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Patricia Mcmanus
Edith Cowan University

Craig Standing
Edith Cowan University

Raffaelli Zanoli

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A PRELIMINARY LADDERING ANALYSIS ON MOBILE SERVICES

McManus, Patricia, Edith Cowan University 270 Joondalup Drive, Joondalup, WA 6027, Australia, p.mcmanus@uws.edu.au

Standing, Craig, Edith Cowan University 270 Joondalup Drive, Joondalup, WA 6027, Australia, c.standing@ecu.edu.au

Zanoli, Raffaeli, Universitá Politecnica delle Marche, Vie Brecce Bianche, Ancona, Italy 60131, zanoli@agrecon.univpm.it

Abstract

This paper proposes the use of laddering technique to determine the decision making process to adoption. Means end theory reveals the human values that are fulfilled for the individual by using various m-technology and services. Preliminary findings of a bigger study are presented. IT shows that mobile technology and services often fulfil such basic needs as self-esteem, achievement, individuality, belonging and well-being. Exploring the realization of values as a theoretical framework offers researchers a way forward in environments characterised by individual technology decisions.

Keywords: Technology Adoption, Means-End Analysis, Mobile Communication, Mobility

1. Introduction

Mobile phones are one of the fastest adopted technologies in history. In 2002 the number of mobile phones worldwide surpassed the number of landlines, with 4 billion mobile phones forecasted for 2010 (Nystedt, 2006; Srivastava, 2005)

The mobile phenomenon goes beyond its unprecedented speed of adoption. Many factors that have contributed to this adoption include the technology's ability to be used at any time in any place, its simple operation and compatibility and the fact that it connects to any phone system (Rogers, 2003). Also, mobile technology is continuously being upgraded and reinvented (Anckar, 2002; Rogers, 2003). Mobile phones have evolved from being a tool for business people always on the move to becoming an integral part of people's personal communication. Mobile devices and services keep continuously presenting new features and application that are leaving its core function behind. Mobile phones importance is such that there are. Sociological studies turn to mobile phone as an integral tool to understand social behaviour in the 21st century (Srivastava, 2005).

The aim of this paper is to present the preliminary findings of a study of m-technology and services adoption and usage. Using means end chain and laddering framework and methodology. It will begin by explaining the growth and significance of mobile-communication. It will then assess the applicability of means ends chain for researching m-technology and services adoption and use. The paper explains the benefits of using laddering to identify the reasons underpinning different consumer value choice perceptions. Finally, the significance of values to explain the decision making process with be discussed.

2. Theoretical Framework for examining Mobile adoption and Use

Many scholars and industry professionals are attempting to understand what influence individuals' to adopt and use mobile services. A number of theories have been used to study consumers' decision making process and to determine the "how" and "why" of adoption of technologies. People adoption of new technologies depends on several of factors, for example, how useful they perceive the technology to be, the product availability and price, how user friendly it is, social-economical motivation (benefits), culture, demographics and psychographics, and past experience.

A number of theories relating to the adoption of new technologies by consumers exist in the literature:

Some authors such as Barnes and Huff (2003) have used Roger's (1962, 2003) innovation and diffusion theory to examine the diffusion of Internet access via mobile phones (iMode). Roger's developed a number of characteristics that explain innovation diffusion: 1) Relative advantage: The degree to which the technology provides an advantage over other methods, 2) Compatibility: The degree to which the technology is compatible with how people work or behave, 3) Complexity: Whether people perceive the technology as easy to understand and use, 4) Trialability: The degree to which a technology can be trialled before being adopted, 5) Observability: The level of visibility of the product to the other members of the adopter's social group.

Studies related to advertising and marketing are closely associated with consumer attitudes and built around the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975)and its applications to IT settings. The theory provides a framework to understand why people behave as they do when they are making decisions. TRA proposes that the use of technology can be predicted by a person's behavioural intention and that this is determined by a person's attitude towards using the technology. A person's attitude is shaped by their positive or negative feelings towards performing a specific behaviour (or using a technology) and whether people who are important to that person, typically in the workplace, think that the person should or should not perform the behaviour.

