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A structured scenario approach to multi-screen ecosystem forecasting in Korean communications market

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ABSTRACT

Ecosystem forecasting is a challenge for any forecaster since it has a large number of variables, which vary dynamically, tightly coupled with environmental factors under a complex ecosystem architecture. The ecosystem behaves like a complex system as a whole where one variable may serve as a hierarchical pillar to other variables, while others interact with each other in non-linear forms of substitution, complementarity, synergy and externalities. This paper is targeted to develop a profound structured approach to the ecosystem forecasting which combines scenario planning with technological forecasting. Three key planning principles are derived and incorporated into the structured ecosystem forecasting methodology. To demonstrate its effectiveness, the Korean multi-screen service market is analyzed and prospected toward the year 2016. Policy and strategic implications from the structured ecosystem forecasting are also discussed to validate the practicality of the suggested methodology.

1. Introduction

The ICT market is currently undergoing a fundamental structural change. Most intriguing might be 'innovation for intelligence,' which transforms the conventional communications service market into a platform-based smart-phone service market. The rapid and wide spread of mobile smart devices on a global scale not only increases data traffic drastically, but also integrates the PC-based Internet market and even the TV-based home service market into a single ICT ecosystem. One might call this global-scale market transition 'multi-screen service convergence' or simply 'ICT convergence' [1,2].

The impact of the ICT convergence is much greater than imagined. The conventional voice services have already been converted and integrated into a data stream called VoIP (Voice over IP) and mVoIP (mobile voice over IP). Furthermore, many OTT (Over the top) service providers have also started to deliver high-resolution video services over the Internet worldwide. One of the most recent innovations for 'intelligence' might be the cloud service which eliminates the interdependencies between network, service and terminal, allowing any device to access to any service or content via any network [3].

As individual communications, contents and computing service markets are transformed into an integrated ICT convergence market, ICT value chain is experiencing a fundamental structural change. Vertically integrated supply chains connecting a service provider to a specific service, a service to a specific network, a network to a specific terminal are disintegrating and fragmented, forming a new horizontally integrated business ecosystem [4]. This trend is accelerating as more advanced smart devices, next-generation fixed mobile convergence networks, variety of broadband convergence services, and new service providers with different business models enter the market. This definitely gives us a significant opportunity to create a new business and to find a sustaining growth engine in the ICT convergence market. However, it requires at the same time a large-scale investment for network upgrades and platform development in advance, leaving them at the risk of failing to recover the investment.

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With the face of this structural change, policy makers seek to find broader prospects on the behavior of ICT ecosystem in response to political and economic conditions of the national economy. Also, they want to know how regulatory policies like market definition, deregulation, network neutrality and market promotions will affect the ICT ecosystem given the political and economic conditions. Meanwhile, service providers are rather more interested in the responsiveness of the market itself to those policy variables as well as the environmental conditions. Their interests are more focused on how the market competition will shape the future ICT market structure, what kind of opportunities are available to expand their market share and to enhance profitability, what risks are to take when they pursue those opportunities, and finally how much network capacity is required to satisfy the market demand.

Unfortunately, however, these kinds of market dynamics seem to be very hard to foresee because of the intrinsic complexity embedded in this multi-screen convergence service ecosystem. This is often the case that any forecast for an individual service has limited merit unless its interactions with other complementary or competing services are precisely specified. The interests of policy makers and service providers lie not only in getting some quantitative forecasts but also in understanding underlying dynamics of ICT ecosystem behaviors responding to environmental changes. This is particularly true when the ecosystem behaves as a complex system, consistently interacting with surrounding environments, so that ecosystem status itself is quite unstable.

