Motivation for Collective Action in the Smart Living Business Ecosystem

Fatemeh Nikayin, Mark de Reuver
Faculty of Technology, Policy and Management
Technology University of Delft
Delft, The Netherlands
{f.a.nikayin; g.a.dereuver}@tudelft.nl

Abstract - **While smart home services have been on the agenda for over three decades, advances in mobile technologies and concepts like Internet of things are creating a new wave of interest in the market. Traditionally, smart home applications were offered in stovepipe architectures by individual organizations, leading to a plethora of service platforms. Today, smart home service providers are increasingly looking to collaborate in order to jointly develop and share common service platforms. However, collective action literature asserts that such collaboration will only take place if the motives to collaborate outweigh the hurdles. In this paper, we study which motivational drivers lead to collective action for smart living services. We do so in a survey study among 140 home installation companies that are member of the major Dutch branch organization. We find that the tendency to collaborate is mainly driven by motives related to new business opportunities, and that more strategic and solidarity motives do not play a role.**

Keywords - collective action; business ecosystem; motivation; platform; smart living

I. INTRODUCTION

Thanks to mobile technologies and concepts like the Internet of things, the vision of Smart homes is changing from simple home automation systems toward advanced smart entertainment, health support and energy management services. Obviously, what is "smart" depends on time [1]. In the 1980s, the "smartness" of smart home concepts merely involved predefined automation of appliance tasks. Since the year 2000, smartness involves much more flexible task automation adapting to the situation based on past usage data, user preferences and interaction with other devices. In addition, the (mobile) Internet make smart home applications accessible regardless of the device and location of the user [2]. Therefore, the concept of "smart home" no longer fits and we coin the notion of "Smart Living" to represent bundles of innovative ICT-enabled services that aim to add value for home tasks and routines.

Although smart homes have been on the agenda for over three decades, and despite many commercialization attempts in different sectors, smart living services typically do not make it into the mass market [3]. This might be a result of the great fragmentation and complexity in smart living service platforms. In an earlier paper, we find that smart living service platforms are often based on closed architectures and are typically sector specific [4]. Typically, functionalities are replicated in the various industry-specific service platforms, and they are not being shared or reused. Practitioners working in the field of smart home services increasingly point to this fragmentation of service platforms as one of the major hurdles, which is also clear when considering major standardization initiatives like KNX.

As such, there are opportunities for service providers to share such generic functionalities on a common service platform to be used in multiple service offerings [4]. Sharing service platforms and collaborating across industry sectors may not only reduce investment costs, but may also reduce complexity and increase flexibility for consumers. Moreover, open innovation literature stipulates that sharing platforms across company boundaries may increase service innovation [5, 6]. As such, collaboration for smart living services may lead to new business opportunities. Other motivation for open forms of collaboration may come from trends like corporate social responsibility and people-planet-profit paradigms (i.e., sustainability of natural resources), which lead to more altruistic and solidarity types of motives.

To achieve such vision of common service platform for Smart Living services, actors from distinct sectors of industry need to work collectively. However, difficulties in cooperation specifically when actors are from different sectors, may hamper collaboration in this domain. For instance, one of the critical issues is that while actors cooperate for creating a shared value, they compete over having the biggest piece of pie [7]. Accordingly, several problems may arise such as conflicts over division of costs, revenues and investments between parties as well as the division of roles and responsibilities [8]. On the other side, increasing dependency between parties may also influence the governance mechanisms and raise concerns over trust or risk of opportunistic behavior of parties [9, 10].

Such issues of cooperation have often looked from the perspective of game theory or mechanism design [11] and there are relatively less empirical studies have been done in this field. While extensive bodies of literature on collective action have discussed motivations in different context like social and political [12-14], less attention has been paid to motivations in high-tech industry, especially to the smart living domain. Indeed fostering innovation in high-tech

 ISBN: 978-1-61208-164-9

industry like Smart Living is mainly dependent on the collaboration between several actors to integrate their knowledge and resources. Such open innovation happens only when different parties are motivated enough to work together. Therefore, to mobilize such cooperation, decision makers in high-tech industry need to know how those external independent parties may become interested in an innovative cooperation [15].