Using a form of TRA (Tsang, Ho, & Liang, 2004) examine the link between attitude, intention and behaviour in relation to m-marketing. In their model entertainment, informativeness, irritation and credibility are seen to shape attitudes in addition to permission which has a major impact. The availability of incentives, such as free calls, impacts on intention to receive m-marketing for certain attitudes. Intention is directly related to behaviour in relation to m-marketing. Their study findings indicate that consumers have a negative attitude towards mobile advertising unless they have consented to it. All four attributes of mobile advertising impact significantly on attitude towards mobile advertising. Attitude was significantly correlated to intention with incentives also positively impacting on intention. There is a strong correlation between intention and behaviour. This study was conducted in Taiwan with a large percentage of respondents regularly using SMS, although it is unclear from the results presented the extent to which respondents had received mobile advertising.

The Technology Acceptance Model (TAM)(Davis, 1989) is tailored to information systems contexts and is designed to predict IT acceptance and usage in the workplace. It focuses on perceived usefulness of the technology and perceived ease of use. The consumer behaviour literature shows that utilitarian, in the sense of instrumental value, or hedonic benefits determine the intention to consume. In some m-commerce studies hedonistic factors including entertainment value have been considered as significant (Bauer, Barnes, Reichardt, & Newman, 2005; Bouwman, Carlsson, Pirkko, & Francisco, 2008)

As there are a number of adoption models available to researchers, (Venkatesh, Morris, & Davis, 2003)synthesized the main models in order to provide a unified view of user acceptance. The unified model identifies determinants and moderators related to intention and suggest intention is a predictor of use behaviour. Four factors impact on intention and usage: performance expectancy, effort expectancy, social influence and facilitating conditions. The key moderators are gender, age, experience and voluntariness of use. Interestingly, attitude was considered to be in overlap with performance and effort expectancies. The non-significance of attitude in the presence of these two other constructs has been supported in a number of other studies (Standing , Benson, & Karjaluoto, 2005). The unified model was found in empirical studies to be a substantial improvement on any of the other earlier models. Work on technology acceptance is still evolving with for example studies that integrate user satisfaction constructs with technology acceptance constructs (Venkatesh & Brown, 2001)

Standing, Benson and Karjaluoto (2005) used a version of the Unified Theory to determine significant factors in the decision to participate in m-marketing schemes and found that granting permission, financial savings and highly relevant information were significant factors in the decision to participate but the time and effort involved in processing m-marketing messages were not considered important.

Consumer adoption related factors can be summarized as including the consumer's general attitude toward the technology, level of involvement, innovativeness, response to stimuli, trust and perceptions of utility, choice, control and risk. Demographic factors (age, gender, income, education) have also been found to be important control variables to consider when looking at consumer acceptance of m-services (Barnes & Scornavacca Jr., 2003; Bauer et al., 2005; Davis, 1989; Gebauer, Tang, & Baimai, 2008; Jonathan, 2008; Se-Joon, James, Jae-Yun, & Kar-Yan, 2008)

Although it is widely recognized that younger consumers have embraced mobile technology it is being increasingly recognized that factors beyond age or gender may be important. It can be argued that segmenting people on the basis of their acceptance and use of technology as well as their lifestyle motivations is more representative of their actual behaviour (Sultan & Rohm, 2005). One study by Forrester Research (Forrester, 2001) looked at factors such as technology attitude, income, career, family and entertainment. One older group identified in the study characterized by high income, interests in

entertainment and a positive attitude toward technology may be high mobile device users. Cultural factors can also impact the type and nature of service used. For example, in high power distance cultures such as Korea, text messaging to supervisors would be seen as a serious offence (Sarker & Wells, 2003).

Consumers' adoption of new technologies/services depends on a number of factors, for example, the type of service to be offered, how comfortable people feel using the technology, how user friendly the service interface is, socio-economic factors, motivations (benefits), culture, demographics and psychographics, time that the customer expects to use the service and past experience (Daghfous, Petrof, & Pons, 1999; Sultan & Henrichs, 2000). Sarker and Wells (2003) provide a framework for understanding the adoption and use of mobile devices that includes most of these factors. Their model considers not only the decision made in the initial adoption but also how users appropriate the technology and services through exploration and experimentation. They argue that users assess their experiences on at three dimensions: functional (e.g. time savings), psychosocial (e.g. safety, elevated self-worth, sense of freedom) and relational (building relationships). We argue that the benefits are consequences of using the technology but the real psychosocial implications are the drivers – in other words all three are not on the same lane but part of a hierarchy.

