

BACKGROUND PAPER

# Digital Dividends

## Information and Communication Technologies, Gamification, and Public Sector Applications

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# **Information and Communication Technologies, Gamification, and Public Sector Applications**

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The progression of information and communications technology (hereafter: ICTs) has been nothing short of revolutionary. In just a few decades, societies have been able to leverage these technologies to bring about significant improvements in the efficiency with which we work and live. The competitive nature of the private sector has allowed for the growth (and death) of technologies at an accelerated pace. With all these improvements, however, the public sector has struggled to keep pace with existing technologies, often falling far behind the development curve, particularly in service delivery. The purpose of this background paper is to focus on how governments can use ICT to improve service delivery, and provide a deeper understanding of how humans interact with ICTs in order to maximize ICT use by citizens.

ICTs can be used to enhance better public service delivery, in much of the same way ICT's have provided improvements in the private sector. These enhancements are arguably most visible in customer service, which has become a core differentiator among firms in the service industry (El Sawy and Bowles 1997; Simester et al. 2000; Szymanski and Henard 2001). Ray, Muhanna, and Barney (2005) show that information technology (IT) enhances customer service, particularly through knowledge sharing. In particular, they find that enhancements from IT can improve the efficiency and effectiveness of business processes, which yield better performance, particularly in the customer service domain. However, gains from implementing IT are not always positive, because high levels of shared knowledge in the firm are a necessary condition for performance improvements.

Although much of the service industry has found use of information technologies to enhance internal processes and client-facing operations, the public sector has been slow to follow suit (Corrigan and

Joyce 2000), mainly due to multiple stakeholders and changing missions. Using the customer service model of service delivery, the “New Public Management” idea in public management focused on three themes: (1) disaggregating public sector functions into flat hierarchies, (2) inducing competition among potential service providers, and (3) performance incentives for employees (Dunleavy et al. 2006). Most of the innovations in New Public Management arose from developed countries, where the attempt was to learn from the private sector and establish those principles into the public sector in order to maximize efficiency and citizen (consumer) satisfaction.

Within these general themes lies a multitude of implementation issues, however. Dunleavy et al. (2006) show that most public sector initiatives (particularly within the theme of disaggregating functions) have either been rolled back, or have stagnated. This is due (in part) to the difficulty of collective action, the inefficiencies resulting from task duplication, and unforeseen issues in service delivery due to complexity. Hence, according to Dunleavy et al. (2006), most of the issues in New Public Management arise in implementation, and often lead to policy reversal (such as the case of the U.K. Passport Agency: see NAO, 1999). Others have also argued for simplicity in public sector operations. For instance, Sunstein (2014) argues that the future of the public sector (particularly in achieving its goals of service delivery and public goods provision) lies in simplicity.

As an example of unintended effects, Loewenstein, Sunstein, and Golman (2013) review the literature relevant to information disclosure, and find that information disclosure laws do not have direct impact on service recipients, but do have significant effects on providers. They argue that the additional information received as a result of these laws interacts with limited attention spans to yield negative outcomes (Loewenstein, Sunstein, and Golman 2013).

Further to this, the literature also shows that humans engage in motivated reasoning (Kahan et al. 2013)<sup>1</sup> and are susceptible to probability weighting (Kahneman and Tversky 1979)<sup>2</sup>. Such behavior leads to cognitive biases, which imply that humans (as cognitive misers) are less likely to learn new processes unless the process is frequent and carries large (perceived) payoffs. Thus, there is a strong

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<sup>1</sup> Meaning that humans are more likely to search for and absorb information that confirms their priors, rather than process new information that does not.

<sup>2</sup> Meaning that humans are likely to rely on their subjective assessments of probability before taking any action.

call for process simplification, particularly in the public sector (Sunstein, 2014), which has historically run counter to New Public Management.