This paper aims to improve understanding on what drives or blocks collaboration in the field of smart living. More specifically, we explore which types of motivational sources exist in the field of smart living and analyze how those sources of motivation in turn affect the tendency to collaborate for smart living services. To do so, we develop and analyze the results of a survey among 140 installation companies that are active in the field of smart living services. While doing so, we compare different types of smart living services, i.e., energy types of services and entertainment and security services.

This paper is organized as follows: Section II presents theoretical background. Section III provides the method. In Section IV, we present the results, and finally, in Section V, we discuss the results and make recommendation for future study.

II. THEORETICAL BACKGROUND AND RESEARCH MODEL

Technology-wise, a service platform is an evolving system in the form of hardware architecture, an operating system or a software framework. A typical service platform usually contains several components that are required by the services running on that platform, and which those services would otherwise need to include themselves [16]. The network of service providers and platform providers that are working together around a service platform to stimulate innovation around it can be viewed as a 'business ecosystem' [17]. One of the important characteristics of business ecosystems is the interconnectedness between actors which make it necessary for them to cooperate for a shared fate [18]. As such, it is in the interest of most members of a business ecosystem to work collectively to develop and expand an existing market [19]. However, there may be several hurdles that hinder actors to join a business ecosystem and cooperate around an innovation. Examples of such obstacles are handling conflicts, differing motivations and conflicting strategic interests.

The cooperation within members of a business ecosystem can be viewed through the of lens collective action theory. Collective action theory is often applied to explain phenomena in which heterogeneous actors collaborate in order to reach a common goal [20, 21], especially when there are sources of conflicts in achieving 'common goal' through individual action [22]. In collective action literature, motivation is considered as an enabler for cooperation. On a general level, motivation can be viewed as an impetus or inspiration that move an individual towards something [23]. Such inspiration in collective action is typically toward pursuit of a common goal.

The classical dilemma of collective action is that "rational, self-interested individuals will not act to achieve their common or group interests" and they tend to free-ride on contributions of others [24]. Such issue of free-riding may hinder many actors from entering into a cooperation and lead to 'start-up dilemma' [25]. To solve the free-riding problem and to motivate actors for cooperation, Olson [24] argued the essence of 'selective incentives'. 'Selective incentives' can be viewed as those private benefits that are provided for those individuals who have contributed for provision of collective good [26]. Thus, those actors with high interests in 'selective incentives' are more likely to move in a cooperation [27].

The two terms 'motivations' and 'incentives' have been used in the literature interchangeably [14, 27]. However, in this research we distinguish 'motivations' from 'incentives' in a way that motivations are intrinsic or extrinsic impetus toward achieving common, while incentives are those benefits that are provided within a group to stimulate cooperation. In this paper, we mainly focus on the motivations and how they play roles in starting up collaboration.

Based on the previous discussion, we propose the following hypothesis:

H1. Stronger motivations to be involved in smart living projects increase the collective orientation in smart living projects

There are several interpretation of the notion of *Collective orientation* in the literature [28]. Following Driskel and Salas [29], we view collective orientation as an individual's tendency to work collectively rather than alone.

Several streams of literature have studied motivation for collective action in different contexts and proposed different categories of motivations [12, 13, 30]. While some studies suggests that cooperation between individuals may be induced by financial motives [14], others identify other types of motives like *normative, occupational, lobbying, material, social* and *information-motive* [27] that play roles in enabling cooperation. In the psychology literature, motivations are generally categorized into two types of intrinsic and extrinsic motivations. According to [23] intrinsic motivations can be defined as "doing the activity for its inherent satisfaction rather than for some separable consequence." An intrinsic motivated person, perform an activity because of the fun, challenges or the good feeling that the activity entail. In compared to intrinsic motivation, [23] define extrinsic motivation as an action that is induced by instrumental value and is toward achieving 'separable outcome'.