3. Means-End Chains

The means-end chain concept concentrates on the relationship between product/service attributes, consequences and values (Gutman, 1982; Judica & Perkins, 1992; Leao & Mello, 2001, 2002; Reynolds & Gutman, 1988; Woodruff & Gardial, 1996). Attributes relate to product characteristics. Consequences are defined as the physiological or psychological results acquired directly or indirectly by the consumer from his/her behaviour (product or service use). This model represents how the consumption of a product enables the individual's realization of his/hers ends desires. The central aspect of this theory is that "…consumers choose actions that produce desired consequences and minimize undesirable consequences"(Reynolds & Gutman, 1988).

It is implicit to the means end chain model different levels of abstraction to demonstrate their depth, the levels of abstraction are a way to identify different subcategories of attributes, consequences and values (Gutman & Reynolds, 1979). Attributes are described to be the physical aspects of the product or its abstract properties. For example mobile phone size is a physical, tangible attribute. However more subjective properties like cute or flash are abstract attributes(Fouskas, Pateli, Spinellis, & Virola, 2002; Reynolds & Gutman, 2001). For consequences the levels of abstraction are functional and psychological. Functional consequences relate to direct results of using the product. For example SMS saves money. Psychological consequences are those instrumental to the achievement of psychosocial results.(Reynolds & Gutman, 2001) For example make an impression, have fun, feel powerful etc. Finally Values, they represent end states of existence. The value construct in this model is drawn from the concept used in psychology and sociology and relates to Rokeach, (1973) classification of human values. (Rokeach, 1973) identified two types of values: instrumental and terminal. Instrumental values relate to those values that act like tools in achieving end-state behaviours (values like courage, honesty, ethics, etc.). Terminal values, also used by (Gutman, 1982) refer to "Preferred end-states of existence" (Gutman, 1982 p 61) for example: accomplishment, happiness and satisfaction. Gutman's, (1982) model (1982) has two basic underlying assumptions: 1) Values are connected to consequences as long as the consequences have positive or negative connotations and 2) Consequences have a direct relationship with product attributes as long as, consumers obtain the product which may cause the desired benefits. It is not uncommon for researchers to have some level of difficulty distinguishing between psychological consequences and instrumental values.

4. Methodology

The laddering technique is the method used to reveal the means-end hierarchy (Leao & Mello, 2002; T. J.; Reynolds & J. Gutman, 1988; (Zanoli & Naspetti, 2002). The term ladder refers to the relationship between attributes, consequences and values. It is a representation of the connection between the actual product and the consumer's cognitive process that leads to a direct and useful understanding of his/hers perceptual orientation in relation to the product or service. The laddering technique is an in-depth individual interview seeking the understanding of consumers' decisions. It translates product attributes into associations relevant to consumer's "self". (T. Reynolds & J. Gutman, 1988)

The data analysis using laddering has four steps. The first one is to specify the elements of the means end chain (MEC) by separating into chunks of meaning. Then a content analysis of the interviews and coding is done in order to combine and generalise the meaning across subjects. The third step is development of the implication matrix by quantifying the relations between the content codes. Finally the there is the creation of hierarchical value map to illustrate the connections between the different levels of abstraction (Gengler & Reynolds, 1995)

For this research 60 people were interviewed but only 57 used. Due to the exploratory aspect of the research the only factor that was fundamental in terms of sampling was that the subject used a mobile phone. Gender distribution was random but the total sample has resulted in 23 males and 34 females. We used a convenience sample and ages varying from 16 to 59. During the analysis the respondents were divided for demographic purpose in gender and age group. The age groups identified were: 16-25; 26-40; 41-54 and over 55. Although due paper size constrains, in this paper we will only discuss the findings in the general hierarchical value map (HMV) and a gender segmented map. The results of the HMV segmented by age will be presented in further publications.

The study aimed at identifying the underlying reasons for mobile phone usage. The laddering interview began with a question to allow respondents to elicit the distinctions they perceive as different features/ services offered on their mobile phones. One of the most used question to elicit distinction was "Why did you get a mobile phone". This has elicited direct services associate with the mobile phones as well as extended services. The interviewees did not seem capable to differentiate between "core" and extended product. Neither the literature seems to be looking at this particularity. What is a core service and what is an embedded object. However this does not seem to impact and in the end the most relevant attributes were voice and text

