Measuring Empowerment to evaluate the impact of a Mobile Based Information System for Sri Lankan Farmers

Full Paper

Tamara Ginige
Computing Department, Macquarie University & Faculty of Business Australian Catholic University, Australia
tamara.ginige@acu.edu.au

Deborah Richards
Computing Department, Macquarie University Australia
deborah.richards@mq.edu.au

Abstract

We are investigating ways to empower Sri Lankan farmers through a technology-based intervention to enhance their livelihood activities. Using empowerment theory and related concepts, we have created a conceptual model of psychological empowerment and identified a person's level of empowerment as a reflection of their sense of control, self-efficacy, competence and motivation. We interviewed 50 farmers and used content analysis to identify the empowerment concepts in our model and measure their current level of empowerment. This paper reports our method for determining empowerment levels and provides findings from our interviews. The results revealed that the majority of farmers have low sense of control, average levels of self-efficacy and high levels of farming knowledge but lack of access to timely information reduced their competency in dealing with new problems. The method will be used in follow-up interviews to determine whether levels of empowerment have increased as a result of technology intervention.

Keywords

Mobile Based Information Systems, Empowerment, Sri Lankan Farmers

Introduction

Empowerment is a concept that is studied extensively across many areas such as psychology, community development, education, social studies, and organisations among others (Perkins et al. 1995; Rappaport 1987; Zimmerman 1988; Zimmerman 2000, p44). Many researchers have described empowerment as an iterative process of gaining power (Masterson et al. 2006; Speer et al. 1995; Wallis et al. 2008). Empowerment has different meanings in different sociocultural and political contexts, typically involving the use of terms such as self-efficacy, control, self-power, self-reliance, independence, making one's own decisions, and being free to define it (Narayan 2002). It has been defined as the "ability to get what one wants, and the ability to influence others to feel, act, and/or behave in ways that further one's own interests" (Dodd et al. 1990, p. 64) and "the capacity to exert control and influence over decisions that affects one's life space for one's own benefit" (Zimmerman 2000, p. 44).

The theory of empowerment includes both processes and outcomes (Bandura 1982). The theory suggests that actions, activities or structures may be empowering, and that the outcome of such processes result in a level of being empowered. Therefore an evaluation of outcomes is important to provide necessary feedback for the continued evolution of empowerment processes. Empowerment is country, population, domain, context and level specific hence empowerment processes and outcome vary significantly across these dimensions (Alsop et al. 2005; Zimmerman 2000, p44). Therefore measuring empowerment is a complex process and a single framework or standard cannot fully capture its meaning for all people in all contexts (Bandura 1994; Zimmerman 1995). Despite the great interest in studying the influence of empowerment across many areas, the development of technology-focussed frameworks to evaluate and monitor empowerment systematically is still at a very early stage.

Social Life Networks (SLN) for the Middle of the Pyramid (www.sln4mop.org) is an International Collaborative research project aiming to develop Mobile Based Information Systems (MBIS) to support livelihood activities of people in developing countries. Within that larger project, a specific project is to develop a MBIS for farmers in Sri Lanka to address a frequently occuring over-production problem. As a part of this project we are investigating whether the provision of relevant and timely information using a MBIS to farmers in Sri Lanka leads to an increased sense of empowerment (Ginige et al. 2012b). The MBIS needs to provide information on rapidly changing dynamic situations such as fluctuations in market prices, prevailing supply and demand situations for their produce as well as more stable information such as information on seeds, pests, weather patterns and soil types (De Silva et al. 2013; De Silva et al. 2012; Ginige et al. 2012a; Ginige et al. 2012b; Giovanni et al. 2012a; Giovanni et al. 2012b; Walisadeera et al. 2013). Our investigation has revealed that providing only this factual knowledge does not empower the user to use them. Therefore we have implemented processes in MBIS to provide both factual as well as procedural knowledge for the user to carry out activities that would enable them to make informed decisions, take actions and improve their livelihood activities (Ginige et al. 2013).

In order to evaluate the MBIS as an empowerment tool, we need to measure the empowerment outcomes for Sri Lankan farmers as a result of their usage of the MBIS. We seek to achieve this by measuring the farmers' level of empowerment before and after use of the MBIS. In this paper we present an approach to measure the farmers' levels of empowerment and present the results of applying the approach to real data captured from Sri Lankan farmers. In a subsequent study, following the farmers' use of the MBIS soon to be deployed, levels of empowerment will be measured again and compared.

The paper is organized as follows. The next section presents background information relevant to the current situations of farmers, followed by an introduction to empowerment theory and related work involving empowerment measurement studies. We then present our research approach involving the design of a questionnaire to conduct a semi-structured interview with farmers, design of an empowerment measurement model and coding of farmer responses based on the empowerment measurement model. Results and discussion follow. The last section contains next steps and conclusions.

Background

In the Sri Lankan economy, agriculture is one of the important sectors and approximately 33% of the total labor force is engaged in agriculture (Agriculture 2015). Farming rice, vegetables or other crops is the most important activity for the majority of people living in rural areas of Sri Lanka. Currently there are not many mobile applications that have been developed to address the local needs of the farmers. Depending on the crop cycle, farmers have different information needs. There are six stages of a crop cycle: *deciding* stage where farmers decide what to grow, *seeding* stage where farmers either purchase or prepare seeds, *preparing and planting* stage, *growing* stage where farmers apply fertilizer, pesticides and water, *harvesting, packing and storing* stage and *selling* stage (De Silva 2010, Agriculture 2015).

