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Enhance collaboration with gaming to start decision making in equipment pooling

A case study at Amsterdam Airport Schiphol about the effect of a role-play on the willingness to collaborate in non-hierarchical networks

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Abstract

Due to growth and scarcity of space, Amsterdam Airport Schiphol experiences a lot of pressure on airside. The liberalization of the ground handling market resulted in a fierce competition with low margins for the ground handlers. Equipment pooling, where every ground handler uses equipment out of one pool, could be an improvement. Therefore collaboration between the ground handlers, which cannot be forced by the airport authority, is needed. Due to unknowns and concerns about collaboration no steps are taken to improve the situation and implement equipment pooling. This paper describes the outcomes of a case study which combines the self-determination theory with gaming. Where enhancing the motivational needs to activate the actor to collaborate through a role-play stands central. The role-play resulted in more self-determined actors, willing to collaborate and to start a decision process. Recommendations for further research are to analyse the added value of role-play in similar non-hierarchical networks and if the progress of decision making is improved on the long term.

Key words: Equipment pooling, gaming, role-play, decision-making, non-hierarchical networks, self-determination theory

1. Introduction

Since the introduction and adoption of the EC directive 96/67 the ground handling market at Schiphol is liberalized. This directive requires a minimum of two ground handlers at Schiphol, Schiphol is an airport which handles more than 10 million passengers a year (Schiphol Group, 2015), of which at least one ground handler has no direct connections with the airport authority or dominant airline (Council of the European Union, 1996).



Figure 1: Overview on types of liberalisation in the EU in 2009 (Airport Research Center, 2009)

Like other sectors during the end of the 90s, the ground handling market in the Netherlands was further liberalized into a fully liberalised market, see Figure 1. The ground handling market at AAS is perceived as the most liberalized market in the European Union (Bilotkach & Polk, 2013) Due to this liberalized market at the airside of Amsterdam Airport Schiphol, AAS, a fierce competition where competitors try to outperform the others is a fact. Besides the consolidation in the airline sector, where heavy price wars and fierce competition for the client are everyday businesses results in even lower margins for the ground handlers. In this hardly to make any profit market surviving every new day is a challenge. Instead of fighting each other, collaboration can be beneficial as well. Therefore the ground handlers have to get rid of competing the other players on every aspect, because collaboration can result in higher profits and a more efficient process (Hamel, Doz, & Prahalad, 1989). Especially AAS is appropriate for the realization of collaboration. Many actors are continuously present at the airport and involved in discussion about operational, tactical and strategical processes. Due to legislation as a consequence of the EC directive 96/67, the airport authority has just a facilitating role. This results in non-hierarchical networks where actors are equal, without the presence of a dominant party. Consequently the parties need to reach general consensus about projects and plans.

AAS is similar to other West-European airports, reaching its limits. The space is scarce and the subsequent continuously pressure on space at airside is not a desired situation at all. One part of this problem is the enormous amount of ground handling equipment at the airport. The amount of equipment endangers the security and safety of the airside at AAS. A reduction of equipment is needed to assure safety and to improve the efficiency of the ground handling process. There is one initiative, equipment pooling, which has potential to improve the ground handling process for all involved actors.

Equipment pooling is a concept in which the equipment of several companies is shared along. In order to decrease risks, lower costs and increase the utilization ratio of the equipment, it seems an appropriate solution for the problems at airside (Li, Qian, & Qian, 2013). The realization of an equipment pool seems a matter of time, based on the theoretical potential and successful applications of equipment pooling in the aviation sector and also for instance the oil and healthcare sector (Forsyth, Niemeier, & Wolf, 2011; Ground Handling International, 2014; Pasin, Jobin, & Cordeau, 2002). However decision making in networks is often more complex.

Decision making in complex networks, with a lot of actors and interdependencies, is often not only based on engineering rationality. Coming up with a solution and thinking that all players just accept this solution is an utopia. Rationality is often bounded where emotions and personal tastes often play an important role (March, 1978). Rationality depends on the horizon of the actor, according to Schumpeter (1984). Consequently in a non-hierarchical network where every actor has its own perspective, or in Schumpeter's words 'horizon', it is almost impossible that the initiated solution is accepted at once by all parties. So actors often do all what it takes to get their solution or initiative accepted, by means of negotiation, exerting pressure and forming alliances. Often the option to discuss and see why the others are reluctant to accept the initiative or plan are left behind.