Similar to humans, companies may also encourage in specific activities on the bases of their intrinsic or extrinsic motivations. Put this in the context of Smart Living domain, there might be several types of intrinsic and/or extrinsic motivations for companies to cooperate over a common service platform. For instance, one possible intrinsic motivation could be to make life easier and more convenient for people. However, in competitive business world, extrinsic factors tend to be more critical. As such, in this paper we focus on exploring the extrinsic motives that lay behind cooperation in the smart living domain.

 ISBN: 978-1-61208-164-9

One of the obvious forms of extrinsic motivation is the business value from cost reduction or more income. For instance, platform providers or service providers may invest in a common service platform if they expect that they can reduce their costs and have more return on their investments. Business value can also be achieved by gaining access to specific information (e.g., customers, market), innovative technology, and/or new market opportunities [15]. We refer to these types of motives as 'new business' motives:

H1a. Stronger motivations to be involved in smart living projects for generating new business opportunities increase the tendency to act collectively in smart living projects

Another less tangible types of extrinsic motivation in the smart living domain is networking and building up relationship. Typically, companies may engage in cooperation to enlarge their networks, extend business opportunities and access more partners and projects. These types of motives are mainly cooperation-oriented and their values last longer than business values [15]. We generally refer to them as 'solidarity motives':

H1b. Stronger motivations to be involved in smart living projects for solidarity reasons increase the tendency to act collectively in smart living projects

Beside business and solidarity motives, companies may participate in a cooperative activity to achieve more high-level strategic objectives related to their status and reputation within a market [31]. For instance, being the first one in accessing or using a new technology is important to build up status and strategic position in the market. In this paper, we refer to these motives as 'strategic motives':

H1c. Stronger motivations to be involved in smart living projects for strategic reasons increase the tendency to act collectively in smart living projects

We assume that collaboration between actors is needed to get smart living projects towards the implementation and commercialization stage. Underlying assumptions are that sharing of service platforms that provide generic modular functions, like identifications, authorization and managed data storage, or business functions, like support, management and maintenance, will make it easier to develop new services for smart living service providers [32]. In addition to that, sharing of risks, investment funds and knowledge may benefit the smart living projects. To test these conjectures, we will test the following hypothesis:

H2. The stronger the tendency to act collectively in smart living projects, the more likely that the actor is involved in smart living projects

Obviously, there may be a direct effect between motivations to be involved in smart living projects and the extent to which actors are involved in these projects, without the collective orientation mediating that effect. To test for such direct effect of motivation on smart living involvement, we will also test the following hypothesis.

H3. The stronger the motivations to be involved in smart living projects, the more likely that the actor is involved in smart living projects

Figure 1 visualizes the conceptual model for this paper.

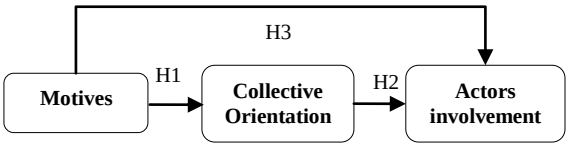

Figure 1. Research Model.

III. METHOD

A. Sampling

We conducted a survey among members of a Dutch branch organization that are providing technical and installation solutions in the area of Smart Living. The survey was conducted through an online questionnaire in January 2011. While the branch organization has in total 5300 members subscribed, 1796 of them were invited to participate that are already involved in domotics or other ICT-enabled solutions. An invitation e-mail was sent through the branch organization to which 144 members responded (response rate 8%). 66% of them participated after receiving the first email and 34% after receiving a reminder. To check non-response bias, we compared the means of the first group of respondents to the latter group of respondents and found no significant differences in overall data [33]. Of the 144 responses, 133 were valid for analysis.