Farmers often make wrong decisions due to the lack of access to current and relevant information. For example, during the deciding stage, many farmers often choose to grow the same crop within a region, and this could cause a potential over supply of that crop (Hettiarachchi 2011). Farmers only come to know, or realise, there is an oversupply when they bring their harvest to the market, and the oversupply reduces market price for the crop, disadvantaging the farmers. Neither the farmers nor government agencies are able to make the necessary adjustments for lack of timely information regarding what farmers plan to cultivate, or have cultivated. The yield could be affected by various other factors such as availability of water and unpredictable weather. Some farmers do not have accurate knowledge on diseases and pests and how to treat them. There are similar issues at all the stages of the crop cycle (Lokanathan et al. 2012). Most farmers seek advice from agricultural extension officers but in the case of a new disease or a new pest, agriculture officers also take time to find the solutions. This delay in receiving timely information often destroys their crops. Farmers do not have accurate knowledge of the best fertilizers to use and how much they need to apply. This is directly related to the quality of their harvest, hence the selling price and profit achieved. The majority of farmers depend on their self-knowledge, friends, family and sometimes a village middle-person for advice and information that may not be accurate, up-to-date or complete (Lokanathan et al. 2012). These situations leave farmers feeling powerless, helpless and desperate, because they do not see that their livelihood is improving.

Empowerment Theory

Empowerment can be analysed at multiple levels such as individual, organisational and community. In empowerment theory, empowering processes and their outcomes are clearly defined (Zimmerman 1995). Though analysis can be done at different levels, individual, organisational and community empowerment are mutually inter-dependent and are both a cause and a consequence of each other (Zimmerman 2000, p44). Similarly, empowering processes at one level of analysis contribute to empowerment outcomes at other levels of analysis. Therefore empowered individuals are the main basis for developing empowered communities and organisations.

Empowerment at the individual level of analysis can be referred to as psychological empowerment (PE) (Zimmerman 1988; Zimmerman 1995). Zimmerman (1995) defines three qualities of psychological empowerment (PE). *Intrapersonal Component* of PE refers to how people think about themselves and includes domain specific perceived control and self-efficacy, motivation to control and perceived competence. *Interactional Component* of PE refers to the understanding that people have about their community and related socio-political issues. *Behavioral component* of PE refers to actions taken to directly influence outcomes. These three components of PE merge to form a picture of a person who believes that he or she has the capability to influence a given context (*Intrapersonal Component),* understands how the system works in that context (*Interactional Component)* and engages in behaviors to exert control in the context (*Behavioral component)*.

Enablers of Psychological Empowerment

There are several other concepts related to psychological empowerment such as motivation, autonomy, meaningful goals, choices and locus of control and there have been many studies done to examine the relationships among these concepts. In the study of human motivation, goals have been identified as the key contributing factor to the long-term levels of well-being (Alsop et al. 2005; Austin et al. 1996; Karoly 1999). Psychological well-being has been defined as "the self-evaluated level of the person's competence and the self, weighted in terms of the person's hierarchy of goals" (Lawton 1996, p. 328). Goals are necessary for daily functioning but they can be trivial and shallow and may not have the capacity to contribute to the sense of meaning. But the goals that are meaningful lend order and structure to these lives (Emmons 2003). Self-determination theory (SDT) (Deci et al. 2000) is an empirically tested theory of human motivation that has been applied and tested in a variety of life domains such as work, education, parenting, relationships, health and well-being, sports and psychotherapy. It discusses the importance of motivation and personally meaningful goals at length. The theory has long recognised that the basic physiological needs of autonomy, competence and relatedness are necessary for optimal functioning and for the integration of social norms and values in all life contexts.

Another important concept is the sense of control of a person. It is defined as the perceived degree of freedom or discretion in carrying out work activities (Hall 1986). The perception that one is an effective agent in one's own life on the one hand, as compared to the belief that one is powerless to control important life outcomes, is central to self-control (Gecas 1989). The concepts related to the sense of control include mastery (Pearlin et al. 1981), locus of control (Rottar 1966), self-efficacy (Bandura 1997), instrumentalism (Wheaton 1980) and personal autonomy (Seeman et al. 1983). The sense of personal control is important scientifically for a number of reasons. Most important, it reflects the real constraints and opportunities of one's ascribed and achieved statuses. Perceptions of control conform realistically to objective status; the sense of control increases with education, earnings, income, employment, occupational status, job autonomy, and status of origin (Mirowsky et al. 1989; Wheaton 1980). It declines with the frequency of undesirable events such as being laid off or fired, divorced or widowed, and sick or injured, and with the intensity of problems such as economic hardship (Pearlin et al. 1981).

When people work, individuals reshape the set of given choices to be personally feasible within their specific situations. Choice process theory assumes that sense of control is a consequence of exercising greater choices (Lawler 1992). To make the set of given choice opportunities more personally feasible, individuals do not remain passive, but react actively to them. Choice process involves reshaping, estimating, developing, and interpreting a set of given choice opportunities. The choice process theory indicates that this active involvement in choice processes generates sense of control beyond the objectively established set of choices (Lawler 1992).