The discipline of gaming provides a new approach towards decision-making in networks. However using gaming in non-hierarchical networks to enhance the motivation for further collaboration have not been analysed a lot before. This article will focus on the added value of gaming in decision making processes in non-hierarchical networks. First a further description of non-hierarchical networks is given. Then an elaboration on the foundations of gaming is handled. The case study at AAS and the role-play are shortly discussed. Thereafter the results of the case study at AAS towards decision making are presented. Finally conclusions and recommendations about using gaming in decision making processes are provided in the last section. For a more detailed description and results of the case study, contact the author.

2. Non-hierarchical networks

The ground handling sector at AAS comprises many involved actors. To gain insights and knowledge an actor analysis was performed. According to the performed actor analysis, different institutional aspects became clear. Firstly the Schiphol Group is the facilitating company. AAS provides the infrastructure at airside, defines airport rules and controls that the rules are being followed. Bounded to the European and Dutch legislation every new ground handler, when complying the ICAO requirements and having at least one customer, is allowed at the airport. A quality check or obliging that ground handlers have to pool their equipment is impossible. Concluding, from the airport authority perspective it is hard to coerce the other players. The actor analysis gave a lot of new

insights about the network. The complexity at airside makes it hard for the sector to integrate new initiatives into the daily business processes. Every process is aligned to other processes, for instance the passenger processes and other airline processes. So changes in the ground handling processes when not correctly executed influence the other processes at an airport to a large extent. In the ground handling sector every actor is dependent on each other, Figure 2 shows a simplified relationship structure of the ground handling sector at AAS. Although there is a dominant airline, which has a high power position, this actor is also dependent on the others for an efficient process at airside and especially when new collaborative designs like equipment pooling are initiated. The other actors are clients or competitors of each other and need each other. So there is not one leading party, or one party with the power to implement large new initiatives on its own.

Figure 2: Simplified formal relationship structure of the ground handling sector AAS

In conclusion, non-hierarchical networks are networks with a lot of actors, large interdependencies and where a dominant actor is missing. The airport authority cannot and will not force the other actors to implement the equipment pool. A process to reach general consensus is needed (de Bruijn, ten Heuvelhof, & in 't Veld, 2010). For the airport authority knowledge about the concerns and where benefits in equipment pooling are seen are needed, to be able to start the decision process.

After an actor analysis and development of a quantitative model four major concerns and prejudices became clear; 1) the actors are concerned about the impact of equipment pooling on their own processes and loss of independency, 2) the potential of an equipment pool is unknown under the involved actors, 3) a shared understanding is missing and 4) there is not trust in each other to collaborate intensively. From the developed quantitative model in the study, the theoretical benefits outweigh the benefits of the current situation. However these benefits have to be perceived as such by the actors (Ostrom, 2002). An equipment pool changes the current equipment process into a self-governed association (Ostrom, 2002), enlarging the possibility on tragedy of the commons (Hardin, 1968) and free riding (Koppenjan & Groenewegen, 2005). A self-governing system, such as an equipment pool, needs to meet several prerequisites (Ostrom, 2002). Accordingly, the most important prerequisites of the actors are absent. In addition, because the pool will be designed and institutionalized, transaction costs will probably rise because of contracts and agreements between the actors and the exact benefits of equipment pooling are unknown (Williamson, 1998).

As a result of the absence of prerequisites a status-quo regarding equipment pooling is the order of the day. No further steps in favour or well substantiated steps to implement equipment pooling are taken. Due to mainly the relational concerns, the essential willingness to collaborate at airside is missing. The actors need to be activated and motivated to collaborate, because collaboration is needed to realize a long-enduring pool (Ostrom, 2002).