For this research the software Mecanalyst, (specifically for Laddering) was used. The software was particularly useful in the generation of the implication matrixes and the HMVs. Macanalyst is commercial software. There is an open source laddering software called LadderMAP developed by Chuck Gengler. However this software is MS DOS based and there is very little or inexistent technical support. Mecanalyst was designed by two Italian professors and is commercialise by an Italian SME called Skymax-dg. This software is windows based and is quite useful in the way it generates the tables and the maps. However the first step is the content analysis is still a manual effort. The second step in the data input is the grouping of the many different terms used by respondents to refer to the different levels of abstraction, where Mecanalyst was quite useful. It also generates a final list of codes. This research had 45 terms (code and synonyms) distributed in the following way: 07 concrete attributes, 03 abstract attributes, 13 functional consequences, 15 psychological consequences, 03 instrumental values and 02 terminal values. The codes table used in this study are depicted on table 1. As explained before the table is the starting point of the ladder, it is the probing method to distinguish differences between products in this case, mobile phone characteristics.

5. Findings

The attributes identified here refer mostly to handset features instead of services offered by carriers for example news alerts. This indicates that those services are not yet a major determinant to the use of mobile services. Reinforcing that voice and text are what consumers are really interested in. Three abstract attributes were identified then asynchronous nature of text message, MMS and the alternative of consumer having only one device to take pictures.

Code	Type	Freq F	Freq M	F %	M %
1. Camera	Ac	10	9	29%	39%
2. Design/Looks	Ac	6	8	18%	35%
3. Internet	Ac	3	5	9%	22%
4. PDA (organiser)	Ac	5	6	15%	26%
5. Ringtone MP3	Ac	3	3	9%	13%
6. SMS	Ac	28	16	82%	70%
7. Voice calls	Ac	25	20	74%	87%
8. Asynchronous communication	Aa	8	2	24%	9%
9. Get a camera	Aa	2	2	6%	9%
10. Picture Message	Aa	1	3	3%	13%
11. Capture memories	Cf	6	1	18%	4%
12. Convenient	Cf	28	19	82%	83%
13. Easy to carry around	Cf	3	3	9%	13%
14. Effective cost savings	Cf	11	6	32%	26%
15. Express myself	Cf	4	1	12%	4%
16. Feels Impersonal	Cf	6	2	18%	9%
17. Get Organise	Cf	6	13	18%	57%
18. Get things done quicker	Cf	18	2	53%	9%
19. Healthier	Cf	1	3	3%	13%
20. It is more personal	Cf	8	6	24%	26%
21. Keep in contact	Cf	10	8	29%	35%
22. Keep informed	Cf	3	7	9%	30%
23. Record / Proof	Cf	4	4	12%	17%
24. Unique	Cf	1	3	3%	13%
25. Acceptance	Cp	6	2	18%	9%
26. Always available	Cp	1	4	3%	17%
27. Bonding	Cp	3	2	9%	9%
28. Considerate of others	Cp	13	7	38%	30%
29. Control	Cp	13	8	38%	35%
30. Convey emotion	Cp	7	4	21%	17%
31. Entertainment	Cp	8	6	24%	26%
32. Feel good	Cp	14	12	41%	52%
33. Freedom	Cp	2	4	6%	17%
34. Image	Cp	7	11	21%	48%
35. less misunderstanding	Cp	3	3	9%	13%
36. Productivity	Cp	8	9	24%	39%
37. Safety	Cp	10	3	29%	13%
38. Social Interaction	Cp	7	6	21%	26%
39. Successful	Cp	3	8	9%	35%

40. Time consuming	Cp	3	2	9%	9%
41. Achievement	Vi	11	11	32%	48%
42. Independence	Vi	4	4	12%	17%
43. Belonging	Vt	26	12	76%	52%
44. Quality of life	Vt	13	9	38%	39%
45. Self-esteem	Vt	19	12	56%	52%

Table 1. The number of times a particular attribute was mentioned by a subject in total and per gender.

Observing the frequencies on the table above it becomes quite noticeable males' preference for voice calls and females' preference to SMS. However further details and relationship within the ladders is better represented in the hierarchical value map.

The hierarchical value map or HMV enable researchers to have a better understanding of the results from the laddering study without having study each ladder separately (Grunert, Beckmann, & Sorensen, 2001). "HMV is an estimate of cognitive structure for that group" (Grunert et al., 2001). When drawing a HMV a cut off level is determined to generate maps that will include only the most significant links (Grunert et al., 2001). In the HMVs illustrated in this paper the different levels of abstraction have been colour coded for easier identification. Concrete attributes are in orange; abstract attributes are yellow; functional consequences are in green, psychological consequences are in white, instrumental values are represented in salmon and terminal values purple. The arrows indicate the direction and strength of the relationships. **The thicker the arrow the stronger is the connection**.