The main leverage point of ICTs for public sector operations is precisely in the simplicity they have the potential to bring. By automating various operations, ICTs can simplify processes for the benefit of both consumers and producers. ICTs provide process improvements and generate knowledge sharing, which is an important component of service delivery (Ray, Muhanna, and Barney 2005). Maglio and Spohrer (2008) stress that “Service Science” is the combination of organizational and human behavior with technological understanding which then has the capability to bring about improvements in service delivery. Service providers have a need for client participation and feedback (Sampson and Froehle, 2006). ICTs have high potential contributions to public sector operations as many services delivered by the public sector high degrees of knowledge intensity and customization, which is precisely where there is more need for feedback and participation (Sampson and Froehle, 2006).

Bitner, Brown, and Meuter (2000) provide case studies to show that technology is especially effective in improving service delivery. Customer satisfaction is impacted by allowing greater customization of services by employees (AT&T) and by customers themselves (Amazon.com). Often for the sake of efficiency, customers demand multiple transactions be carried out at the same time. Using pre-designed customization tools, both employees and customers can engage in service customization, which yields greater customer satisfaction. Meuter et al. (2000) show that an important factor in using self-service technologies to improve customer satisfaction is the ability to customize services.

Amazon.com is cited by Bitner, Brown, and Meuter (2000) as an early adopter of customization, which paved the way for online transactions. One of the core design principles that Amazon embraced early in its lifecycle was the use of an efficient search tool that not only displayed results that the customer was looking for, but also recommended other products that other customers frequently bought together. Furthermore, customers also were given a customized list of recommendations based on their browsing history (which remains an industry standard to this day). In addition, other customization tools such as the electronic shopping cart, tailored the experience to the customer. Amazon’s “One-Click” payment technology allowed users to store their billing and shipping information in their system, such that once customers completed the shopping experience, paying for

the goods was quick and (importantly) allowed for more impulse purchases. This, coupled with their return policy, drastically lowered the cognitive costs that online shopping imposed on customers. Hence, Amazon was able to minimize the costs to the customer, both in terms of searching for products and in terms of carrying out the transaction.

A second factor that Bitner, Brown, and Meuter (2000) is “service recovery.” This concept stems from the basic idea that often services fail to deliver in the private sector, for a variety of reasons. Service delivery failure has negative impacts on service providers, the consequences of which often include loss of customers, negative impact on ratings, and ultimately, decreased profits (Tax et al. 1998). Conversely, effective service recovery yields greater customer satisfaction (Bitner, Booms, and Mohr 1994; Johnston, 1995).

Recognizing that service failures may arise both from the firm and the client side, private sector firms invest in technology allowing reductions in the time and manpower needed to resolve service failures. In response to routine failures, service providers developed a variety of different “Frequently-Asked-Questions,” (FAQs) to address commonly recurring problems. Originally developed at NASA<sup>3</sup>, these sources of information serve as quick recovery mechanisms for common problems, and lighten the traffic on customer service centers, which in turn helps speed up service recovery stemming from process failures.

A final factor on the relationship between technology and service delivery (outlined by Bitner, Brown, and Meuter, 2000) concerns technology introducing unexpected positive experiences. Managing customer expectations is an extremely important aspect of customer service. Bitner (1990) shows that a significant proportion of positive customer feedback is due to customer pleasure from an unprompted and unsolicited action. Conversely, a significant proportion of negative customer feedback is due to the reverse. An example of this is the case reported by Hart (1996), whereby Ritz-Carlton tracks guest preferences by prompting employees to ask seemingly innocuous questions about guest preferences at check-in, and tailoring small aspects of service to match the preference (for example, the guest’s favorite newspaper is delivered to the guest without a prompt).

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<sup>3</sup> See <http://www.faqs.org/faqs/faqs/about-faqs/>

Meuter et al. (2000) caution, however, that the benefits from technology are only as good as the underlying processes. Technological innovations can (and do) backfire when the underlying process is flawed and customers cannot access the services they need. Using a critical incident study of over 800 customer service encounters with self-service technologies, the authors report that most satisfying incidents stem from improvements of customer expectations from the status quo. These were categorized as: easy to use; avoided personnel; saved time; free of any time and geographic restrictions; and saved customer expenses. The second source of satisfying incidents was when the technology met expectations (“did its job”), and the final source was solving intensified needs (such as delivering in an emergency-type scenario).