3. Activation by means of enhancing intrinsic motivation

The motivation of the actors is missing, due to concerns about trust, autonomy and if an equipment pool can be realized efficiently. The motivational self-determination theory is often used to enhance motivation and change behaviour of persons (Deci & Ryan, 1985). Self-determination, the highest level is reached when the actors are totally intrinsically motivated, is enhanced by three motivational needs. The three aspects are competence, autonomy and relatedness (Deci & Ryan, 1985). Competence is defined as the ability to do something successfully or efficiently. Autonomy can be seen as deciding and doing it yourself and relatedness is the need to have close

relationships. How higher the perceived degree of one of the three aspects, how higher the determination, see Figure 3. This means that for the actors in the network a process in which their competence, autonomy or relatedness is increased results in more self-determination. Mainly those needs were missing when the equipment pool is considered. Enhancing the motivation by focusing on the three motivational needs seems the first step in the decision process about equipment pooling at AAS.

Figure 3: The relations between competence, autonomy, relatedness and self-determination. How higher the degree of one of the three needs, how higher the perceived self-determination, based upon (Deci & Ryan, 1985)

According to Deci & Ryan (1985) there are three types of motivation: Amotivation, extrinsic motivation and intrinsic motivation. The more intrinsically motivated the more self-determined the concerned person or organisation behaves to reach goals. Being intrinsically motivated results in the most positive outcomes (Deci & Ryan, 2000; Gagné & Deci, 2005), see also Figure 4. In short intrinsic motivation can be defined as doing things which are inherently interesting or give satisfaction. Extrinsic motivation plays a role when people are not internally motivated to do things, but can be motivated through external input, for instance rewards and punishments. Amotivation is also known as unwillingness, or have totally no intention to act (Deci & Ryan, 2000). The actor network itself is amotivated when taking equipment pooling into account, but the parts of the network, actors, itself are motivated, however restrained by the status of the network. Nevertheless the intrinsic motivation of the actors is however too low to get them activated.

Behavior	Nonself-determine	Self-determined				
Type of Motivation	Amotivation		Extrinsic Motivation			Intrinsic Motivation
Type of Regulation	Non- regulation	External Regulation	Introjected Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation
Locus of Causality	Impersonal	External	Somewhat External	Somewhat Internal	internal	Internal

Figure 4: The self-determination continuum (Deci & Ryan, 2000)

4. Gaming: a role-play during a workshop, to enhance intrinsic motivation

The current communication methods at AAS do not suffice to activate the actors. Therefor an intervention is needed to solve the status-quo. An intervention method with the ability to enhance intrinsic motivation is the field of gamification. Gamification is about enhancing extrinsic or intrinsic motivation and change behaviour in a socio-technological system with help of game elements (Deterding, 2012). A lot of gamified applications have been used in practice (Hamari, Koivisto, & Sarsa, 2014). Gamification is used to realize a certain behaviour in daily processes. Therefor in this case gamification is not suitable, since the decision process about equipment pooling is not a daily process. The discipline of gaming is therefore a good solution.

Since its introduction, the discipline of simulation and gaming has developed and been used in a lot of fields (Duke, 1974). Gaming have been used also a lot in policy analysis and policy making (Geurts, Duke, &

Vermeulen, 2007)(T. Ryan, 2000)(Duke, 1995). A part of policy making and analysis in the more complex world is collaborative decision making. Several studies towards collaborative decision making have been conducted (Mayer, van Bueren, Bots, van der Voort, & Seijdel, 2005). In these studies the focus of the games is too often on supporting the actual decision. As a result, managers and other decision makers too often focus on their final goal, so what there has to be accomplished, instead of focussing on how to get there. According to (de Bruijn & ten Heuvelhof, 2008) decision making is a dynamic game in which the outcome is often unknown, so using games to come to the desired outcome seems premature and unwisely. Searching for solutions and improvements in networks is a game of giving and taking and especially a way to enhance collaboration. Games are developed in such way that the self-determination is enhanced (R. M. Ryan, Rigby, & Przybylski, 2006). A role-play can be the game which can enhance intrinsic motivation and change the actors' attitude towards equipment pooling.