Regarding the background of respondents, 70% of respondents were the owners of the company, 22% were involved in operational management and 8% were project managers. The majority of the participants were involved in strategic and policy management (79%). Similar to the population of installation companies, most participants work at SMEs, as only 14% have more than 100 employees.

B. Measures and Items in the questionnarie

The items to measure motivations were largely adapted from [27, 34]. Respondents were asked to indicate to what extent the statements are important for them, using Likert seven-point scales ranged from *not important* to *very important*. We conduct Exploratory Factor Analysis, using principal axis factors with Oblimin Rotation method and Kaiser Normalization on all the measurement scales, see Table 1. The three extracted factors were consistent with our expected motive types, i.e., *new business motives*, *strategic motives* and *solidarity motive.*

The likelihood of engaging in collective action is conceptualized as *'collective orientation'* and the items were mainly adapted from [35, 36]. Table 2 shows acceptable factor loadings (i.e., > .5) and construct reliability (i.e., > .7).

With regard to the involved actors and their sectors, the respondents were asked to indicate to what extent they are involved in different field of smart living projects. (7-point

Likert scales ranging from *not involved at all* to *is our core business)*. Typically, actors in the smart living domain are involved in offering different types of activities. For instance, many companies are involved in offering energy management solutions as well as security and safety services; several companies are providing domotics and home automation solutions. Recently, healthcare solutions like telecare or telemedicine are also gaining momentum. Accordingly, we include measurements items for four categories of activities in energy, security, health, entertainment and communication fields. These categories for the smart living domain have been confirmed by an expert in the domain.

Table 1. Extracted factors for motivation for cooperation (Oblimin Rotation- KMO =.94, Bartlett's test= 2063.55, p < .001).

Our organization should participate in smart living projects to: (7-point scale: Highly unimportant – Highly important)	**New business Motive α= .95**	**Solidarity Motive α= .92**	**Strategic Motive α= .92**	**Communalities**
To improve our reputation			.89	.89
To improve our position			.77	.74
To emphasize our mission and objectives			.63	.76
To experiment with new technologies	,67			.77
To create new market	.81			.74
To improve our market position	.75			.83
To increase our income	.88			.80
To gain access to more customers	.80			.76
To have market opportunities	.97			.90
To increase cooperation with other companies		.55		.71
To develop joint smart living projects		.84		.82
To raise funds for smart living projects		.86		.77
To strengthen the relationship with other organizations		.49		.80
To help other organizations in smart living projects		.56		.63

Table 2. Extracted factor for positive attitute towards cooperation (Oblimin Rotation- KMO=.74, Bartlett's test= 187.29, p < .001).

To what extent do you find collaboration necessary for smart living services? (7-point scale: Highly disagree – Highly agree)	**Collective orientation α= .79**	**Communalities**
Collaboration leads to problems (R)	.59	.35
The reasons to collaborate are scarce in smart living services (R)	.90	.81
Collaboration leads to better services	.64	.41
It's belter to deliver smart living services alone rather than with others (R)	.71	.50

(R) Reversely coded

For actors' involvement, despite our expectation of the four categories of smart living services, only two factors were extracted based on a cut-off eigenvalue of 1.00, see Table 3. The first factor includes activities in the field of energy and the second factor covers other fields like, security, health, entertainment and communication. We refer to the first factor as *'energy field'* and the second factor as *'other fields'*.

Table 3. Extracted factors for fields of involvement (Oblimin Rotation- KMO=.83, Bartlett's test= 658.43, p < .001).