Conversely, the largest sources of dissatisfying incidents were driven by technology and process failures, second only to perceptions of poor design, and finally, customer-driven failures. Thus, the implication of this work is that while technologies can often provide valuable complements to existing service encounters (such as lightening the load and automating routine tasks), their effectiveness is dependent upon the underlying process the technology seeks to automate. With unreliable processes, implementing self-service technologies is not advisable, because they generate negative impacts on the perceptions of the service providers, leading users to abandon the technology.

Smith (2000) underscored the importance of consumer benchmarking in improving customer service. This approach puts the consumer front and center in service production, and recognizes that consumers themselves are an essential part of the production process. Using feedback from consumers is critical in designing and tailoring services and experiences in the private sector. Not only that, but consumer benchmarking has an impact on internal processes as well, the benefits of which include reduced costs, higher productivity, and improved quality (Rogers, Daugherty, and Stank 1995). However, the main implementation problem arises from resource constraints (of time and personnel). Smith (2000) shows that consumer benchmarking is even more important for high involvement, continuously delivered services. The implication here is that the public sector can generate enormous value from consumer feedback, given that there is a high degree of involvement.

## **The Public Sector and ICT Implementation**

Berman (1998) notes that the public sector is distinct from the private sector in that it has three main goals: efficiency, effectiveness, and equity, but focuses on equity and effectiveness over efficiency. This is in direct contrast with the private sector, which is focused on efficiency and effectiveness, with no focus on equity. This is often cited as a major roadblock to using self-service technologies, since they may serve one segment of the population (educated, wealthier). Fountain (2001) criticizes New Public Management on exactly this issue, as improvement in service delivery might be observed at the cost of inequality.

Using these customer service principals (customization, service recovery, and pleasing experiences) in the public sector is rare, particularly since a majority of New Public Management reforms have been scaled back due to implementation issues. Karwan and Markland (2006) report the findings from the South Carolina Department of Motor Vehicles. Most Departments of Motor Vehicles are perceived negatively in the United States due to the amount of time it takes to conduct business and the lack of customer service (Allerton 2002). Yet, Departments of Motor Vehicles are the major “client-facing” departments for the public sector in the United States.

Karwan and Markland (2006) report that the department was implementing a host of changes to its IT infrastructure, reengineering business processes, and implementing a customer focus. The Departments of Motor Vehicles implemented these changes with little observed impact. One cited reason for this was implementation: funding constraints did not allow for increases in personnel and improvements to physical facilities (Karwan and Markland, 2006). This is not unusual: Doraisamy, Ibrahim, and Mahrin (2014) found that besides implementation issues in public sector IT projects (projects running over budget, little direction and quality control), there is also little end-user involvement, which ultimately leads to the software solution falling short of expectations, which then causes users to revert to low-tech solutions.

In recognition of these constraints, Karwan and Markland (2006) carried out additional reforms. One significant change was to move simple and repeated transactions online. In addition, employees were given extensive training in customer management and operations. These additional changes showed dramatic improvements in outcomes, including shorter lines, increased use of the website, fewer



interventions in online transactions, better customer reviews, fewer complaints, and positive media reports. IT reforms improved service delivery through improved efficiency in internal processes.

Simplifying public sector service delivery processes has been effectively largely because humans are cognitive misers (Fiske and Taylor 1991): we seek to minimize mental costs. When navigating the social world, much of human behavior is “automatic” (that is, engaged in without processing new information). An example of this is demonstrated in Liu, White, and Dumais (2010), where they find that most web-browsing activity occurs in the form of “screen-and-glean,” meaning that webpages need to pass some initial screening before users will actively absorb the information contained within them. Noting this, search engines often place a high value on the relevance of their search results.

While the public sector has taken strides in implementing ICTs for efficiency improvements, it lags behind the private sector. There are a number of reasons for this: First, there is less scope for experimentation - reforms need to come at low costs, with well-defined outcomes in an environment where outcomes are not easily observed. Second, there is a lack of benchmarking; since the public sector has no direct competitors, it is difficult to determine whether the service being offered is working well. Third, while some services are continually being provided to the users (such as police response and health care), others are largely infrequent (such as driver’s licenses and passports), making it difficult to obtain feedback in a timely fashion. Fourth, public employees themselves have weak incentives to improve performance or propose efficient alternatives.

