area.

As with any research, our study has limitations – some of which offer future research opportunities. A natural next step is to build game scenarios and evaluate their impact empirically. Furthermore, the current literature provides very little information about the misuse of gamification. According to Nicholson (2012), meaningful gamification focuses on introducing an element of play instead of an element of scoring; over-dependence on scoring can undermine intrinsic motivations, which will lead to users internalizing experiences (Nicholson, 2012). Engaging people to participate voluntarily for commercial purposes can also expose companies to negative criticisms – such as that they are using games as a tool to exploit lower-paid employees (Schmidt, 2013).

In addition, existing research explains little about the diffusion process of gamification in commercial applications. For example, what is the managerial and organizational tolerance level with regard to gamification? Do managers have the experience and awareness to implement gamification? According to Robson et al. (2015a), individual acceptance of gamification can vary considerably. Instead of taking a monolithic approach to adopting gamification, future studies could therefore focus on the 'gamification receptiveness' of different personality types.

Our study reviews three types of emotional mechanics associated with gamification. We have connected these to explore the impact of gamification in overcoming transitional barriers to advanced-service provision and in the context of increasing interest among manufacturing firms in making this transition (Baines & Shi, 2015; Bikfalvi et al., 2013; Fang et al., 2008; Neely, 2009). We developed six research propositions to inform scholars and practitioners, in terms of adopting gamification's emotional mechanics to facilitate the transition to advanced-service provision. Whereas servitized providers, users, customers and other actors within business networks had previously undertaken the 'unwrapping' work that made manufactured products fit to deliver the services intended, thanks to our propositions they



can now see the value in advanced-service offerings based on previous product offerings. Finally, our study offers an important step towards unifying gamification-related attempts to address problems linked to advanced-service transformation.

## Acknowledgement

This work was supported by EPSRC Grants Ref EP/K014064/1, EP/K014072/1, EP/K014080/1 'Transforming the adoption of Product-Service Systems through innovations in applied gaming technology'; a joint project with Aston Business School and the Advanced Manufacturing Research Centre, University of Sheffield.

