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Framework for Systematic and Strategic Planning of Innovation-based Mobile Broadband Services

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Abstract

The underlying paper describes a framework for the systematic and strategic planning of mobile broadband services, providing an industrial application and an impulse for further and future research on adoption and diffusion studies in the field of mobile broadband technology.

Elaborated conditions and characteristics of innovations, keyfindings of basic theoretical approaches on adoption and diffusion studies and the critical review of advanced and recently developed modelling approaches are combined with the special characteristics of the telecommunication industry, to a two-level based framework describing factors of influence on adoption and diffusion of mobile broadband services.

The framework strength is in its detailed state-of-the-art description of current industrial mobile broadband situation and the two-level – micro- and macro-level – approach on adoption and diffusion research. The novelty of the framework is its potential exemplary appliance on Germany, Finland or other countries, extraction of key-patterns in this highly competitive business field, highly consumer-oriented approach and its advanced scopes and recommendations for mobile broadband service development units.

1. Introduction

The paper originates out of a Bachelor Thesis (Bachelor of Science), the keyfindings are elaborated out of an in-depth analysis and description of mobile

telephone and mobile standard evolution with concentration on countries embedded in the European Union and special descriptions of the historical and current market structure evolutions in Finland and Germany. Followed by a critical review and discussion of principal and process descriptions, frameworks and models, and current approaches and evolutions in adoption and diffusion research applied to the mobile technology sector. The synthesis of characteristics of innovations and implications in the adoption and diffusion process and its influencing factors on the mobile broadband market from screened literature lead to a framework enabling strategic planning of mobile broadband services, in a two-level approach. The macro-level describes the social system through attributes, in which the innovative mobile broadband services are introduced. The micro-level describes the perceived factors on an individual level in bundled categories deduced from the previous analysis.

2. Mobile broadband services

Mobile broadband services are part of the mobile telephone evolution and embedded in the mobile standard evolution process, driven by highly sophisticated transmission and mobile technology developments, like the third (3G) or fourth (4G) generation of mobile telecommunication, disruptive technologies like *wireless LAN* or *WiMAX* (Worldwide Interoperability for Microwave Access) [1] or new networking concepts like *pervasive networks*, *mobile mesh network* [2] and *ambient networking* [3]. Stated key-developments push the door open to an innovation-orientated service-dominated phase of mobile telecommunication on the providing side and

result in complex acceptance and usage behaviour of customers.

A sophisticated approach on emerging mobile broadband services is presented by the scholars Varshney/Vetter [4] including a proposed classification of services, whereas there is a need to advance the framework and classification away from a pure commercial alignment to a broader spectrum of services. For the underlying framework mobile broadband services are classified as an unit or a bundle of information systems (IS), describable as a conglomeration of human, machine and methods units, interacting and being connected to execute specific functions [5] and social consumer-orientated systems with an emphasis on business-to-consumer and consumer-to-consumer services, e.g. group-related IS and virtual mobile communities. Mobile broadband IS are communication- and information systems, as information is communicated and computed through various channels and feature highly mobile, real-time and possible location-based information to serve a user unit embedded in its mobile environment.

3. Adoption and diffusion studies

The analysis of existing base and mobile telecommunication amplified adoption and diffusion models base on an innovation-centered driven perspective considering the perception of innovation by Drucker [6] exposing a set of *three* influencing entities: technology, innovation and entrepreneurship; resultant in sources for innovative opportunity.

This given presupposition makes it reasonable to imply theoretical- and practical-elaborated findings of ex-ante or/and ex-post, adoption and diffusion data and model patterns, combined with influential developments of potential innovations of today's telecom sector.

The elaborated framework bases on traditional adoption and diffusion modelling approaches, their analysis and critical review, such as the Innovation Diffusion Theory (IDT) according to Rogers [7] and the Technology-Acceptance Model (TAM) according to Davis [8]. Furthermore two chosen wireless-focused amplification models are presented, discussed and critically reviewed.

The analysis focused on the principles and structure of the Wireless Technology Diffusion Model presented

by Gera/Chen [9], which tends two objectives: to assist the stakeholders in analyzing the "potential success/failure of their new wireless applications or services prior to their launch" and in planning of their "strategies for the entire diffusion process" [9]. The lack of socio-logical focus of the IDT is balanced with the adoption of components of the TAM. The amplified model is a hybrid of constructs and applied on wireless technology services, but it is not focusing on special characteristics of the technology and services itselfes.

The second analysed amplified model is the Trust Enhanced Technology Acceptance Model (TOMI), an amplification of the TAM, focusing on explaining the use of mobile payment solutions, according to the analysis of the scientists Dahlberg, Mallat & Öörni [10] emphasizing on the influencing factor *trust* towards IS service solutions. Point of criticism is the subdivisional view of the model and the emphasis on special personal characteristics which therefore leads to a loss of inherited commonality and integrity of its base model.