The major pushback against implementing technological innovations for client feedback and calibration lie in scarcity of resources in the public sector. There is a lack of feedback in public sector service delivery. In addition, there are concerns that service providers will not be able to respond in a timely manner, further eradicating the use of the ICT.

### **The Private Sector and ICT Implementation**

In the last decade, the private sector has focused on the customer experience, outpacing the public sector in terms of perceptions of service. One major aspect of this change is the ability of service providers to engage with the users of the service in multiple ways. Most private sector organizations have multiple methods of interacting with the customer, usually via the internet, telephone, and

dedicated service centers. The multitude of service encounters are driven by competition: customer retention is increased by positive service encounters. In order to facilitate positive service encounters, the private sector has developed tools to bridge the gap between customer expectations and service delivery. However, public sectors service delivery has little competition, so similar evolutions are less frequent (though notable exceptions remain; see Kavanaugh et al. 2012).

Even when we do not consider technical difficulties and implementation issues (which can be insurmountable), it is not immediately apparent that investments in ICT will be particularly useful for public sector operations (especially along the dimension of customer relations and service orientation). Unlike the private sector, where services are frequent, and customers have repeated interactions with small gaps, a vast majority of public services are repeated interactions with heterogeneity in time between interactions. Indeed, some services are specialized and occur very rarely (like petitioning zoning permits), while other services can be frequent (interactions with law enforcement, schooling). Therefore, designing one ICT strategy for a range of services is complicated by this heterogeneity. Moreover, customer responses and feedback will also vary, with short-term repeated interactions more likely to attract feedback than longer-term interactions.

The cycle between service provision and service feedback is the key to improving public services, particularly when there is a lack of competition. To see this, consider the competitive case, where some firms die out while others survive. A variety of factors contribute to survival, but an important one is efficiency (that is, providing the best service at the lowest cost). As each “generation” of inefficient firms dies out, the industry as a whole becomes more efficient over time. However, when competition is not present (i.e. firms cannot die out), the incentives to evolve are minimal. In this situation, the only source of evolution comes from the intrinsic motivation of firms wanting to improve their processes.

A necessary ingredient for the evolution of service providers is customer engagement and feedback. Customer engagement is difficult to achieve and retain: feedback is costly on the part of customers, and (depending on the industry) is likely to be biased, as well. Customers will only provide feedback when it has the potential to generate tangible results (i.e. feedback must have expected benefits), as providing feedback is costly. Prior to ICT interventions, feedback was achieved using either focus groups or customer surveys, usually with some form of extrinsic incentives to offset the costs of effort.

Data acquisition was costly and slow. Since then, advances in ICT have enabled data collection at a fraction of the cost and time, but the issue of expected benefits still remains.

One strategy has been to reinforce the fact that feedback *matters*. This has been achieved through firm responsiveness to consumer demand, and often has led to direct customer engagement. Thus, the expected benefits to the consumer are made salient; if you provide feedback, you will receive better service.

The second strategy by which firms have increased expected benefits has been to use ICT to create incentives (or “motivational affordances”) for providing feedback. According to Gibson’s (1977) “affordance theory,” an affordance is defined as an action that is available primarily through the relationship between an agent and the environment. A “motivational affordance” is defined as the properties of the environment that can support the motivation needs in the agent (Zhang 2008). One way that service providers have done this is to use “Gamification,” which relates to the use of gaming elements to improve user experience and engagement (Deterding et al. 2011). This is a growing area of research, focusing on providing incentives to users to engage in certain (usually low cost) tasks. It relies on implementing gaming elements to any activity to influence motivation and behavior.

Adding gaming elements to tasks has varying degrees of success in inducing effort. Good and Robertson (2006) point out that while computer games have been exceptionally successful in engaging users, using computers for learning has been less successful. Squire (2005) reports that online educational course completion rates are less than 50 percent, but gamers spend countless hours learning to play games, and even provide resources for others to play games, and contribute to the game context (for example, writing fan fiction). This has prompted the question of why one form of learning and engagement is superior to the other.