When describing empowerment, researchers often include self-efficacy. Perceived self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affects their lives (Bandura 1997). Self-efficacy beliefs determine how people feel, think, motivate themselves and behave. Self-efficacy is one of the core elements of the empowerment process. It has been studied extensively and measured across many domains. There is a large amount of consistence evidence linking it to motivation and performance across situations and cultures (Bandura 2002; Bandura et al. 2003). Competence is one of the other factors that is believed to be related to self-efficacy (Bandura 1995). Competence is defined as the ability to do something successfully and efficiently. It is a combination of observable and measurable knowledge, skills, abilities and personal attributes that contribute to enhanced individual performance and ultimately result in achieving goals. Individuals who perform unsuccessfully are likely to do so not necessarily because they lack skills, but because they lack the self-efficacy belief to use skills effectively (Bandura 1997).

Relationships between Psychological Empowerment and its enablers

Drawing the literature together, we have created Figure 1 to show the three components of psychological empowerment (i.e. interactional, behavioral and interpersonal), the four empowerment outcomes (i.e. competence, sense of control, motivation and self-efficacy), the key drivers and influencers (i.e. decision making, choices, autonomy, engagement, communication and meaningful personal goals) and their relationships to each other. Note that some factors are bidirectional as they may influence an empowerment outcome, but also change as empowerment level changes. The empowerment outcome will be influenced by the actions taken by users due to these drivers. For example, when the users have access to different types of knowledge and information, they are able to make informed decisions and become competent. Further, with the access to knowledge and data in context, users are able to identify the choices and also the barriers they may have. When exercising greater choices, users gain a sense of control of their lives, become more engaged, motivated to gain new experiences and believe that they have necessary skills to achieve goals in their lives. Zimmerman (1995) suggests that the skills of users that are enhanced by the processes and structures provide them with the support to make necessary changes at the community level too (Zimmerman 1995).

To increase the sense of power (i.e. empowerment) experienced by Sri Lankan farmers, we need to be able to measure their level of power before and after an intervention. To this end, this paper investigates two interrelated research questions (RQ):

RQ1:   "Can we identify the empowerment concepts in our model in Sri Lankan farmers"
RQ2:   "If so, can we measure their level of empowerment?"

Research Approach

To answer the research questions, we needed to gather data from farmers about them and their situation. For example, we needed to find out how they make decisions and which information they use to make these decisions, whether they have any choices in the decision making process and freedom to use those choices; how they engage and communicate with each other, how they interact in the society and the obstacles they face during their farming cycle. To gather this data we chose to use an interview method. The interviews were conducted using semi-structured questions to guide the process. The aim of the questions was to understand how farmers behave when they take actions while doing their livelihood activities. Therefore the questions were designed to find out which information is available for the farmers to make informed decisions and how they make them, how they find information and apply them in action, choices they have and autonomy to choose, their strengths and weaknesses, commitment, beliefs about their competency and their engagement in the community. As these intrapersonal components of psychological empowerment cannot be measured directly, we have looked at empowerment related attributes, (Table 1) that can be articulated and thereby measured.
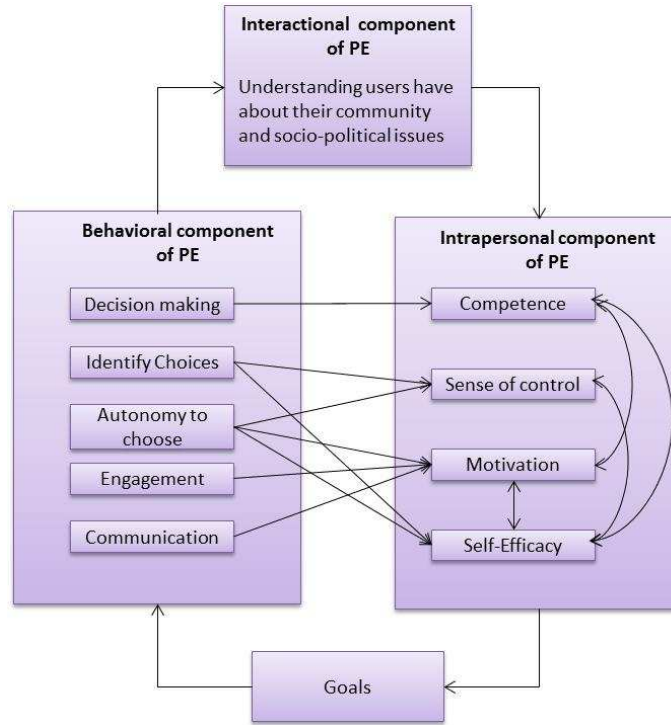
Figure 1 – A Conceptual Model of Psychological Empowerment

Sense of Control	Self-Efficacy	Competence	Motivation
Personal autonomy, Internal and external locus of control, Personal choices, Meaningful goals, Outcomes, Ability to overcome constraints	Self-belief, Self-confidence, Strong commitment, Ability to organise and take actions, Ability to recover from failures/setbacks, Ability to exercise influence	Proficiency, Problem solving, Mastery, Decision making, Ability	Meaningful goals, Self-belief, strong commitment, engagement, communication