## References

- Allmendinger, G., & Lombreglia, R. (2005). Four strategies for the age of smart services. *Harvard Business Review*, 83(10), 131.
- Araujo, L., Dubois, A., & Gadde, L. E. (2003). The multiple boundaries of the firm. *Journal of Management Studies*, 40, 1255–1277.
- Azarenko, A., Roy, R., Shehab, E., & Tiwari, A. (2009). Technical product-service systems: Some implications for the machine tool industry. *Journal of Manufacturing Technology Management*, 20, 700–722.
- Baines, T., & Lightfoot, H. (2013). *Made to serve 'what it takes for a manufacturer to compete through servitization and product-service systems'*. Wiley.
- Baines, T., Lightfoot, H., Peppard, J., Johnson, M., Tiwari, A., Shehab, E., & Swink, M. (2009). Towards an operations strategy for product-centric servitization. *International Journal of Operations and Production Management*, 29, 494–519.
- Baines, T., & Shi, G. (2015). A Delphi study to explore the adoption of servitization in UK companies. *Production Planning & Control*, 26(14–15), 1171–1187.
- Baines, T. S., Lightfoot, H. W., Benedettini, O., & Kay, J. M. (2009). The servitization of manufacturing: A review of literature and reflection on future challenges. *Journal of Manufacturing Technology Management*, 20, 547–567.
- Balzert, S., Pannese, L., Walter, M. T., & Loos, P. (2012). Serious Game in Business. In M. M. Cruz-Cunha (Ed.), *Handbook of Research on Serious Games as Educational, Business and Research Tools*. 1. (pp. 539–558). IGI Global.
- Bedwell, W. L., Pavlas, D., Heyne, K., Lazzara, E. H., & Salas, E. (2012). Toward a taxonomy linking game attributes to learning: An empirical study. *Simulation and Gaming*, 43, 729–760.
- Bhaskoo, V., & Choi, T. (2013). The iron cage exposed: Institutional pressures and heterogeneity across the healthcare supply chain. *Journal of Operations Management*, 31, 432–449.
- Bikfalvi, A., Lay, G., Maloca, S., & Waser, B. (2013). Servitization and networking: Large-scale survey findings on product-related services. *Service Business*, 7, 61–82.
- Bittner, J. V., & Shipper, J. (2014). Motivational effects and age differences of gamification in product advertising. *Journal of Consumer Marketing*, 31, 391–400.
- Blascovich, J., & Bailenson, J. (2011). *Infinite reality: Avatars, eternal life, new worlds, and the dawn of the virtual revolution*. HarperCollins.
- Blohm, I., & Leimeister, J. M. (2013). Design of IT-based enhancing services for motivational support and behavioral change. *Business & Information Systems Engineering*, 275–278.
- Bogost, I. (2007). *Persuasive games: The expressive power of videogames*. MIT Press.
- Böhm, E., Eggert, A., & Thiesbrummel, C. (2017). Service transition: A viable option for manufacturing companies with deteriorating financial performance? *Industrial Marketing Management*, 60, 101–111.
- Brax, S. (2005). A manufacturer becoming service provider – Challenges and a paradox. *Managing Service Quality*, 15, 142–155.
- Brax, S. A., & Visintin, F. (2017). Meta-model of servitization: The integrative profiling approach. *Industrial Marketing Management*, 60, 17–32.
- Burke, B. (2014). *Gamify: How Gamification Motivates People to Do Extraordinary Things*. Brookline, MA: Bibliomotion, Inc.
- Bustanza, O. F., Bigdeli, A. Z., Baines, T., & Elliot, C. (2015). Servitization and competitive advantage: The importance of organizational structure and value chain position. *Research-Technology Management*, 58, 53–60.
- Caulfield, C., Xia, J. C., Veal, D., & Paul Maj, S. (2011). A systematic survey of games used for software engineering education. *Modern Applied Science*, 5, 28–43.
- Chatham, R. E. (2007). Games for training. *Communications of the ACM*, 50, 36–43.
- Choi, T., & Linton, T. (2011). *Don't let your supply chain control your business*.
- Conaway, R., & Garay, M. C. (2014). Gamification and service marketing. *SpringerPlus*, 3, 653.
- Coombes, P. H., & Nicholson, J. D. (2013). Business models and their relationship with marketing: A systematic literature review. *Industrial Marketing Management*, 42, 656–664.
- Cova, B., & Salle, R. (2008). Marketing solutions in accordance with the SD logic: Co-creating value with customer network actors. *Industrial Marketing Management*, 37, 270–277.
- Dachs, B., Biege, S., Borowiecki, M., Lay, G., Jäger, A., & Schartinger, D. (2014). Servitization of European manufacturing: Evidence from a large scale database. *The Service Industries Journal*, 34, 5–23.
- Davies, A., Brady, T., & Hobday, M. (2006). Charting a path toward integrated solutions. *MIT Sloan Management Review*, 47.
- Davies, A., Brady, T., & Hobday, M. (2007). Organizing for solutions: Systems seller vs. systems integrator. *Industrial Marketing Management*, 36, 183–193.
- Deci, E. L., & Ryan, R. M. (1975). Intrinsic motivation. *Corsini Encyclopedia of Psychology*.
- Deterding, S. (2012). Gamification: Designing for motivation. *Interactions*, 19, 14–17.
- Deterding, S. (2015). The lens of intrinsic skill atoms: A method for gameful design. *Human-Computer Interaction*, 30, 294–335.
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: Defining "gamification". *Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments*. Tampere, Finland: ACM.
- Eloranta, V., & Turunen, T. (2016). Platforms in service-driven manufacturing: Leveraging complexity by connecting, sharing, and integrating. *Industrial Marketing Management*, 55, 178–186.
- Fang, E., Palmatier, R. W., & Steenkamp, J. -B. E. (2008). Effect of service transition strategies on firm value. *Journal of Marketing*, 72, 1–14.