Thuring and Mahlke (2007) note that human-computer interaction is based on more than simple usefulness and usability. While the literature tends to emphasize usefulness above all else (Nielson 1993), aesthetics and user experiences are an important determinant in the use of a given technology (though, admittedly, effectiveness and efficiency are first order issues). Thuring and Mahlke (2007) show that a well-designed and aesthetically pleasing system has a positive impact on user emotions, and ultimately on perceptions of usefulness. Firms can even specialize in user experience, while

providing similar products (a prominent example is Apple). The focus on aesthetics recognizes that these factors have a large impact on perceived product usefulness.

The most basic gaming element involves assigning “points” to an activity that users can track. Increases in motivation come from users either competing against themselves, or against others, for higher scores. Additional gaming elements are leaderboards (ranking of players), achievements, levels, context, goals and targets, positive/negative feedback, tangible rewards, linear progression, and challenges (Hamari, Koivisto, and Sarsa, 2014). These elements provide motivational affordances (Zhang 2008). Humans engage in activities with such elements to satisfy motivational needs such as competence, autonomy, and relatedness (Deterding 2011).

Gamification (adding gaming elements to tasks) introduces small timely benefits to the user in exchange for effort. Hamari, Koivisto, and Sarsa (2014) provide a useful literature review of empirical studies on gamification and a classification of gaming elements used in ICTs. The most common elements on the list, and the theoretical channel through which user motivation is triggered, are:

- *Points:* The use of points is a simple way that users can track their performance over time. Points provide immediate user feedback on the appropriateness of an action, allowing the game to direct user actions toward a desired outcome or goal. The accumulation of points also provides users with a crude measure of efficiency in conducting the task.
- *Leaderboards:* Leaderboards refer to ranking players against each other, and introduces social motivation. Leaderboards induce competition among players, and thereby improve effort.
- *Achievements/Badges/Levels/Rewards:* These refer to bonuses provided to players upon reaching certain targets (which may be specified in advance). They provide feedback at timely intervals that are less frequent than points, in order to layer on additional performance targets.

- *Clear Goals/Story/Theme:* These provide a context for the effort exerted by the player. Often, the effort required is pretty basic and in the absence of context, are not engaging for the user. These narrative elements are a driving force behind behavior.

These elements combine within games to generate effort from users and provide avenues for user engagement. Note, however, that these elements carry small immediate benefits, but no long-term payoff, making it cheap for firms to implement. Service providers are able to tap into these gaming elements to engage users before and after they consume the service. The feedback generated from users is low-cost and timely.

Providing feedback is just one form of effort. The larger question is how gamification improves effort in general. Hamari, Koivisto, and Sarsa (2014) review the empirical literature and find that gamification is associated with improved effort, but the effects are not universal, vary with the type of task, the context in which the task is performed, and the nature of the player performing the task.

Dominguez et al. (2013) report the results of an experiment designed to identify the effect of gamification on learning and student achievement using university students in online learning courses. They found that adding gaming elements improved overall outcomes and outcomes on practical assignments, but worsened outcomes on written assignments, and on participation in class activities. Moreover, they report gaming elements having effects on certain types of subjects.

Meder, Plumbaum, and Hopfgartner (2013) report the results of an employee survey recording perceptions of gamification prior to implementation. They added gaming elements (points, badges, and a leaderboard) and observed effort. They found that respondents with positive perceptions of gamification are both more likely to use, and benefit, from adding gaming elements. Similarly, Hamari (2013) report that user preferences are a driving factor behind success and usage. At the other end of the spectrum, Thom, Millen, DiMicco (2012) find that removal of gaming elements led to a decline in user activity.

Lee et al. (2013) report the results of an experiment adding gaming elements to a crowdsourcing task. They conducted a baseline and three treatments: an “individual achievement” treatment where subjects were given performance targets and achievement was tracked by levels; a “social

achievement” treatment where subjects were provided with a leaderboard-style ranking; and a “combined” treatment where subjects were given both the individual and social elements. They found that both quantity and quality of work improved, but improvements in quality had limited effectiveness. They also found that evidence for diminishing returns: performance in the combined treatment was lower than the sum of performance in the individual and social treatments. Finally, they also report larger sustained increases in performance in the social treatment.