To what extent is your company currently involved in smart living projects in the field of: (7-point scale: We are totally not involved – Is our core business)	**Energy fields α= .83**	**Other fields α= .88**	**Communalities**
Energy supply smart grids and smart meters	.57		.53
Systems for heating and ventilations management	.81		.63
Applications in the health		.78	.63
Applications that improve elderly independent living		.83	.66
Integrated entertainment and Info. communication services		.84	.65
Smart security services		.75	.59
Smart anywhere any time working services		.62	.53
Smart climate systems	.85		.68
Intelligent water management system	.68		.48

IV. RESULTS

A. Correlations

After extracting factors, in order to test our research model, we correlate the extracted factors. (See Table. 4 for correlation between the factors)

Table 4. Correlation between extracted factros (* p < .05, ** p < .01).

	New business Motive	**Solidarity Motive**	**Strategic Motive**	**Collective Orientation**	**Other fields**
New business motive	1				
Solidarity Motive	.70**	1			
Strategic Motive	.80**	.72**	1		
Collective orientation	.19*	.12	.11	1	
Other fields	.24**	.30**	.34**	-.033	1
Energy field	.11	.22*	.22**	-.058	.57**

With regard to our first hypothesis, not surprisingly, there is a positive correlation between *new business motives* and *collective orientation*. However, there is not a significant relation between the two other types of motives (i.e., *solidarity* and *strategic motives*) and collective orientation.

This implies that material values play more important role in motivating actors to work together in this domain. Still, considering the strong correlations between the different dimensions of motives, there may indeed be a direct or second-order effect of the other motivation types and the collective orientation.

H1 – Partly supported (H1a: Supported; H2b: Rejected; H1c : Rejected)

In our second hypothesis, we assume that collective orientation leads to actor's involvement in smart living project. However, it appeared that actors' involvement is not related to their collective orientations. Put simply, even if actors are involved in the smart living projects, it does not mean that they have positive attitude toward cooperation.

H2 – Rejected

We also correlate the factors of motives to the factors of actors' involvement to control for the direct effects between them. Apparently, the actors in all fields are generally motivated for cooperation. However, their motivation is mainly self-centered and toward strategic positioning in the market, i.e., towards improving the reputations, status or emphasizing their own objectives.

H3 – Supported

V. DISCUSSION AND RECOMMENDATIONS FOR FUTURE STUDIES

The results indicate that the primary motivation for cooperation in the smart living domain is to create *new business* opportunities. This result is opposed to our initial lessons in our ongoing, qualitative case studies where many practitioners refer to solidarity and cooperative-oriented motives to be important in this domain. Possibly, there is little cooperation going on in this field at this moment and mostly actors are still perusing their goal in isolation.

Despite our expectations, there is not any relation between *'collective orientation'* and the actors' current involvement in this domain. In other words, collaboration between actors is not related to the extent to which they are involved in smart living projects. Apparently, collaboration is not a prerequisite at this moment for being involved in smart living projects. Alternatively, this may imply that there might be several issues in collaboration that hinder even interested actors to move in this domain.

With regard to the motivations, there is a stronger relation between motivation and involvement in *other fields* rather than the *energy field.* This is quite in line with our observations in the domain where many service providers in energy sectors are offering isolated smart metering services [4]. However, in both groups, strategic motives are stronger than solidarity and business motives. This might be explained by the fact that still there is not a dominant actor in the smart living domain and actors from distinct sectors seek to effectively position themselves in this growing market. As such, companies are tapping into each other business and trying to prove themselves in this industry. For instance, telecom companies are considering to provide energy services to households through their fiber infrastructure [37]. This indicates that having a strategic position, status and reputation in the smart living domain is in the interest of all the involved actors.

Despite the competition for dominance in this domain, literature discusses the importance of inter-organization cooperation for the growth of smart living industry [38]. The current trends of proprietary service platforms with differentiated standards leave no space for cooperation, while the promise of a shared service platform highlights the growing importance of cooperation between parties around the platform, i.e., through open API or open standards, to stimulate innovation in the smart living business ecosystem. However, the challenge is how to set up such collaboration, considering several underlying issues that may hamper actors to move in cooperation.