- Fischer, T., Gebauer, H., Gregory, M., Ren, G., & Fleisch, E. (2010). Exploitation or exploration in service business development?: Insights from a dynamic capabilities perspective. *Journal of Service Management*, 21, 591–624.
- Frank, A. (2012). Gaming the game: A study of the gamer mode in educational wargaming. *Simulation and Gaming*, 43, 118–132.
- Garris, R., Ahlers, R., & Driskell, J. E. (2002). Games, motivation, and learning: A research and practice model. *Simulation & Gaming*, 33, 441–467.
- Gatautis, R., & Medziausiene, A. (2015). Gamification impact on customer relationship development in virtual environment. *Strategic customer relationship management in the age of social media*, Vol. 108.
- Gebauer, H., & Friedli, T. (2005). Behavioral implications of the transition process from products to services. *Journal of Business & Industrial Marketing*, 20, 70–78.
- Gebauer, H., Paiola, M., & Sacconi, N. (2013). Characterizing service networks for moving from products to solutions. *Industrial Marketing Management*, 42, 31–46.
- Gebauer, H., Pütz, F., Fischer, T., & Fleisch, E. (2009). Service orientation of organizational structures. *Journal of Relationship Marketing*, 8, 103–126.
- Gnauk, B., Dannecker, L., & Hahmann, M. (2012). Leveraging gamification in demand dispatch systems. *Proceedings of the 2012 Joint EDBT/ICDT workshops* (pp. 103–110). ACM.
- Hamari, J. (2015). Do badges increase user activity? A field experiment on the effects of gamification. *Computers in Human Behavior*.
- Hamari, J., & Koivisto, J. (2015). Why do people use gamification services? *International Journal of Information Management*, 35, 419–431.
- Hamari, J., Koivisto, J., & Pakkanen, T. (2014). Do persuasive technologies persuade? A review of empirical studies. In A. Spagnoli, L. Chittaro, & L. Gamberini (Eds.), *Persuasive technology*. Springer International Publishing.
- Harman, K., Koohang, A., & Paliszkievicz, J. (2014). Scholarly interest in gamification: A citation network analysis. *Industrial Management and Data Systems*, 114, 1438–1452.
- Hayes, R. H. (2005). *Operations, strategy, and technology: Pursuing the competitive edge*. Wiley.
- Hemp, P. (2006). Avatar-based marketing. *Harvard Business Review*, 84, 48–57.
- Hemp, P. (2008). Getting real about virtual worlds. *Harvard Business Review*, 86, 27–28.
- Hugos, M. (2012). *Enterprise games: Using game mechanics to build a better business*. O'Reilly Media, Inc.
- Humphreys, S. (2008). Ruling the virtual world: Governance in massively multiplayer online games. *European Journal of Cultural Studies*, 11, 149–171.
- Huotari, K., & Hamari, J. (2012, October). Defining gamification: A service marketing perspective. *Proceeding of the 16th International Academic MindTrek Conference* (pp. 17–22). ACM.
- Innsley, V., & Nunan, D. (2014). Gamification and the online retail experience. *International Journal of Retail & Distribution Management*, 42, 340–351.
- Jaakkola, E., & Hakanen, T. (2013). Value co-creation in solution networks. *Industrial Marketing Management*, 42, 47–58.
- Johnson, M. W., & Christensen, C. M. (2008). Reinventing your business model. *Harvard Business Review*, 50–60.
- Kagermann, H., Osterle, H., & Jordan, J. M. (2011). *IT-driven business models: global case studies in transformation*. Hoboken, NJ, Wiley; Chichester: John Wiley.
- Kindström, D. (2010). Towards a service-based business model—key aspects for future competitive advantage. *European Management Journal*, 28, 479–490.
- Kohler, T., Matzler, K., & Füller, J. (2009). Avatar-based innovation: Using virtual worlds for real-world innovation. *Technovation*, 29, 395–407.
- Kohtamäki, M., Partanen, J., & Möller, K. (2013). Making a profit with R&D services – The critical role of relational capital. *Industrial Marketing Management*, 42, 71–81.
- Kohtamäki, M., Partanen, J., Parida, V., & Wincent, J. (2013). Non-linear relationship between industrial service offering and sales growth: The moderating role of network capabilities. *Industrial Marketing Management*, 42, 1374–1385.
- Kowalkowski, C., Windahl, C., Kindström, D., & Gebauer, H. (2015). What service transition? Rethinking established assumptions about manufacturers' service-led growth strategies. *Industrial Marketing Management*, 45, 59–69.
- Kowalkowski, C., Witell, L., & Gustafsson, A. (2013). Any way goes: Identifying value constellations for service infusion in SMEs. *Industrial Marketing Management*, 42, 18–30.
- Laine, T. (2012). Using a business game concept to enhance servitization: A longitudinal case study. *Managing Service Quality*, 22, 428–446.
- Li, M., & Choi, T. Y. (2009). Triads in services outsourcing: Bridge, bridge decay and bridge transfer. *Journal of Supply Chain Management*, 45, 27–39.
- Lindberg, N., & Nordin, F. (2008). From products to services and back again: Towards a new service procurement logic. *Industrial Marketing Management*, 37, 292–300.
- Liu, Y., Alexandrova, T., & Nakajima, T. (2011). Gamifying intelligent environments. *Proceedings of the 2011 international ACM workshop on Ubiquitous meta user interfaces* (pp. 7–12). ACM.
- Mainemelis, C. (2001). When the muse takes it all: A model for the experience of timelessness in organizations. *Academy of Management Review*, 26, 548–565.
- Martinez, V., & Turner, T. (2011). Designing competitive service models. In M. Macintyre, G. Parry, & J. Angelis (Eds.), *Service design and delivery*. Springer.