Table 1. Empowerment related attributes for the farming domain

We interviewed 50 Sri Lankan farmers at six different locations over five days. The major cities closest to these locations were Dambulla, Pollonnaruwa and Galigamuwa. Dambulla is situated in the central province of Sri Lanka, 148km north-west of Colombo, the capital of Sri Lanka. Pollonnaruwa is 73km from Dambulla and Galigamuwa is 95 km from Pollonnaruwa. Dambulla has the largest wholesale vegetable market in Sri Lanka. We spent 2 days at Dambulla with 19 farmers, 1 day at Galigamuwa with 10 farmers and 2 days at Pollonnaruwa with 21 farmers. The research group at University of Colombo, Sri Lanka organized the farmers to attend the study via the agricultural officers at Dambulla, Galigamuwa and Pollonnaruwa. We met the farmers at the agricultural offices at Dambulla and Pollonnaruwa and at the farm at Galigamuwa. Five researchers from the Australian and Sri Lankan research groups were involved in this study which was conducted in the farmers' native language: Sinhala.

The interviews were approx. 20 minutes long and recorded. The audio files of these interviews were transcribed to create the text files in Sinhala. This was carried out by a research officer at Peradeniya University in Sri Lanka. Through reading of each individual transcript one-by-one and reviewing the interview response against the empowerment related attributes shown in Table 1, we marked up each transcript. An example is given in Table 2. For each empowerment related attribute, a value of either "low" or "high" was assigned to reflect the level of that attribute. These two values represent the notion that the farmer either has (high) or does not have (low) that attribute. The resultant value for each empowerment outcome (sense of control, self-efficacy, competence and knowledge) was computed by subtracting the number of "low" values from the number of "high" values recorded of related empowerment attributes. Then a value for overall empowerment was computed by adding the values of all four empowerment outcomes: sense of control, self-efficacy, competence and motivation. This simplistic

or crude approach does not take into account that some sub-categories may have more weight than others but does provide an initial means of comparison. Table 2 shows some possible responses based on examples from our dataset that a farmer may give for a process such as applying pesticide.

Concept	Sense of Control	Self-Efficacy	Competence	Motivation
Example excerpt from farmer transcript	Soon after I applied pesticide, it rained heavily. Two days later crops contracted a fungal. Everything was destroyed.	I believe I can apply exact amount of pesticide to my crop.	I read about pests often. I go to farm every day and look for them. If there are any unexpected pests, I ask agriculture officer immediately. I ask my friends about that too. I can go to the farm and apply pesticide correctly.	My goal for this season is to have a better crop yield. This time I am going to choose better quality seeds and fertiliser. It may not attract too many pests or get subjected to diseases.
Coding for the above example	Outcome – low; Ability to overcome constraint – low external locus of control – high	Self-belief – high Self-confidence – high	Ability – high Problem solving - high	Goals – high Self-belief - high Strong Commitment - high

Table 2. Coding example for the process of applying pesticide to a crop

This process was carried out for all 50 files by the first author. After the coding was finished, both negative (low) and positive (high) responses were totaled for each code. To obtain a net "empowerment" score at the individual farmer level, the negative score was added to the positive score. The main objective of the coding was to find out how many times farmers talked about sense of control, self-efficacy, competence and motivation, both positively and negatively. Nvivo10 software was used to perform the content analysis coding described above. The coding approach and results were validated by the second author after coding of the first 10 (20%) (4 from Dambulla, 4 from Pollonnaruwa and 2 from Galigamuwa). Disagreements were discussed and reconciled. Further validation was performed after 40%, 70% and 100%.

Results and Discussion

Participant Demographics

Out of 50 farmers, 90% were married, 8% were unmarried and 2% were widowed. Education up to year 10 had been completed by 58% of them, 20% of them up to year 12, 14% up to year 6, 4% up to diploma, 2% of them were university graduates, and 2% did not have any formal education. 88% of the farmers were over the age of 31 and 80% of the farmers owned the land they used for farming, 10% of them rented the land and the rest of the farmers did not make any comment.

Regarding technology usage, 82% of the farmers had at least one mobile phone, 12% had two mobile phones and 6% had none. 98% of the households had at least one mobile phone, 74% of the households had two mobile phones, 32% of the households had three mobile phones and 14% had four mobile phones. 82% of the farmers did not use the Internet using a computer as they did not have one at home. The main reason for this was the high purchase cost, inability to use technology related to operating a computer and ongoing maintenance cost.

Current Empowerment

Figures 2, 3, 4 and 5 show the results for empowerment outcomes for the whole sample. With regards to sense of control measurements (Figure 2), many farmers believe that their decisions and life are controlled by environmental factors such as weather, market prices or the amount of water being released by the water authority. They do not believe that they can control these events. This is shown by high external locus control values. These events have affected their harvest resulting low harvest (low outcomes). Their ability to overcome constraints was low. The farmers rarely mentioned choice, hence the lack of coded results showing high or low levels of choice.