Mekler et al. (2013) use an experiment to identify the effect of points and framing on user performance. Using a simple image classification task (Machajdik and Hanbury 2010), they implement a points system, and a context (task contributes to science), in addition to a baseline and a combined treatment. They found that points improved quantity, while the frame improved quality. Contrary to Lee et al. (2013), they find the effects are higher in the combined treatment. Other aspects of gamification can also be relevant: for example, Ling et al. (2005) found that providing users with an identity and uniqueness yielded greater effort (in a movie rating task).

Gamification can bring about improvements in effort, on both the employee and consumer side. However, the literature in this area is still nascent, so the causal channels through which elements are most effective in which contexts is still a subject of debate. That being said, however, ICTs can be effective in engaging consumers by providing short-run targeted benefits (either material or psychological) to offset the costs of effort. Online ecosystems for service industries have been effective in generating user content for these purposes. Therefore, consumer feedback can be available to public service providers if they are willing to engage with these ecosystems. However, effective use of depends on how public organizations engage in follow-up activities and provide feedback to consumers.

Public organizations can use these principles to improve employee effort. As Banuri and Keefer (2016) show, public officials are different in that they exhibit higher degrees of prosocial motivation. However, unmotivated, low-ability individuals are also drawn to the public sector due to job security and stability. Adding gaming elements carrying individual and social incentives to tasks in the public sector can theoretically improve effort, and is worth investigating deeply. In particular, providing tools for social recognition would be especially effective in non-private-sector settings.

There are some fundamental differences between the public and the private sector, which affects the ways gamification is used. Lindgren and Jansson (2013) make three main points about the differences between public and private organizations: public organizations work for all citizens, and are constrained in the services they provide; public organizations remain in place, even if they are ineffective; and consumers of public services have a right to equal treatment. Thus, lack of exit, valuing equity over efficiency, and limited capacity in decision making, constrain the use of ICTs in public sector service delivery. These reasons contribute to the growing gap between public and private sector ICT use.

## References

- Allerton, H.E., 2002. DMV: does the D stand for 'Dumb'? *T+D* 56 (12), 78–80
- Banuri, Sheheryar, and Philip Keefer. "Pro-social motivation, effort and the call to public service." *European Economic Review* (2016). Forthcoming.
- Berman, Evan. 1998. *Productivity in Public and Nonprofit Organizations*. Thousand Oaks, CA: Sage Publications.
- Bitner, Mary Jo. "Evaluating service encounters: the effects of physical surroundings and employee responses." *the Journal of Marketing* (1990): 69-82.
- Bitner, Mary Jo, Stephen W. Brown, and Matthew L. Meuter. 2000. "Technology infusion in service encounters." *Journal of the Academy of Marketing Science* 28 (1): 138–149.
- Bitner, Mary Jo, Bernard H. Booms, and Lois A. Mohr. "Critical service encounters: The employee's viewpoint." *The Journal of Marketing* (1994): 95-106.
- Corrigan, Paul, and Paul Joyce. "Reconnecting to the public." *Urban Studies* 37.10 (2000): 1771-1779.
- Deterding, Sebastian. "Situated motivational affordances of game elements: A conceptual model." *Gamification: Using Game Design Elements in Non-Gaming Contexts*, a workshop at CHI. 2011.
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011, September). From game design elements to gamefulness: defining gamification. In *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments* (pp. 9-15). ACM.
- Domínguez, A., Saenz-de-Navarrete, J., De-Marcos, L., Fernández-Sanz, L., Pagés, C., & Martínez-Herráiz, J. J. (2013). Gamifying learning experiences: Practical implications and outcomes. *Computers & Education*, 63, 380-392.
- Doraisamy, Mariayee, Suhaimi Ibrahim, and Mohd Nazri Mahrin. "The Need for Software Project Monitoring Methodology: An Exploratory Survey at Malaysian Public Sector." *International Journal of Innovative Computing* 4.1 (2014).
- Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). New public management is dead—long live digital-era governance. *Journal of public administration research and theory*, 16(3), 467-494.
- El Sawy, Omar A., and Gene Bowles. "Redesigning the customer support process for the electronic economy: insights from storage dimensions." *MIS quarterly* (1997): 457-483.
- Fike, David, Renea Fike, and Krystal Lucio. 2012. "Does clicker technology improve student learning?" *Journal of Technology and Teacher Education* 20 (2): 113–126.