- Matthyssens, P., & Vandenbempt, K. (2008). Moving from basic offerings to value-added solutions: Strategies, barriers and alignment. *Industrial Marketing Management*, 37, 316–328.
- Matthyssens, P., & Vandenbempt, K. (2010). Service addition as business market strategy: Identification of transition trajectories. *Journal of Service Management*, 21, 693–714.
- Mayer, I. S. (2009). The gaming of policy and the politics of gaming: A review. *Simulation & Gaming*, 40, 825–862.
- Mettler, T., & Pinto, R. (2015). Serious games as a means for scientific knowledge transfer—A case from engineering management education. *Engineering Management, IEEE Transactions on*, 62, 256–265.
- Miller, D., Hope, Q., Eisenstat, R., Foote, N., & Galbraith, J. (2002). The problem of solutions: Balancing clients and capabilities. *Business Horizons*, 45, 3–12.
- Moncrief, W. C., Marshall, G. W., & Rudd, J. M. (2015). Social media and related technology: Drivers of change in managing the contemporary sales force. *Business Horizons*, 58, 45–55.
- Naudé, P., & Buttle, F. (2000). Assessing relationship quality. *Industrial Marketing Management*, 29, 351–361.
- Neely, A. (2009). Exploring the financial consequences of the servitization of manufacturing. *Operations Management Research*, 1, 103–118.
- Neely, A., Benedettini, O., & Visnjic, I. (2011). The servitization of manufacturing: Further evidence. *18th European operations management association conference* (pp. 3–6) (Cambridge).
- Nicholson, S. (2012). A user-centered theoretical framework for meaningful gamification. *Proceedings GLS*, 8.
- Oliveira, R., & Kallenberg, R. (2003). Managing the transition from products to services. *International Journal of Service Industry Management*, 14, 160–172.
- Paharia, R. (2013). *Loyalty 3.0: How to revolutionize customer and employee engagement with big data and gamification*. McGraw-Hill.
- Palmer, D., Lunceford, S., & Patton, A. J. (2012). The engagement economy: How gamification is reshaping businesses. *Deloitte Review*, 11.
- Pedreira, O., García, F., Brisaboa, N., & Piattini, M. (2015). Gamification in software engineering – A systematic mapping. *Information & Software Technology*, 57, 157–168.
- Petridis, P., Hadjicosta, K., Shi, V. G., Dunwell, I., Baines, T., Bigdeli, A., ... Uren, V. (2015). State-of-the-Art in business games. *International Journal of Serious Games*, 2, 55–69.
- Platt, G., Rowe, D., & Wall, J. (2013). What comes after the low-hanging fruit? In F. P. Sioshansi (Ed.), *Energy efficiency: Towards the end of demand growth*. Academic Press.
- Purchase, V., Mills, J., & Parry, G. (2011). A multi-organisational approach to service delivery. In M. Macintyre, G. Parry, & J. Angelis (Eds.), *Service design and delivery*. Springer.
- Quinn, R. W. (2005). Flow in knowledge work: High performance experience in the design of national security technology. *Administrative Science Quarterly*, 50, 610–641.
- Raasch, C., & von Hippel, E. (2013). Innovation process benefits: The journey as reward. *MIT Sloan Management Review*, 55, 33–39.
- Raddats, C., & Burton, J. (2011). Strategy and structure configurations for services within product-centric businesses. *Journal of Service Management*, 22, 522–539.
- Raddats, C., & Easingwood, C. (2010). Services growth options for B2B product-centric businesses. *Industrial Marketing Management*, 39, 1334–1345.
- Reeves, B., Malone, T. W., & O Driscoll, T. (2008). Leadership's online labs. *Harvard Business Review*, 86, 58.
- Ribeiro, C., Farinha, C., Pereira, J., & Mira da Silva, M. (2014). Gamifying requirement elicitation: Practical implications and outcomes in improving stakeholders collaboration. *Entertainment Computing*, 5, 335–345.
- Robson, K., Plangger, K., Kietzmann, J. H., McCarthy, I., & Pitt, L. (2015a). Game on: Engaging customers and employees through gamification. *Business Horizons*, 59(1), 29–36.