The measurements for self-efficacy are shown in Figure 3. Though many farmers lost their harvest due to external factors in some seasons, most of them had a strong commitment to work harder in the following season and had a strong belief that the new season would be better. Their self-confidence reported mixed responses. As a community they helped each other hence they reported high values for their ability to

organise and take actions. However, when they needed help from outside organisations to find solutions to their problems, for example when dealing with damage caused by elephants or gaining access to water for a longer period, they were not very successful in exercising influence.

Current competency measurements are shown in Figure 4. With regards to decision making, they responded with equal low and high values. When farmers had to do decide which crop to grow, most farmers responded positively. When there was a new disease or a pest, most farmers were unable to decide what to do next. They often depended on the agriculture officer and the shop owners who sold them chemicals to control the problem. This uncertainty was reflected in the low values in their ability and problem solving.

One of the major goals for the farmers in their life is to achive a good income at the end of their crop season. This is reflected in a high value for meaningful goals in figure 5. Despite the hardships they go through each season, they were still committed and had the self belief that the next season would be better. However their ability to recover from failures and overcome constraints were very low. As shown in Figure 2, though they had high expectations at the beginning of a season with meaningful goals, their outcome at the end of the season seemed to be low.
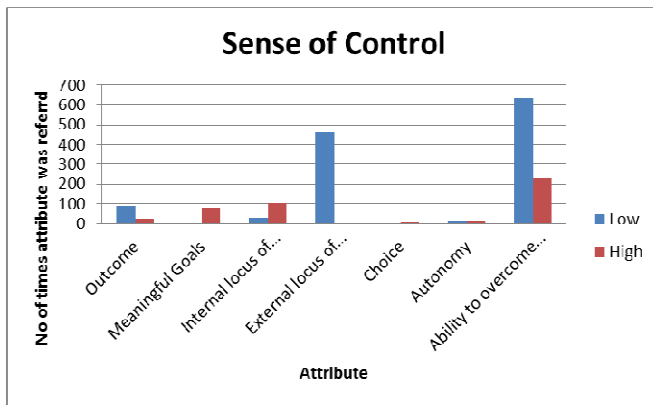
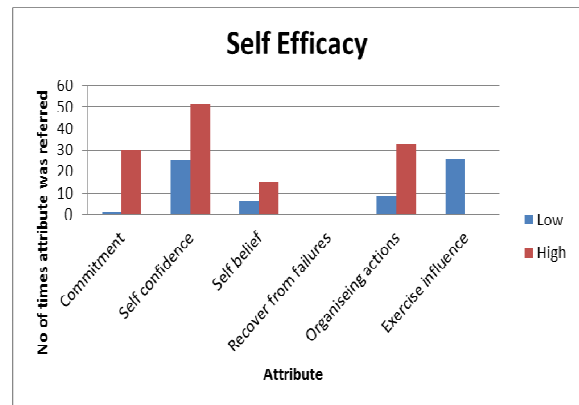

Figure 2. Sense of Control Measurement

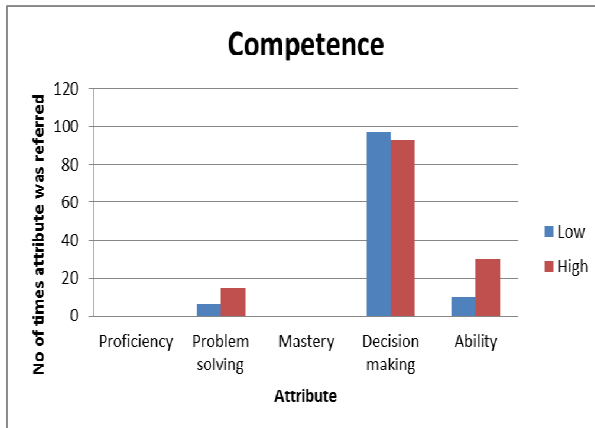**Figure 3. Self Efficacy Measurement**

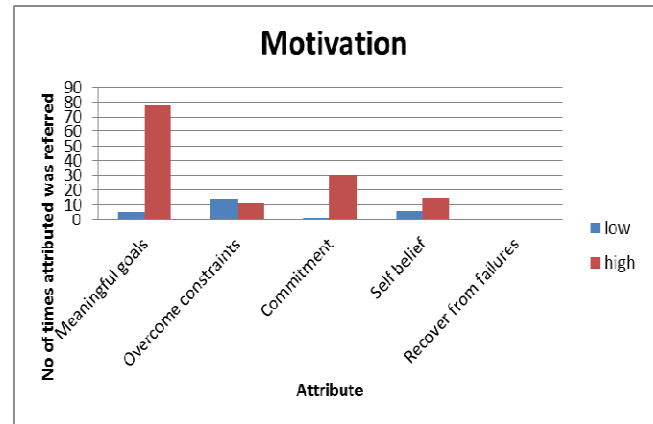
Figure 4. Competence Measurement

Figure 5. Motivation Measurement

As shown in Figure 6, farmers recorded equally high and low responses for crop knowledge. Because of their years of experience in farming, they had a good knowledge of their crops. As shown in figure 7, they had low levels of knowledge on pests, diseases, disease control and pest control. They did not have a good market knowledge and were often worried about the fluctuating selling prices at the end of the seasons. Their reponses for IT and financial knowledge was very low.