A role-play is interesting because one of the things it can solve is the status-quo. As described by de Laat & Geurts (2008), when a role, interaction or relation changes, this will create dynamics in the other aspects. So since the actors role is about to change, other relations and interactions between the participants will change as well. Thereby role-play have already been used to change policies and in some way to enhance aspects like autonomy (Gagné & Deci, 2005; Geurts et al., 2007). Especially, role-play coerces the participants to leave their comfort zone. The expectation is that this will result in a more open and useful discussion and helps the actors to come further in the decision analysis (de Laat & Geurts, 2008). Learning the concerns and benefits of the other parties can improve trust among the parties. The informal setting must contribute to the overall commitment and conviction that collaboration pays off. A role-play shows great potential to increase the perception about the necessity of collaboration at airside. Due to the fact that the actors need to leave their comfort zone and learn about others in an interactively and more informal way. This has already been applied a lot in education (Hawk, 2007). To enhance the self-determination, the role-play focusses on the three needs competence, autonomy and relatedness.

5. The role-play: a fictive world comparable to AAS

The actors need to be taken out of their normal routine and put together. This is done in the way of a workshop format, where almost every representative of the ground handling sector at AAS was present. The role-play was a part of the workshop. With the help of the role-play the concerns about collaboration should be taken away. The role-play itself took place in a fictive world at a fictive airport. This airport showed many comparisons with the currents situation at AAS. Since the roles are derived from existing parties and the participants will be able to see the similarities between the real world and fictive world. However the role given to the participants will be different than their current jobs. The highly comparable case with the current situation at Schiphol resulted in recognizable points and not a totally random case. The danger of a totally random case is that when the role-play ends everyone returns to their own behaviour because the role-play had nothing to do with their normal job.

During the workshop there were two groups; the control group and the testing group. The testing group, the role-play group, and the control-group had exactly the same rounds and same process during the workshop. Except for the fact that an existing situation at AAS was used for the control group. Herein the actors could act from their normal job perspective. Both groups were obliged to collaborate during the workshop.

The game and workshop was developed using the management approach of games (Peters & van de Westelaken, 2008) as framework and implementing the three needs of the SDT. Expert and actor interviews and gained knowledge about equipment pooling and ground handling were used to give substance to the workshop and the role-play. The development itself was a iterative process, in which as well experts of AAS as experts of Delft University Technology gave input and validated the workshop to assure the societal and scientific substance of the workshop. The process of the workshop was validated by workshop experts, of which one gave over more than hundred workshops differing from CEO to specialists.

The results are mainly qualitative analysed. The qualitative interviews beforehand, observations during the workshop and interviews afterwards provided insight, results and validation of the results. By means of questionnaires, one before and one after the workshop, the two groups could be compared quantitatively regarding their perspective towards collaboration. The participants had to fill in a Likert scale, from 1 to 5, about several propositions. The results of the questionnaire were statistical analysed using a Wilcoxon-Mann-Whitney Test (Nachar, 2008).

6. Results: role-play results in positive change of attitude

The statistical analysis of the questionnaire showed a significant change in the perception of the participants on the hypothesis which stated: '*Collaboration with other parties leads to a higher improvement of the efficiency in the ground handling process than continuing to operate separately*'. The significant decreasing score presumes a positive attitude change of the role-play group towards the efficiency improvements by means of collaboration.

Figure 5: the mean scores of the groups before and after the workshop

The results of the Wilcoxon-Mann-Whitney test, see Table 1, show a significant difference between the two groups before the workshop (a lower score is a more positive attitude towards collaboration at airside) and no significant difference after the workshop. The results of the role-play are promising when it comes to the self-determination behaviour to collaborate. The role-play group's perception on collaboration changed significantly, where the perception of the control group did not resulted in a significant change. The difference before the workshop is remarkable. The role-play group was far more negative about the possible improvements of collaboration where the control group was already more positive, see Figure 5. The actors affirmed this attitude by having negative prejudices about the other actors. These prejudices resulted in the actors not willing to cooperate and collaborate. The participants indicated to be concerned about the power of the director of the availability of the equipment, certainly when a competitor will use the equipment before. These prejudices were more present in the role-play group than in the control group.