In this paper, we aimed to answer the questions about motivations that lay behind the actors' cooperation in the smart living domain, though, the questions about 'selective incentives' and their importance in persuading actors for cooperation remained unanswered. Furthermore, demotivation issues, like conflicting strategic interests, lack of trust and disagreement over division of costs and benefits, that may hinder cooperation are missing in this study. We also didn't study the effects of actors' performance or the level of interdependency among them. We suggest that further research include the effects of those issues in their studies.

As in any cross-sectional survey study, a limitation is that we measured the independent, mediating and dependent construct at the same moment in time. As such, we cannot test one of the conditions of causality, that is, time difference.

Regarding the population, this study just includes the installation companies and no service providers, network providers, or IT vendors. This makes our results stronger in terms of internal validity, though, less strong regarding external validity. As such, one subject to be explored in the future studies is whether the motivations differ when other actors are included in the population.

In this study, we mainly use exploratory data analysis techniques to explore the measurement scales and the causal model. In subsequent analysis, we will use more confirmatory and stringent techniques to test the results. We will use confirmatory factor analysis to test the measurement model. Moreover, we will use structural regression analysis in SEM to more stringently test the mediation effect that the collective orientation may have on the relation between motivations and involvement in smart living projects.

Possibly, given the strong correlations between the different types of motivations, there may be a multilevel structure inherent in the measurement model. A second-order construct *Motivations* that influences the three underlying

 ISBN: 978-1-61208-164-9

dimensions explored in this paper may better explain the other theoretical constructs. Similarly, the strong correlation between the two types of smart living projects may be explained by a higher-order factor. We will test for such higher-order factors in our subsequent research steps using structural equation modeling.