Figure 8 shows the current empowerment level of individual farmers. This value was computed by adding the measurements for sense of control, self-efficacy, competence and motivation. Average empowerment

level of the sample was −4.26. Sixty four percent of the farmers had an empowerment level below the average and 74% of the farmers had an empowerment level below zero.

Figure 9 shows the detailed values of empowerment for three farmers: a more empowered farmer with a value of 60 (FID 24), a farmer with an average value of -5 (FID 15) and a farmer with the lowest value of -37 (FID 41). The farmer with FID 24 with the highest empowerment level, has above avearge values for empowerment components: sense of control =31, (sample average = -8.16), self efficacy=10 (sample average =1.24), competence = 4 (sample average =.5) and motivation = 15 (sample average = 2.16). . This is a young farmer (age group 31-40) who has a farming experience of only five years and is still gaining the knowlegde on farming. Farmer with FID 15 has an average empowerment value of -5, with sense of control =10, self efficacy = 2, motivation = 3 and zero competence. Farmer with FID41 has the lowest empowerment value of -37 in the sample. His sense of control, self efficay, competenc and motivation values are -29, -8, 1 and -1 respectively. Understanding these values for individual components of current empowerment of the farmers who has highest, average and low values are important for us as the next step of our research is to investigate the impact of the empowerment processes of the Mobile Based Information System would have on these empowerment outcome values.
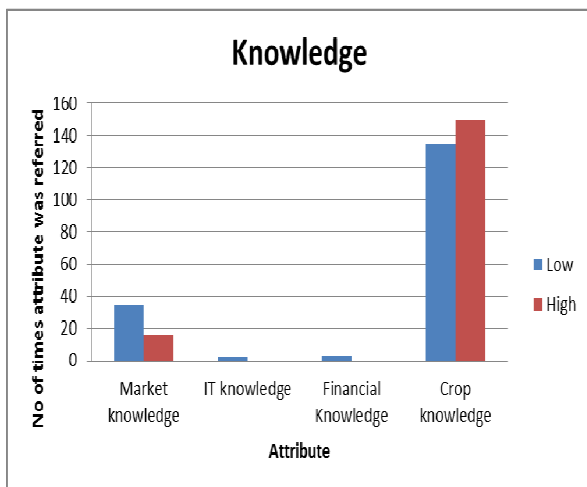

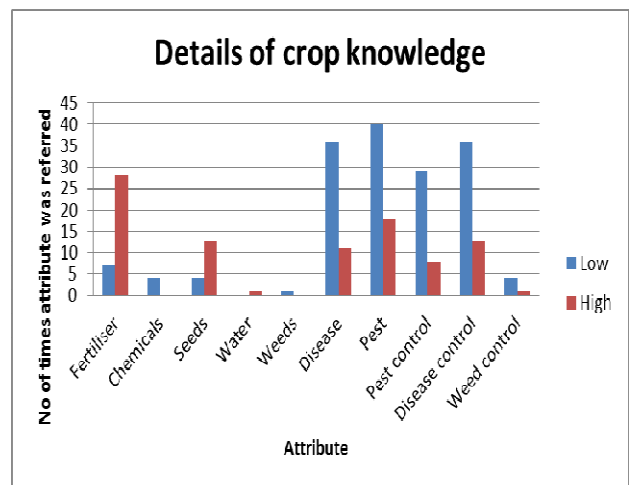**Figure 6. Knowledge Measurement**
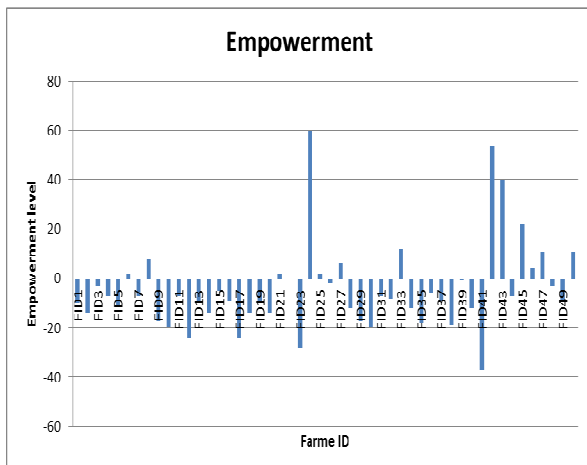

Figure 7. Details of crop knowledge

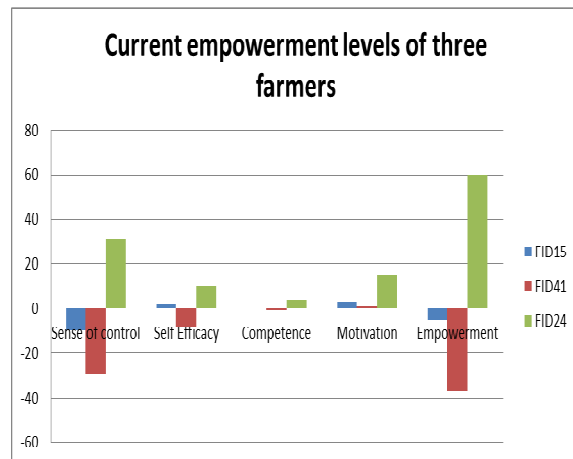**Figure 8. Current Empowerment Measurement**

Figure 9. Highest, average and lowest empowerment levels

Conclusion and Next Steps

Empowerment theory suggests that empowerment processes must be identified clearly and outcomes should be measured to establish the impact of the intervention. Measuring empowerment is a complex process as it depends on a country, population, problem domain and the level at empowerment is analysed: individual, organisation and community. In this research a person's level of empowerment is defined as combination of their sense of control, self-efficacy, motivation and competence. As farmers do not use these terms in their everyday speech, we have used their responses to farming related activities to capture these underlying attitudes and feelings. Based on that concept, we designed a model to measure empowerment outcomes and used it to establish the current empowerment levels of Sri Lankan farmers.