The strongest relations in the ladder voice call/convenience/ get things done quicker/feel good /self esteem. However there is only a marginal difference to the ladder: SMS/convenience/ get things done quicker/feel good /self esteem Overall the preliminary findings from the general map (cut off 7) seem to confirm what is known about the key services consumers use on their mobile phones. Looking at isolated relationships, besides those already pointed, the other significative relationships are between conveniences and get things done quicker is expected. The relationship between convenience and considerate of others leading has considerable strength and seem to lead to belonging and self esteem.

Figure 2 is the HMV of males (cut off 5) and *figure3* HMV (cut off 6) females. When confronting those two maps interesting results and relations are identified. The male's map has six out of the seven concrete attributes identified indicating a more evenly use of the features and services. This can be related to the fact that most males use of their phones primarily for businesses purpose. In general, whenever talking about their personal usage of their mobiles the cost factor was raised. .Another interesting finding relates to the ladder: design /looks (aA) – image (pC) - self-esteem (tV). Many would expect this chain to be stronger within the female group. However the attribute Design/looks is not represented at all in the female map contrasting with the strong relationship between designs, image and self-esteem ladder on the men's map. Also by contrasting both maps it is noticeable that men have stronger ladders from voice. This indicates that they tend to talk on their mobiles more than women. This is visible but the strong relation voice calls/convenience- leads to achievement; self –esteem and belonging generating 3 ladders of similar strength. . SMS is a strong attribute did not generate any real significant relationship between consequences and values in the males HMV. However the female HMV (cut off 6) has in SMS / convenience/ its strongest relation. The only attributes presented in the female's map are SMS, voice call and camera. Incomplete ladders indicate a very weak relation. This is the case between camera and capture memories. The key ladder in the female map is SMS/convenience/get things done quickly / belonging. However the SMS / convenience relation lead to a series of ladders. This finding seems to contradict some popular belief that man uses more text message than woman.