Reference

1. Weiser, M., *Open house*. Review, the web magazine of the Interactive Telecommunications Program of New York University, ITP Review, 1996. **2**.
2. Rohracher, H., *Smart Homes and Energy Efficiency Constructive Technology Assessment of ICT Use in Sustainable Buildings*, in *ACEEE*. 2002. pp. 241-252.
3. Peine, A., *Understanding the dynamics of technological configurations: A conceptual framework and the case of Smart Homes.* Technological Forecasting and Social Change, 2009. **76**(3): pp. 396-409.
4. Nikayin, F., D. Skournetou, and M. De Reuver, *Establishing a Common Service Platform for Smart Living: Challenges and a Research Agenda.* Toward Useful Services for Elderly and People with Disabilities, 2011: pp. 251-255.
5. Eisenmann, T.R., et al., *Opening platforms: How, when and why?* 2008: Harvard Business School.
6. Chesbrough, H.W., *Open innovation: The new imperative for creating and profiting from technology*. 2003: Harvard Business Press.
7. Brandenburger, A.M. and B.J. Nalebuff, *Co-opetition: A revolutionary mindset that combines competition and cooperation: The game theory strategy that's changing the game of business*. 1997: HarperCollinsBusiness.
8. de Reuver, M., H. Bouwman, and T. Haaker, *Mobile business models: organizational and financial design issues that matter*. Electronic Markets, 2009. **19**(1): pp. 3-13.
9. De Reuver, M., *Governing mobile service innovation in co-evolving value networks*, in *Faculty of Technology, management and policy*. 2009, Technology University of Delft: Delft. pp. 159.
10. Williamson, O.E., *Corporate finance and corporate governance.* The journal of finance, 1988. **43**(3): pp. 567-591.
11. Locher, T., et al., *Free riding in BitTorrent is cheap.* IRVINE IS BURNING, 2006. **300**: pp. 85.
12. Elster, J., *The cement of society: A study of social order*. 1989: Cambridge Univ Pr.
13. Schlozman, K.L., S. Verba, and H.E. Brady, *Participation's Not a Paradox: The View from American Activists.* British Journal of Political Science, 1995. **25**(01): pp. 1-36.
14. Gillinson, S., *Why cooperate? A multi-disciplinary study of collective action.* Overseas Development Institute, 2004.
15. Boudreau, K.J. and K.R. Lakhani, *How to manage outside innovation.* mIt Sloan management review, 2009. **50**(4): pp. 69-76.
16. Evans, D., A. Hagiu, and R. Schmalensee, *Invisible engines: how software platforms drive innovation and transform industries*. 2006: The MIT Press.
17. Moore, J., *Predators and prey: a new ecology of competition.* Harvard Business Review, 1993. **71**: pp. 75-75.
18. Iansiti, M. and R. Levien, *Strategy as ecology.* Harvard Business Review, 2004. **82**(3): pp. 68-81.
19. Moore, J.F., *Business ecosystems and the view from the firm.* Antitrust Bull., 2006. **51**: pp. 31.
20. Oliver, P., G. Marwell, and R. Teixeira, *A theory of the critical mass. I. Interdependence, group heterogeneity, and the production of collective action.* American Journal of Sociology, 1985. **91**(3): pp. 522-556.
21. Poteete, A. and E. Ostrom, *Heterogeneity, group size and collective action: The role of institutions in forest management.* Development and change, 2004. **35**(3): pp. 435-461.
22. Keohane, R.O., *Cooperation and International Regimes*, in *After Hegemony*. 1984, Princeton University Press: New Jersey.
23. Ryan, R.M. and E.L. Deci, *Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions* 1.* Contemporary educational psychology, 2000. **25**(1): pp. 54-67.
24. Olson, M., *The Logic of Collective Action: Public Goods and the Theory of Groups*. Revised edition ed. 1971, Massachusett: Harward University Press. 186.
25. Bina, M. and G.M. Giaglis, *Unwired collective action: Motivations of wireless community participants.* 2006.
26. Oliver, P., *Rewards and punishments as selective incentives for collective action: theoretical investigations.* American Journal of Sociology, 1980. **85**(6): pp. 1356-1375.
27. Knoke, D., *Incentives in collective action organizations.* American Sociological Review, 1988. **53**(3): pp. 311-329.
28. Alavi, S.B. and J. McCormick, *A new approach to studying collective orientation in team contexts.*
29. Driskell, J.E. and E. Salas, *Collective behavior and team performance.* Human Factors: The Journal of the Human Factors and Ergonomics Society, 1992. **34**(3): pp. 277-288.
30. King, D.C. and J.L. Walker, *The provision of benefits by interest groups in the United States.* The Journal of Politics, 1992. **54**(02): pp. 394-426.
31. Lopes, H., A.C. Santos, and N. Teles, *The motives for cooperation in work organizations.* Journal of Institutional Economics, 2009. **5**(03): pp. 315-338.
32. Feng, W., *Remote service provision for connected homes* 2010, De Montfort University. pp. 163.
33. Armstrong, J.S. and T.S. Overton, *Estimating nonresponse bias in mail surveys.* Journal of marketing research, 1977. **14**(3): pp. 396-402.
34. Sako, M., *Suppliers' associations in the Japanese automobile industry: collective action for technololgy diffusion.* Cambridge Journal of Economics, 1996. **20**(6): pp. 651.
35. Kelly, C. and S. Breinlinger, *Identity and injustice: Exploring women's participation in collective action.* Journal of Community & Applied Social Psychology, 1995. **5**(1): pp. 41-57.
36. Frege, C., *Union membership in post-socialist East Germany: who participates in collective action?* British Journal of Industrial Relations, 1996. **34**(3): pp. 387-413.
37. Jeff St., J., *The Telco Home Energy Invasion*. 2009, GreenTechMedia.
38. Novais, P., et al., *Inter-organization cooperation for ambient assisted living*. Journal of Ambient Intelligence and Smart Environments, 2010. **2**(2): pp. 179-195.

 ISBN: 978-1-61208-164-9