Proposition: Collaboration to improve the efficiency in the ground handling process benefits to a smaller extent than continuing to operate separately	Group	Mean	Signific ance	Retain/ reject hypothesis
Hypothesis 0: There is no difference in the attitude to collaborate	Before	3,63	,041	Reject
before and after the workshop (Role-play group)	After	2,50		
Hypothesis 0: There is no difference in the attitude to collaborate	Before	2,33	,655	Retain
before and after the workshop (Control group)	After	2,17	-	
Hypothesis 0: There is no difference in the attitude to collaborate between the groups before the workshop (pre-measurement)	Role-play	3,63	,043	Reject
between the groups before the workshop (pre measurement)	Control	2,33		
Hypothesis 0: There is no difference in the attitude to collaborate between the groups after the workshop (post-measurement)	Role-play	2,50	,662	Retain
between the groups after the workshop (bost-measurement)	Control	2,17		

Table 1: results of Wilcoxon-Mann-Whitney test

The disappeared quantitative difference about the perception on collaboration was analysed further, because several reasons can have influenced the change. The potential of the role-play group to get a more positive perception on collaboration was larger and it was therefore easier to take advantage of the potential than it was for the control group. If this is only caused by the role-play is hard to prove. However the participants acknowledged the value of the role-play. Stating that 'it was real fun and surprisingly interesting to do', 'let them think outside the box' and 'being forced to think from the other's perspective'. To that extent that their opinion about collaboration drastically improved. The control group was not experiencing the same. Lacking the role-

play, they got less internal information about the attitude of the others and have to rely on the information given by the other participants and their pre-known information about the rest. The workshop and the control groups situation was seen as a long negotiation, where collaboration could be the result of a negotiation. Thereby the participants said that having more players around the table gave it more substance and made the negotiations less hard.

Another remark can be made. The interviews done afterwards confirm the results of the test and indicate even a more positive attitude of the role-play group than the attitude of the control group towards collaboration. A few actors of the role-play group are self-determined to such extent that they already show initiative to solve problems at airside. Remarkable is that the actors in the control group were not more self-determined after the workshop and see collaboration more as something which can be established by means of negotiations.

The form in which the collaboration have to be established will be not a self-governing equipment pool at a large scale. Equipment pooling has still a lot of unknown disadvantages and a few known advantages. However this workshop paved the way to a decision and design about equipment pooling. An equipment pool at a small scale can be realized, since the sector acknowledges the possibilities.

7. Conclusions & discussion

Concluding from the results, for a prejudiced group role-play enhances the self-determination to collaborate to a large extent. Such that the actors are motivated to collaborate. The first actors of the role-play group have taken initiative for more collaboration at airside of AAS. When a network of actors is in a bad way very prejudiced about each other and collaboration is needed in the sector, role-play can provide a solution and enhances the self-determination of the actors to collaborate significantly.

Playing games in non-hierarchical networks enhances the self-determination to collaborate. Collaboration which is necessary to implement equipment pooling in the ground handling process at AAS. So eventually the efficiency at airside will be improved. The great concern of being obliged, due to interdependencies, to work together can partially be taken away by playing a role-play. The intrinsic and extrinsic motivation in the decision process of self-governing systems is often a forgotten aspect, although it is essential for the progress and success of the design of the eventual self-governing pool. Concluding from the results, role-plays can be used in the initiation phase of the decision process for an equipment pool to meet the prerequisites. In order to increase the motivation and subsequently the self-determination of the actors to realize collaboration.

There are a few limitations and directions for further research regarding this paper. The role-play was done with a small group of participants, although this was the maximum when looking at the actors in the network. A higher number of participants during future role-plays can confirm the aforementioned conclusions and makes the role-play as mean to enhance collaboration more robust.

Thereby as could be seen in the results there was a large potential for the role-play group to increase their attitude towards collaboration compared to the control group. More research can be done if other tools, gaming and simulation but also tools from other disciplines, results in the same increase of positive attitude of collaboration. Secondly for an unknown reason the control group did not take the potential left for them. Since there was space to improve (from 2,3 score to 1 according to the Likert scale). It can be interesting to test similar cases with a role-play to see if a role-play results in an increase of attitude for less prejudiced groups. It could also be the result of the central tendency bias, participants avoid extreme response categories (Guilford, 1954). Though it can be concluded that a role-play itself did increase the willingness to collaborate and took some parts of the concerns away.