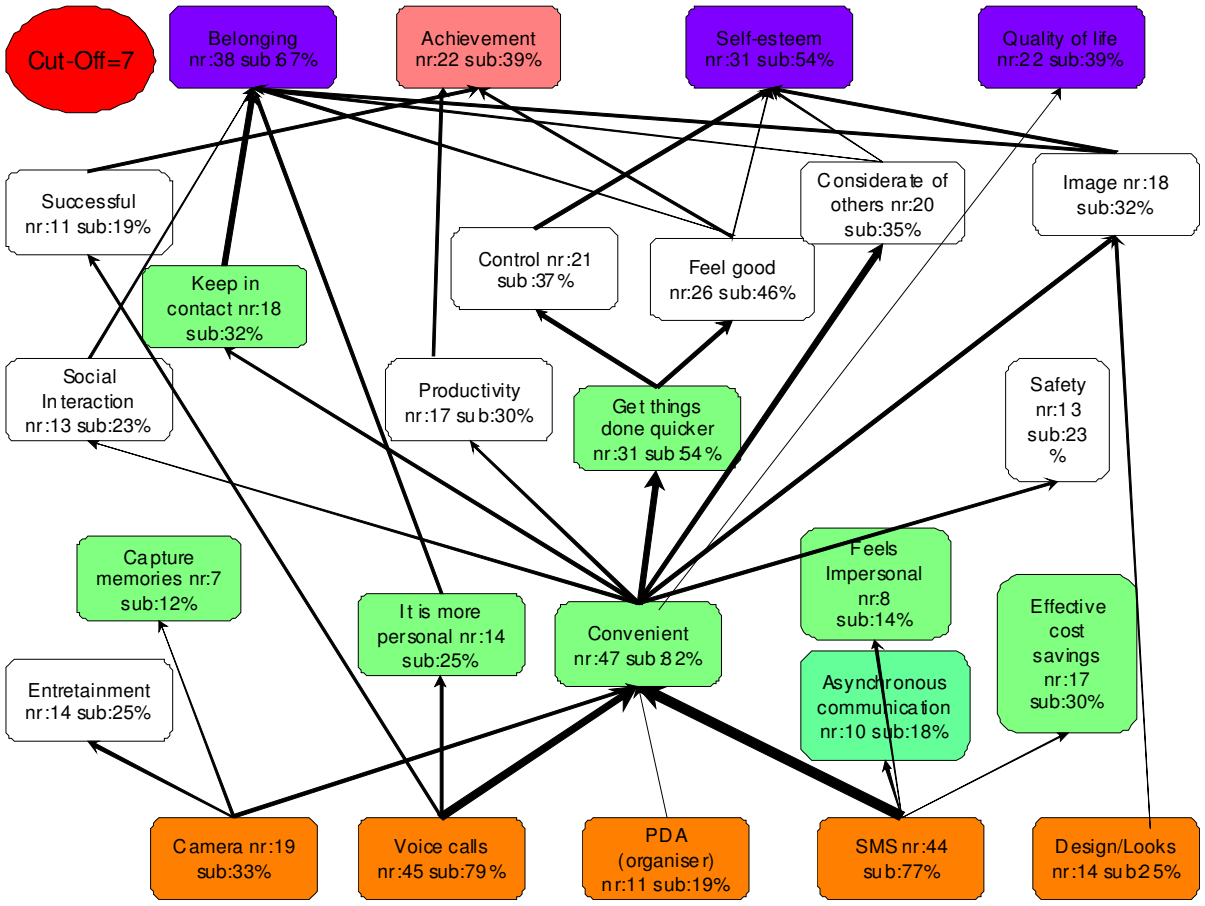

Figure1. *HMV general cut off* 7 . This map was generated with no demographic filter. Concrete attributes are in orange; abstract attributes are yellow; functional consequences are in green, psychological consequences are in white, instrumental values are represented in salmon and terminal values purple. The arrows indicate the direction and strength of the relationships. **The thicker the arrow the stronger is the connection**