The results revealed that the majority of farmers are subjected to high levels of external locus of control resulting in low values for sense of control. They believe that their decisions and life are controlled by environmental factors which they cannot influence or change. The majority of the farmers commented on their inability to influence the government authority to support them in situations such as damage and threat to their lives by the elephants and the amount of water that they need for their farming. Though they face difficult situations in every farming season, they still believed that the following season would be a better one. That strong belief helped them to continue with farming despite hardships. They were able to organise activities to help each other as a community. Overall these factors produced an average level of self-efficacy. Most of the farmers had good knowledge about crops, diseases, pests, and disease control and pest control methods. They were able to make decisions about their farming in most cases. However when there was a new disease or a pest, they did not have correct information to handle the situation. They had to depend on other sources to receive information and make decisions to control such situations. Often there was a delay in receiving this information and advice hence making the situation even worse. This was reflected in our analysis as a lack of competence and ability in solving new problems. Some farmers reported that it was difficult for them to find required information when they wanted to grow something new indicating lack of knowledge.

We have used a content analysis approach using empowerment themes to measure levels of empowerment. The method used does not take into account that some categories or attributes may have more weight or importance than others. It is also likely that there are relationships and themes between different concepts that we need to further investigate and incorporate in the calculation of empowerment outcomes. The detailed analysis of the farmer interview data helped us to understand the current empowerment levels of the farmers and design processes in the Mobile Based Information System to enhance the current levels of empowerment. Our next step is to deploy the MBIS being designed to address their empowerment needs and measure if empowerment levels change.

References

Agriculture 2015. "Department of Agriculture: Sri Lanka," http://www.agridept.gov.lk/.

Alsop, R., and Heinsohn, N. 2005. "Measuring Empowerment in Practice: Structuring Analysis and Framing Indicators," World Bank, p. 47.

Austin, J. T., and Vancouver, J. B. 1996. "Goal constructs in psychology: Structure, process and content," *Psychological Bulletin* (120:3), pp 338-375.

Bandura, A. 1982. "Self Efficacy Mechanism in Human Agency," *American Psychologist* (37:2), pp 122-147.

Bandura, A. 1994. "Self-Efficacy," *Encyclopedia of human behaviour* (4), pp 71-81.

Bandura, A. 1995. "Exercise of personal and collective efficacy in changing societies," in *Self-Efficacy in Changing Societies,* A. Bandura (ed.), Cambridge University Press: New York NY, pp. 1-45.

Bandura, A. 1997. "Self-efficacy: Toward a Unifying Theory of Behavioral Change " *Psychological Review* (84:2), pp 191-215.

Bandura, A. 2002. "Social cognitive theory in cultural context," *Applied Psychology: An International Review* (51), pp 269-290.

Bandura, A., and Locke, E. A. 2003. "Negative Self-Efficacy and goal effects revisited," *Journal of Applied Psycology* (88), pp 87-99.

De Silva, H., Ratnadiwakara, D. 2010. "ICT Policy for Agriculture Based on a Transaction Cost Approach: Some Lessons from Sri Lanka," *International Journal of ICT Research and Development in Africa (IJICTRDA)* (1:1), p 14.

De Silva, L. N. C., Goonethilaka, J., Wikramanayake, G. N., and Ginige, A. 2013. "Farmer Response towards the Initial Agriculture Information Dissemination Mobile Prototype," in *1st International Workshop on Agricultural and Environmental Information and Decision Support Systems -AEIDSS 2013*: Ho Chi Minh City, Vietnam.

De Silva, L. N. C., J.S., G., Wikramanayake, G. N., and Ginige, A. 2012. "Towards using ICT to Enhance Flow of Information to aid Farmer Sustainability in Sri Lanka," in *23rd Australasian Conference on Information Systems* Geelong, Victoria, Australia, p. 10.

Deci, E. L., and Ryan, R. M. 2000. "The "what" and "why" of goal pursuits: Human needs and the self-determination of behaviour," *Journal of Psychological Inquiry* (11), pp 227-268.

Dodd, P., and Gutierrez, L. 1990, p. 64. "Preparing students for the future: A power perspective on community practice," *Administration in Social Work* (14:2), pp 63-78.

Emmons, R. A. 2003. "Personal goals, life meaning and virtue: Weespings of a positive life," in *Flourishing: Positive psychology and the life well-lived,* C. L. M. Keyes and J. Haidt (eds.), American Psychological Association: Washington, DC, US, pp. 105-128.