For the result of the decision process it is of great value if the role-play eventually leads to more collaboration than when no role-play is performed. This is very hard to state since this role-play focused on the motivation to come to a decision concerning collaboration in a network such at AAS. This is only the start of the decision process. After this role-play a lot of other design and decision steps have to be taken before the decision is made (Ostrom, 1990). It is interesting to see whether role-play accelerates the total decision process or not. However due this research, it can be stated that a role-play is a first step towards collaboration and it creates a platform in which collaboration is more acknowledged. Also other simulation and gaming tools are worth investigating to see whether this enhances collaboration (Veenstra, Meijeren, Harmsen, & Verbraeck, 2015).

Besides the ground handling sector at AAS, a lot of similar non-hierarchical networks are present at AAS and beyond. Future research for implementing role-play and other gaming elements to accelerate the decision making process is especially recommended for other networks where the airport authority has an facilitating role. Specifically if the actors are very prejudiced a role-play adds probably value and increases the willingness to collaborate. Besides Schiphol, other airports in Europe where the market is liberalized and self-governing systems have to be realized, are worth investigating. In order to see if role-play have the same results as it had at AAS. Besides the aviation sector, a lot of similar non-hierarchical networks in infrastructure can be identified in the Dutch economy, for instance the Port of Rotterdam, the electricity market, the railways, the gas and oil market, water purification network and maybe even the financial transaction market. New big challenges lay ahead in these sectors and new initiatives in which collaboration is needed are popping up. However in these markets there are also great concerns about collaboration and it is difficult to realize. While it can be very beneficial and results in a lot of efficiency improvements.

Referring back to Schumpeter, maybe everyone has its own horizon, however by performing a role-play game the horizons can coincide.

References

- Airport Research Center. (2009). Study on the Impact of Directive 96 / 67 / EC on Ground Handling Services 1996-2007. Aachen.
- Bilotkach, V., & Polk, A. (2013). MARKET POWER OF AIRPORTS : A CASE STUDY FOR AMSTERDAM AIRPORT SCHIPHOL. *Competition and Regulation in Network Industries*, 320–337.
- de Bruijn, H., & ten Heuvelhof, E. (2008). Management in Networks. Abingdon: Routledge.
- de Bruijn, H., ten Heuvelhof, E., & in 't Veld, R. (2010). Process Management: Why Project Management Fails in Complex Decision Making Processes. http://doi.org/10.1007/978-3-642-13941-3
- de Laat, P., & Geurts, J. (2008). Common Foundations underlying gaming/simulation and psychodrama. In L. de Caluwe, G. J. Hofstede, & V. Peters (Eds.), *Why Do Games Work?* (1st ed., pp. 105–116). Deventer: Kluwer.
- Deci, E. L., & Ryan, R. M. (1985). Intrinsic Motivation and Self-Determination in Human Behavior. Springer Science & Business Media. Retrieved from https://books.google.com/books?hl=en&lr=&id=p96Wmn-ER4QC&pgis=1
- Deci, E. L., & Ryan, R. M. (2000). The "What" and "Why" of Goal Pursuits : of Behavior Human Needs and the Self-Determination. *Psychological Inquiry*, *11*(4), 227–268. http://doi.org/10.1207/S15327965PLI1104
- Deterding, S. (2012). Gamification: designing for motivation. *Interactions*, 19, 14–17. http://doi.org/10.1145/2212877.2212883
- Duke, R. D. (1974). Gaming: The future's language. New York: Halsted.
- Duke, R. D. (1995). Gaming: An Emergent Discipline. *Simulation & Gaming*, *26*(4), 426–439. http://doi.org/10.1177/1046878195264004
- Forsyth, P., Niemeier, H. M., & Wolf, H. (2011). Airport alliances and mergers Structural change in the airport industry? *Journal of Air Transport Management*, 17(1), 49–56. http://doi.org/10.1016/j.jairtraman.2010.10.011
- Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior*, 26(4), 331–362. http://doi.org/10.1002/job.322
- Geurts, J. L. a, Duke, R. D., & Vermeulen, P. a M. (2007). Policy Gaming for Strategy and Change. Long Range Planning, 40(6), 535–558. http://doi.org/10.1016/j.lrp.2007.07.004
- Ground Handling International. (2014). Poolside reflections. Ground Handling International, 38-39.