- Robson, K., Plangger, K., Kietzmann, J. H., McCarthy, I., & Pitt, L. (2015b). Is it all a game? Understanding the principles of gamification. *Business Horizons*.
- Rolstad, A., Henriksen, B., & O'Sullivan, D. (2012). *Manufacturing outsourcing: A knowledge perspective*. Springer.
- Sakamoto, M., Nakajima, T., & Alexandrova, T. (2012). Value-based design for gamifying daily activities. *Entertainment computing-ICEC 2012*. Springer.
- Salonen, A. (2011). Service transition strategies of industrial manufacturers. *Industrial Marketing Management*, 40, 683–690.
- Sandberg, B., & Aarikka-Stenroos, L. (2014). What makes it so difficult? A systematic review on barriers to radical innovation. *Industrial Marketing Management*, 43, 1293–1305.
- Schmidt, F. A. (2013). The good, the bad and the ugly: Why crowdsourcing needs ethics. *Cloud and Green Computing (CGC), 2013 Third International Conference on* (pp. 531–535). IEEE.
- Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *International Journal of Human-Computer Studies*, 74, 14–31.
- Shelton, T. (2013). *Business models for the social mobile cloud: Transform your business using social media, mobile internet, and cloud computing*. John Wiley & Sons.
- Sheth, J. N., & Sharma, A. (2008). The impact of the product to service shift in industrial markets and the evolution of the sales organization. *Industrial Marketing Management*, 37, 260–269.
- Stock, R. M., Oliveira, P., & von Hippel, E. (2015). Impacts of hedonic and utilitarian user motives on the innovativeness of user-developed solutions. *Journal of Product Innovation Management*, 32, 389–403.
- Storbacka, K. (2011). A solution business model: Capabilities and management practices for integrated solutions. *Industrial Marketing Management*, 40, 699–711.
- Storbacka, K., Windahl, C., Nenonen, S., & Salonen, A. (2013). Solution business models: Transformation along four continua. *Industrial Marketing Management*, 42, 705–716.
- Stremersch, S., Wuyts, S., & Frambach, R. T. (2001). The purchasing of full-service contracts: An exploratory study within the industrial maintenance market. *Industrial Marketing Management*, 30, 1–12.
- Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management*, 14, 207–222.
- Uлага, W., & Loveland, J. M. (2014). Transitioning from product to service-led growth in manufacturing firms: Emergent challenges in selecting and managing the industrial sales force. *Industrial Marketing Management*, 43, 113–125.
- Uлага, W., & Reinartz, W. J. (2011). Hybrid offerings: How manufacturing firms combine goods and services successfully. *Journal of Marketing*, 75, 5–23.
- van der Spek, E. D., Wouters, P., & van Oostendorp, H. (2011). Code red: Triage or Cognition-based DDesign rules enhancing Decisionmaking TRaining in a game environment. *British Journal of Educational Technology*, 42, 441–455.
- Vargo, S. L., & Lusch, R. F. (2004). Evolving to a new dominant logic for marketing. *Journal of Marketing*, 68, 1–17.
- Werbach, K., & Hunter, D. (2012). *For the win: How game thinking can revolutionize your business*. Wharton Digital Press.
- Witt, M., Scheiner, C., & Robra-Bissantz, S. (2011). Gamification of online idea competitions: Insights from an explorative case. *Informatik schafft Communities*, 192.
- Wynstra, F., Spring, M., & Schoenherr, T. (2015). Service triads: A research agenda for buyer-supplier-customer triads in business services. *Journal of Operations Management*, 35, 1–20.
- Zichermann, G., & Linder, J. (2010). *Game-based marketing: Inspire customer loyalty through rewards, challenges, and contests*. Wiley.
- Zichermann, G., & Linder, J. (2013). *The gamification revolution: How leaders leverage game mechanics to crush the competition*. McGraw Hill Professional.