Gecas, V. 1989. "The Social Psychology of Self-Efficacy," *Annual Review of Sociology* (15), pp 291-316.

Ginige, A., Ginige, T., and Richards, D. 2012a. "Architecture for Social Life Network to Empower People at the Middle of the Pyramid," in *UNISCON 2012 – 4th International United Information Systems Conference*, Springer: Yalta, Ukraine.

Ginige, T., and Richards, D. 2012b. "A Model for Enhancing Empowerment in Farmers using Mobile Based Information System," in *23rd Australasian Conference on Information Systems*: Geelong, Victoria, Australia, p. 10.

Ginige, T., and Richards, D. 2013. "Design and Evaluation of a Mobile-Based Cultivation Planning Application for empowering Sri Lankan farmers," in *24th Australasian Conference on Information Systems*: Melbourne, Australia.

Giovanni, P. D., Romano, M., Sebillo, M., Tortora, J., Vitiello, G., De Silva, L. N. C., Goonethilaka, J., Wikramanayake, G. N., Ginige, T., and Ginige , A. 2012a. "Building Social Life Networks through Mobile Interfaces– the Case Study of Sri Lanka Farmers " in *IX Conference of the Italian Chapter of AIS (ITAIS 2012)*: Rome, Italy.

Giovanni, P. D., Romano, M., Sebillo, M., Tortora, J., Vitiello, G., De Silva, L. N. C., Goonethilaka, J., Wikramanayake, G. N., Ginige, T., and Ginige , A. 2012b. "User Centered Scenario based Approach for Developing Mobile Interfaces for Social Life Networks," in *34th International Conference on Software Engineering (ICSE 2012) - UsARE Workshops*: Zurich, Switzerland.

Hall, R. H. 1986. *Dimensions of work*, (Sage: London, England.

Hettiarachchi, S. 2011. "Leeks Cultivators Desperate as Price Drops to Record Low."

Karoly, P. 1999. "A goal systems - self-regulatory perspective on personality, psychopathology and change," *Review of General Psychology* (3:4), p 264.

Lawler, E. J. 1992. "Affective attachments to nested groups: A choice-process theory," *American Sociological Review*), pp 327-339.

Lawton, M. P. 1996, p328. "Quality of life and affect in later life," in *Handbook of emotion, adult development, and aging,* C. Magai and S. H. McFadden (eds.), Academic Press: San Diego, CA, US, pp. pp. 327-348.

Lokanathan, S., and Kapugama, N. 2012. "Smallholders and Micro-enterprises in Agriculture," LIRNEasia, Colombo, Sri Lanka.

Masterson, S., and Owen, S. 2006. "Mental health service user's social and individual empowerment: Using theories of power to elucidate farreaching strategies," *Journal of Mental Health* (15:19-34).

Mirowsky, J., and Ross, C. E. 1989. *Social Causes of Psychological Distress*, (Aldine de Gruytar: New York.

Narayan, D. 2002. *Empowerment and Poverty Reduction: A Sourcebook*, (

Pearlin, L. I., Menaghan, E. G., Lieberman, M. A., and Mullan, J. T. 1981. "The Stress Process," *Journal of Health and SodcU Behavior* (22), pp 337-366.

Perkins, D. D., and Zimmerman, M. A. 1995. "Empowerment Thoery, Research and Application," *American Journal of Community Psychology* (23:5), pp 569-579.

Rappaport, J. 1987. "Terms of empowerment/exemplars of prevention:Toward a theory for community psychology," *American Journal of Community Psychology* (15), pp 121–148.

Rottar, J. B. 1966. "Generalized Expectandes for Intamal vs. Extamal Control of Reinforcements," *Psychological Monographs* (80), pp 1-28.

Seeman, M., and Anderson, C. A. 1983. "Alienation and Alcohol: The Role of Work. Mastary, and Community in Drinking Behavior," *Journal of American Sociological Review* (48), pp 60-77.

Speer, P. W., and Hughey, J. 1995. "Community organizing: An ecological route to empowerment and power," *American Journal of Community Psychology* (23), pp 729–748.

Walisadeera, A. I., Wikramanayake, G. N., and Ginige, A. 2013. "An Ontological Approach to Meet Information Needs of Farmers in Sri Lanka," in *International Conference on Computational Science and its Applications*: Ho Chi Minh City, Vietnam.

Wallis, A., Dukay, V., Mellins, C., Kaaya, S., Hollingsworth, H., and Larson, C. 2008. "Power and Empowerment:Fostering effective collobarations in meeting the needs of OVC," Laundy Foundation, Tanzania.

Wheaton, B. 1980. "The Sodogenesls of Psychological Disorder An Attributional Theory," *Journal of Health and Social Behavior* (21), pp 100-124.

Zimmerman, M. A. 1988. "Citizen participation, perceived control and psycological empowerment " *American Journal of Community Psychology* (16:5), pp 725-750.

Zimmerman, M. A. 1995. "Psycological Empowerment: Issues and Illustrations," *American Journal of Community Psychology* (23:5), pp 581-600.

Zimmerman, M. A. 2000, p44. *Empowerment Theory : Psychological, Organisational and Community Levels of Analysis*, (Kluwer Academic/Plenum Publishers New York