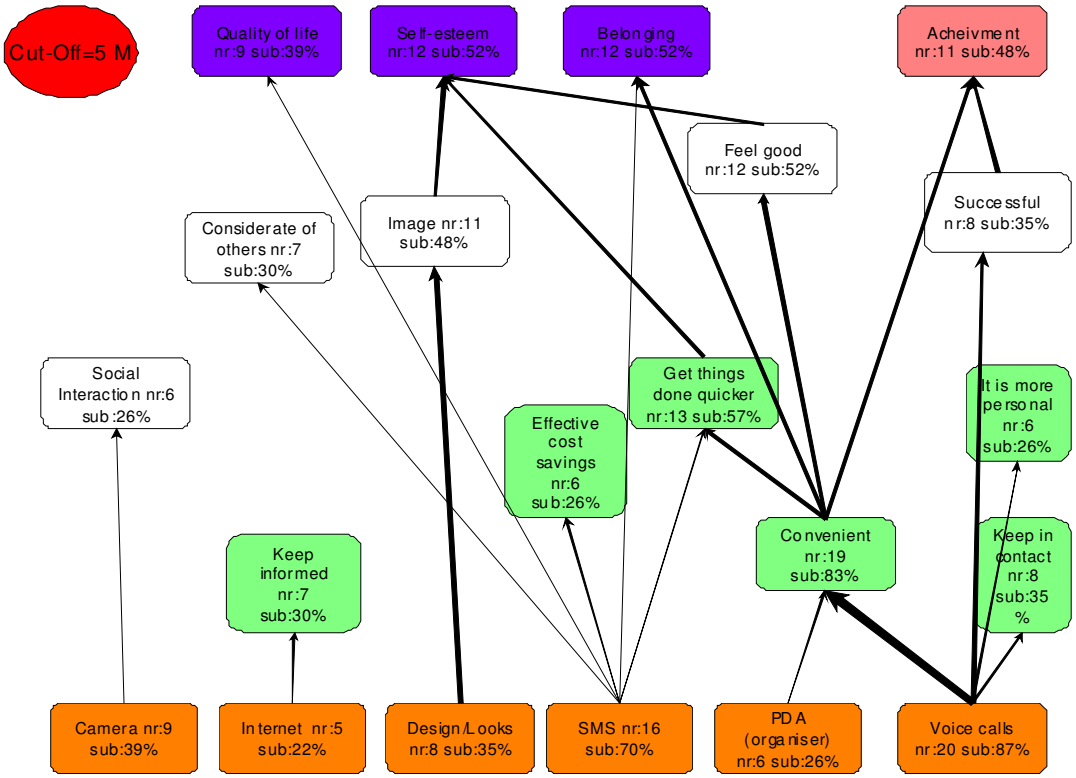

Figure2. HMV cut-off 5 filtering by male gender

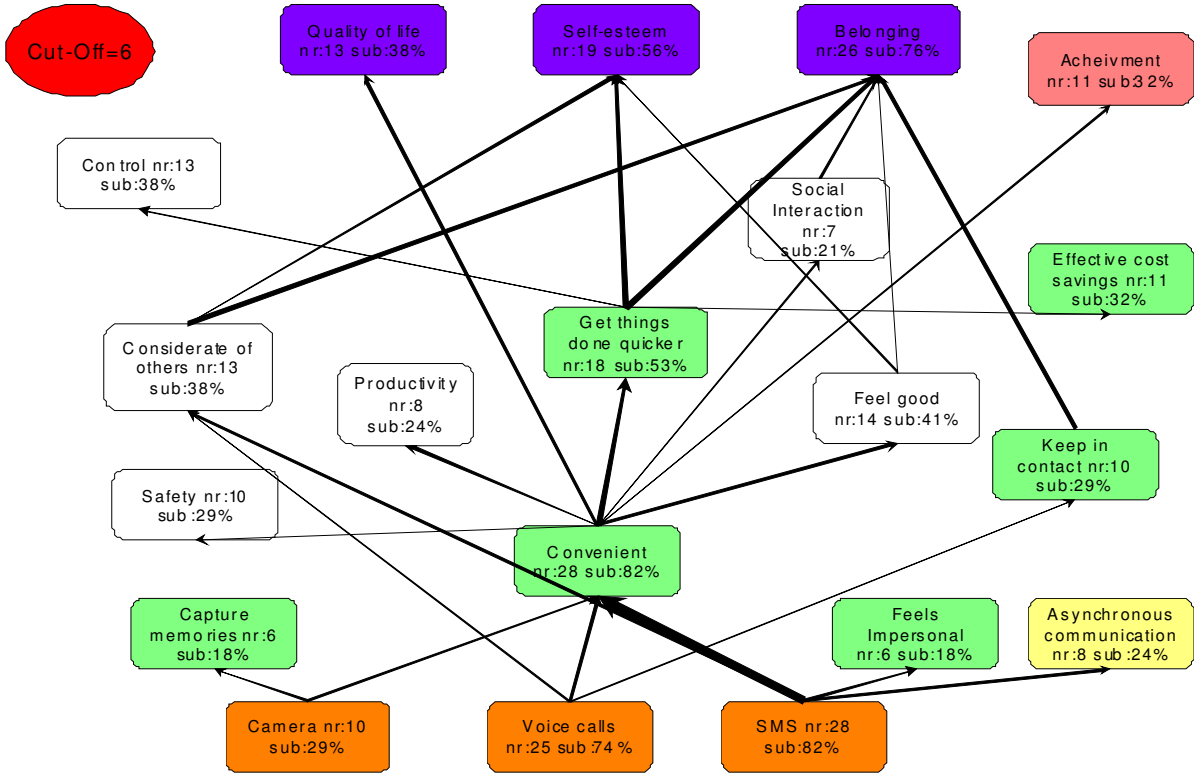

Figure3. HMV cut off 06filtering by female gender

6. Discussion and conclusion

This paper presented a summary of the preliminary findings to study mobile service adoption using means end chain and laddering. Many carriers and content creators are forecasting the change in mobile phone users expanding their services usage beyond calls and text messages. The initial findings of this study do not indicate that the existing scenario will change soon. Voice and text (SMS) are the key attribute consumers used because of its utmost convenience. This finding seems to be supported by the literature. For example (Bouwman et al., 2008) found that the usage patterns in Finland were reasonable stable in terms of preferences. The authors have indentified flexibility as a contributor factor between present and future usage.

The cognitive association maps presented may not be a definitive group for the m-services area. Rather we propose them as an illustration on the value of this approach. Nor are the maps mutually exclusive. Mobile services have a functional value as they are convenient but the decision to adopt may often be combined with the desire to feel part of a group or community of use. Indeed, the erosion of boundaries between work, home, leisure, learning and education, partly brought about by mobile technology, means that people may have multiple reasons for adopting or using services. Mobile technology can serve multiple needs including, family, friends, work and curiosity or learning.

7. Study limitations and further research

The results presented here are preliminary and partial. For a better indication of the patterns of mobile services use additional maps need to be studied. Also due to the qualitative nature of this research the aim only to gain deeper insights and understanding of consumer use of mobile services.

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