- Fiske, S.T., & Taylor, S.E. (1991). *Social cognition* (2nd ed.). New York: McGraw-Hill.
- Fountain, Jane E. "Paradoxes of public sector customer service." *Governance* 14.1 (2001): 55-73.
- Free, Caroline, Gemma Phillips, Louise Watson, Leandro Galli, Lambert Felix, Phil Edwards, Vikram Patel, and Andy Haines. 2013. "The effectiveness of mobile-health technologies to improve health care service delivery processes: a systematic review and meta-analysis." *PLoS medicine* 10 (1): e1001363.
- Furey, Timothy R. 1991. "How information power can improve service quality." *Strategy & Leadership* 19 (3): 24–26.
- Gibson, James J. "The theory of affordances." Hilldale, USA (1977).
- Good, Judith, and Judy Robertson. "Learning and motivational affordances in narrative-based game authoring." the Proceedings of the 4th International Conference for Narrative and Interactive Learning Environments (NILE), Edinburgh. 2006.
- Hamari, Juho. "Transforming homo economicus into homo ludens: A field experiment on gamification in a utilitarian peer-to-peer trading service." *Electronic commerce research and applications* 12.4 (2013): 236-245.
- Hamari, Juho, Jonna Koivisto, and Harri Sarsa. "Does gamification work?--a literature review of empirical studies on gamification." *System Sciences (HICSS)*, 2014 47th Hawaii International Conference on. IEEE, 2014.
- Hart, Christopher W. 1996. "Made to Order." *Marketing Management* 5 (2): 11-23.
- Johnston, Robert. "Service failure and recovery: impact, attributes and process." *Advances in Services Marketing and Management: Research and Practice* 4.1 (1995): 211-228.
- Kahan, D. M., Peters, E., Dawson, E. C., & Slovic, P. (2013). *Motivated numeracy and enlightened self-government*. Yale Law School, Public Law Working Paper, (307).
- Kahneman, Daniel, and Amos Tversky. "Prospect theory: An analysis of decision under risk." *Econometrica: Journal of the Econometric Society* (1979): 263-291.
- Karwan, Kirk R., and Robert E. Markland. 2006. "Integrating service design principles and information technology to improve delivery and productivity in public sector operations: The case of the South Carolina DMV." *Journal of Operations Management* 24 (4): 347–362.
- Kavanaugh, A., Fox, E. A., Sheetz, S. D., Yang, S., Li, L. T., Whalen, T., et al. (2012). *Social media use by government from the routine to the critical*. *Government Information Quarterly*, 29(4), 480–491.