The purpose of this paper is to set up a profound ecosystem forecasting procedure which is comprised of a structured scenario planning and a structured quantitative forecasting and to demonstrate its applicability to a real-world ecosystem forecasting problem. Following this introductory section, Section 2 reviews the most recent research on scenario planning and selected relevant studies. Section 3 derives three key principles which serve as profound guidelines for the subsequent structured scenario planning and the structured ecosystem forecasting and develops four key evolution scenarios. Given the scenarios, Section 4 formulates the ICT ecosystem forecasting problem with eight different networks with seven different terminal devices. Section 5 performs a Korean case study with quantitative ICT ecosystem forecasting for the year 2016, based on the real data collected for the period from 2004 to 2011. The sensitivity of the forecasts to those four scenarios is analyzed and the policy and strategic implications are discussed. Finally, Section 6 concludes this paper and discusses future research directions.

2. Review of relevant literature

As growing attention has been paid to evolutionary dynamics of large-scale socio-economic systems [5–8], much research has been reported on the scenario method as an effective tool to gain foresights for an unpredictable future [9–14]. Among large number of issues which have been dealt with in the abundant scenario planning literature, three categories of issues are apparently relevant to ecosystem forecasting. They are the scenario planning method which is most suitable for the ecosystem forecasting, the effective combining of scenario planning with the quantitative ecosystem forecasting, and lastly the need for and the usefulness of a structured approach based on the structuration theory [15] and the complexity theory [16].

There are many different views and dimensions to apply when you try to categorize the scenario planning methods and processes. The most essential one might be your perspective on the nature of uncertainty. “Scenario does not predict the future, but it explores multiple plausible future situations with the purpose of extending the sphere of thinking. Therefore, scenario planning is not forecasting of the most probable future but it creates a set of the plausible futures” [14]. The “intuitive logics” approach, which is the most representative scenario development methodology, tries to develop flexible and internally consistent scenarios, unfolding the causal relationships among the economic, political, technological, social, resource and environmental factors [17,18].

The most typical scenario planning process, as suggested by Konno et al. [19], is the eight-step consecutive process, which is composed of ‘focal issue,’ ‘key factors,’ ‘environmental forces,’ ‘critical uncertainties,’ ‘scenario logics,’ ‘scenarios,’ ‘implications and options,’ and ‘early indicators.’ When you try to execute the “intuitive logics” approach, an option arises in the ‘scenario logics’ step, where you can choose between ‘the inductive approach’ and ‘the deductive approach’. A bottom-up democratic process among participants is pursued in the ‘deductive’ approach, while a top-down, fairly strong and skilled facilitation is executed in the ‘inductive’ approach. Bowman et al. [20] reported a nine-year period longitudinal ‘community planning’ case study where the ‘inductive’ method was successful, meeting the objectives set by the organization, while the ‘deductive’ method was deemed a failure.

Regardless of whether the “intuitive logics” approach exploits quantitative factors or qualitative factors in the exploration stage, and whether it uses the ‘inductive’ or ‘deductive’ approach in its logic development step, it is descriptive in nature. In other words, the final output of the scenario planning process is a set of descriptions for a number of plausible scenarios. Wright et al. [17] recently reported in their review on the “intuitive logics” approach that among three presumed objectives from the literature, the first two, which are ‘enhancing understanding of the causal processes’ and ‘challenging conventional thinking’ are well addressed, while the last one, ‘improving decision making’ is not. It further questioned whether scenario methods in any form and in themselves have any causal connection with improved decision making to inform strategy development.

Until recently, much research attention has been paid to bridge the gap between scenario-based foresight research and traditional quantitative market research/technological forecasting [21–25]. The common purpose of this research is to improve the strategic decision making by strengthening the linkages between the qualitative and quantitative future research. However, they are somewhat different from each other in their focus, methodology, and targeted stage to apply in the scenario planning process. The first category is to use quantitative/systematic aids in the stages of ‘key factors’ and ‘environmental forces’ to analyze exactly the dynamic causal relationships among the environmental variables. The typical examples are patent analysis, interactive cross impact simulation, interactive future simulations, trend impact analysis, and Fuzzy cognitive map [14,21]. The second category is to combine a Delphi process with scenario development [8,24,26,27]. Since

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