4. Framework description

In imitation to the categorisation of adoption and diffusion models by Frank [11] in micro- and macro-level models, the framework tries to counteract the fact of high specialisation (micro-level orientated models) and generalisation (macro-level orientated models) with a two-level approach and a manageable amount of screened attributes. In short, the micro-level discription of perceived attributes control the adoption decision process of individuals or decision-making units, and the macro-level conditions describe the social system adoptional units (in particular innovators, early adopters and early majority) are embedded in.

4.1. Macro-level: social system "attributes"

The macro-level approach on the adoption and diffusion of mobile broadband services tries to define constructs of the social system in deducing factors (introduced as *attributes*) which influence the individual or decision-making units and describe the range of underlying conditions. An individual or decision-making unit is embedded in a social system, which is defined through so-called *dimensions* forming the *environmental space*. In this environmental space adoption decisions are taken and diffusion of mobile

broadband services and other technologies take place, in a dynamic interplay of attributes. In this work four different types of dimensions are identified: the (1) *cultural and demographic*, (2) *technological*, (3) *economical* and (4) *political and jurisdictional* dimension. A dimension is defined through attributes (refer to object-oriented methodology) that describe the character of each dimension and its influence on the environmental space. The attributes can be regarded as external variables that take an indirect effect on embedded technology service solutions, and therefore carry importance on the systematical and strategic introduction of mobile broadband services. It should be noted that dimensions can influence each other; changes of attributes in one dimension can affect the whole system, e.g. jurisdictional decisions can cause changes in the technological dimension.

One assumption [12, 13, 14, 15, 16] of the framework is the growing influence of cultural and demographical-defined dependent and non-dependent attributes: *individualism, collectivism, low-context, high-context* [17], *uncertainty avoidance, power distance, assertiveness* [13]; spanning the cultural and demographical dimension. The technological dimension depicts macro influences on mobile broadband services from a technological background, described through: *degree of interconnectivity* [18] with other parallel or previous emerging technologies, *degree of standardization* [19], *facilitating conditions* [12, 19], *facilitating conditions* [19] in the evolution process of a technology. Following attributes for the economical dimension are derivable from literature: *demand attribute* [19], *cost conditions*, the *competitive rivalry* [19] of mobile application developer, content provider, service provider, handheld developers and manufacturers, network technology developers and operating system developers, *market size*, general *economical situation*, *suitable cooperation possibilities* [18], *transferability conditions* [19] and the *activity of consumers*. The political and jurisdictional dimension describes firstly the influence of political decisions on the implementation rules of mobile technology infrastructure and market regulations with implications for mobile broadband services and secondly judgments from influential jurisdictional units through elaborated attributes: effect of *regulations*, *socio-economical* effects that include consequences on restrictions, *limitation of usage* and *protection of data privacy*.

4.2. Micro-level: perceived attributes of adopter units

The second iteration of the framework is the micro-level [15] describing the direct effect on individual adoption units caused by micro-level dimensions: (1) *innovational*, (2) *technology*, (3) *marketing* and (4) *social*. The innovational dimension carries following influential attributes deduced from characteristics of an invention: *market-pull* or *technology-push* introduction strategies, general degree of *knowledge*, perceived *improvement and novelty* [6], degree of *incongruity* [6] and perceived *diversity*. Technology perceived attributes are the characteristics of an implemented innovative service solution in the actual interaction process of individual adopter units and defined through the following elaborated attributes: *complexity of usage* [6], *relative advantage* compared to parallel introduced service solutions, *security and trust* and *connectivity*. Through the dimension of marketing-related attributes: *pricing, promotion and advertising* and *distribution availability* [20], the future user or current user gets informed by marketing channels about new technological developments in the form of market-introduced services. The framework assumes two main attributes that describe social perceived characteristics of a mobile broadband service solution, servicing two social needs of the user: *socialising* and *entertainment* [12].

An in-detail description of all underlying dimensions (macro- and micro-level) and listed attributes please refer to the underlying thesis, whereas correlations and emerging effects between each dimensional layer are not part of the framework, as a description would flow into a model design.

5. Conclusion

The framework tries to give a new impulse (balanced approach in detail and generality) on adoption and diffusion studies (clearly differentiating between both of them) related to recent evolving technologies, providing a new theoretical approach applicable for industrial units to analyse research, development and managerial processes and actions. Further work aims on the inclusion of practice-oriented information (underlying thesis' questionnaire) to develop a model description (weighted influence of attributes) of the adoption and diffusion process of mobile broadband services.

The macro-level description can be applied on countries, cultural- defined areas and economic regions. (Please refer to underlying thesis) The micro-level application aims on the description of design recommendations and managerial implications to control the attributes that influences and take effect on the adoptal unit; like market- and situational-aligned strategies (including e.g. certain launch waiting period), low degree of complexity implementations (e.g. well-structured menus), focus group adjusted promotion and advertising activities and focused socialising solutions (e.g. focus on group-related location-based services) and combined entertainment perceived use activities.

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