- Lee, T. Y., Dugan, C., Geyer, W., Ratchford, T., Rasmussen, J. C., Shami, N. S., & Lupushor, S. (2013, June). Experiments on Motivational Feedback for Crowdsourced Workers. In ICWSM.
- Lindgren, Ida, and Gabriella Jansson. "Electronic services in the public sector: A conceptual framework." *Government Information Quarterly* 30.2 (2013): 163-172.
- Ling, K., Beenen, G., Ludford, P., Wang, X., Chang, K., Li, X., ... & Resnick, P. (2005). Using social psychology to motivate contributions to online communities. *Journal of Computer-Mediated Communication*, 10(4), 00-00.
- Liu, Chao, Ryen White, and Susan Dumais. 2010. "Understanding web browsing behaviors through Weibull analysis of dwell time." In *SIGIR '10: Proceeding of the 33rd international ACM SIGIR conference on Research and development in information retrieval*. New York: Association for Computing Machinery, Inc., October, pp. 379–386.
- Loewenstein, George, Cass R. Sunstein, and Russell Golman. "Disclosure: Psychology changes everything." (2013). Unpublished manuscript.
- Machajdik, J., and Hanbury, A. Affective image classification using features inspired by psychology and art theory. In *Proceedings of the international conference on Multimedia, ACM* (2010), 83–92.
- Maglio, P., J. Bailey, and D. Gruhl. 2007. "Steps toward a science of service systems." *Computer* 40 (1): 71–77.
- Maglio, Paul P., and Jim Spohrer. 2008. "Fundamentals of service science." *Journal of the Academy of Marketing Science* 36 (1): 18–20.
- Meder, Michael, Till Plumbaum, and Frank Hopfgartner. "Perceived and actual role of Gamification principles." *Proceedings of the 2013 IEEE/ACM 6th International Conference on Utility and Cloud Computing*. IEEE Computer Society, 2013.
- Mekler, E. D., Brühlmann, F., Opwis, K., & Tuch, A. N. (2013, April). Disassembling gamification: the effects of points and meaning on user motivation and performance. In *CHI'13 Extended Abstracts on Human Factors in Computing Systems* (pp. 1137-1142). ACM.
- Meuter, Matthew L., Amy L. Ostrom, Robert I. Roundtree, and Mary Jo Bitner. 2000. "Self-service technologies: understanding customer satisfaction with technology-based service encounters." *Journal of marketing* 64 (3): 50–64.
- NAO, UK. "National Audit Office (1999) The UK Passports Agency: The Passport Delays of Summer 1999 (London: The Stationary Office), HC 812 Session 1998-9." Available on: [www.nao.gov.uk](http://www.nao.gov.uk) Click publications, reports by theme, law and order.

- Nielsen, J. (1993). Usability engineering. San Diego, CA: Academic Press.
- Ray, Gautam, Waleed A. Muhanna, and Jay B. Barney. 2005. "Information Technology and the Performance of the Customer Service Process: A Resource-Based Analysis." *MIS Quarterly* 29 (4): 625–652.
- Rogers, Dale S., Patricia J. Daugherty, and Theodore P. Stank. "Benchmarking programs: opportunities for enhancing performance." *Journal of Business Logistics* 16.2 (1995): 43.
- Sampson, Scott E., and Craig M. Froehle. "Foundations and implications of a proposed unified services theory." *Production and Operations Management* 15.2 (2006): 329-343.
- Simester, Duncan I., John R. Hauser, Birger Wernerfelt, and Roland T. Rust, (2000) "Implementing Quality Improvement Programs Designed to Enhance Customer Satisfaction: Quasi-experiments in the U.S. and Spain," *Journal of Marketing Research*, 37 (February), 102-112.
- Smith, Anne M. 2000. "Using consumer benchmarking criteria to improve service sector competitiveness." *Benchmarking: An International Journal* 7 (5): 373–388.
- Squire, Kurt. "Changing the game: What happens when video games enter the classroom?." *Innovate: Journal of online education* 1.6 (2005): 5.
- Sunstein, Cass R. *Simpler: The future of government*. Simon and Schuster, 2014.
- Szymanski, David M., and David H. Henard. "Customer satisfaction: A meta-analysis of the empirical evidence." *Journal of the academy of marketing science* 29.1 (2001): 16-35.
- Tax, Stephen S., Stephen W. Brown, and Murali Chandrashekar. 1998. "Customer Evaluations of Service Complaint Experiences: Implications for Relationship Marketing." *Journal of Marketing* 62 (April): 60-76.
- Thom, Jennifer, David Millen, and Joan DiMicco. "Removing gamification from an enterprise SNS." *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work*. ACM, 2012.
- Thüring, Manfred, and Sascha Mahlke. "Usability, aesthetics and emotions in human–technology interaction." *International Journal of Psychology* 42.4 (2007): 253-264.
- Torres, Edwin N. 2012. "Hotel general managers' use of consumer, expert, and internal feedback to improve service quality." PhD dissertation, Purdue University, West Lafayette, Indiana, United States.
- Zhang, Ping. "Technical opinion Motivational affordances: reasons for ICT design and use." *Communications of the ACM* 51.11 (2008): 145-147.