Guilford, J. P. (1954). Psychometric methods (2nd ed.). New York: McGraw-Hill.

Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does Gamification Work?--A Literature Review of Empirical Studies on

Gamification. System Sciences (HICSS), 2014 47th Hawaii International Conference on, 3025–3034. Retrieved from internal-pdf://3759159937/DoesGamificationWork.pdf

- Hamel, G., Doz, Y., & Prahalad, C. . (1989). Collaborate with your competitors and win. *Harvard Business Review*, 133–139.
- Hardin, G. (1968). The Tragedy of the Commons. Science, 162(3859), 1243-1248.
- Hawk, T. F. (2007). Using Learning Style Instruments to Enhance Student Learning. *Journal of Innovative Education*, 5(1), 1–19.
- Koppenjan, J., & Groenewegen, J. (2005). Institutional design for complex technological systems. International Journal of Technology Policy and Management, 5(3), 240–257.
- Li, L., Qian, G., & Qian, Z. (2013). Do partners in international strategic alliances share resources, costs, and risks? Journal of Business Research, 66(4), 489–498. http://doi.org/10.1016/j.jbusres.2011.12.001
- March, J. G. (1978). Bounded rationality and the engineering of Choice. The Bell Journal of Economics, 9(2), 587-608.
- Mayer, I. S., van Bueren, E. M., Bots, P. W. G., van der Voort, H., & Seijdel, R. (2005). Collaborative decisionmaking for sustainable urban renewal projects: A simulation - Gaming approach. *Environment and Planning B: Planning* and Design, 32(3), 403–423. http://doi.org/10.1068/b31149
- Nachar, N. (2008). The Mann-Whitney U: A Test for Assessing Whether Two Independent Samples Come from the Same Distribution. *Tutorials in Quantitative Methods for Psychology*, *4*(1), 13–20. Retrieved from http://www.tqmp.org/doc/vol4-1/p13-20_Nachar.pdf
- Ostrom, E. (1990). Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge, UK: Cambridge University Press.
- Ostrom, E. (2002). Common-pool resources and institutions: Toward a revised theory. In B. Gardner & G. Rausser (Eds.), *Handbook of Agricultural Economics* (2nd ed., Vol. 2, pp. 1315–1339). Amsterdam: Elsevier Science B.V. http://doi.org/10.1016/S1574-0072(02)10006-5
- Pasin, F., Jobin, M.-H., & Cordeau, J.-F. (2002). An application of simulation to analyse resource sharing among health-care organisations. *International Journal of Operations & Production Management*, 22(4), 381–393. http://doi.org/10.1108/01443570210420395
- Peters, V., & van de Westelaken, M. (2008). The Management Approach: Thinking in Systems. In L. de Caluwe, G. J. Hofstede, & V. Peters (Eds.), *Why Do Games Work?* (1st ed., pp. 151–170). Deventer: Kluwer.
- Ryan, R. M., Rigby, C. S., & Przybylski, A. K. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion*, 30(4), 347–363. http://doi.org/10.1007/s11031-006-9051-8
- Ryan, T. (2000). The role of simulation gaming in policy-making. *Systems Research and Behavioral Science*, *17*(4), 359–364. http://doi.org/10.1002/1099-1743(200007/08)17:4<359::AID-SRES306>3.3.CO;2-J
- Schiphol Group. (2015). Jaarverslag 2014. Schiphol.
- Schumpeter, J. A. (1984). The Meaning of Rationality in the Social Sciences. Retrieved September 22, 2015, from http://www.jstor.org/stable/40750743?seq=1#page_scan_tab_contents
- Veenstra, A. W., Meijeren, J. Van, Harmsen, J., & Verbraeck, A. (2015). Fostering Cooperation in Inland Waterway Networks: A Gaming and Simulation Approach. In C. Ocampo-Martinez & R. R. Negenborn (Eds.), *Transport* of Water versus Transport over Water (pp. 463–478). Springer International Publishing. http://doi.org/10.1007/978-3-319-16133-4
- Williamson, O. E. (1998). Transaction Cost Economics: How It Works; Where It is Headed. *De Economist*, 146(1), 23–58. http://doi.org/10.1023/a:1003263908567