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Evaluating technology disruptiveness in a strategic corporate context: A case study

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Abstract

This study examines how firms interpret new, potentially disruptive technologies in their own strategic context. The study uses a propositional framework for evaluating the amount of radical change in the companies' business models with two middle variables, the disruptiveness potential of a new technology, and the strategic importance of a new technology to a firm. The framework is used in a cross-case analysis of four potentially disruptive technologies or technical operating models: Bluetooth, WLAN, Grid computing and Mobile Peer-to-peer paradigm. The technologies were investigated from the perspective of three mobile operators, a device manufacturer and a software company in the ICT industry.

The data was gathered in group-discussion sessions in each company. The results of each case analysis were brought together to evaluate, how firms interpret the potential disruptiveness in terms of changes in product characteristics and added value, technology and market uncertainty, changes in product-market positions, possible competence disruption and changes in value network positions. The results indicate that the perceived disruptiveness in terms of product characteristics does not necessarily translate into strategic importance. In addition, firms did not see the new technologies as a threat in terms of potential competence disruption.

Keywords: Disruptive technology; ICT industry; Business model; Technology strategy; Business strategy

1. Introduction

Technology development is recognized as one of the most visible business processes challenging management [1]. The role of technologies in strategic analyses has not been given the attention that it

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deserves. The problem of linking technological strategic planning to corporate strategic planning has been identified as the most acute problem in the Management of Technology (MOT) discipline [2]. The lack of a clear understanding of the role of technologies is reflected in the business strategies of many firms [3]. This research responds to the preceding two challenges by seeking a way of bringing the new technology into the context of an individual firm's strategy-formation process.

The goal of the study was to analyze how firms interpret the disruptiveness potential of a new technology and link its effects to the company's operations. To reach this goal, there was a need to create a framework that combined the technology analysis with a holistic view of the company's operations and to utilize the framework to analyze four different technologies or technical operating models from the perspectives of the ICT industry players. Instead of reporting the results of the individual cases, this paper focuses on: a cross-case analysis, evaluation of the functionality of the framework and reflection on what the results reveal about the characteristics and interpretations of disruptiveness at the firm level.

Research on how new technologies affect company strategies and performance may be roughly summarized as follows. Some studies concentrate on the *ex post* examination of industries transformed by disruptive technologies [4,5], or on the influence of environmental and managerial characteristics as predictors of radical innovation [6]. Others take the *ex ante* approach in an attempt to provide diffusion [7] or forecasting models [8], roadmaps [9–11] or scenarios of future developments [12–14], to estimate future demand. Future technologies and their consequences can be analyzed through technology intelligence, forecasting, Delphi and even chaos-like behaviour in technological data [15,16]. However, there is a definite need for firm-level investigation of disruptive technologies and their effects. Although many researchers have focused on the role of new technologies and high-tech developments in an industry, there is a lack of information on how a business adapts to a disruptive technology [17].

Many of the studies relating to discontinuous innovations or disruptive technologies have concentrated on *ex post* identification [5], and on the characterization of the effects of disruptive technologies or discontinuous innovations on product positions and markets. The idea behind our study was to explore how this *ex post* information could be utilized at the firm level in strategy formation and technology management. To achieve this, there was a need to create a conceptual framework with which a company could try to evaluate *ex ante* the potential disruptiveness of a new technology in its own business context. As a way of combining technology analysis and business strategy, the business model was chosen as it gives a useful description of a company's operation. The business model concept has recently been singled out as a potentially useful tool for technology analysis: as Chesbrough and Rosenbloom [18] state: "The business model provides a coherent framework that takes technological characteristics and potentials as inputs, and converts them through customers and markets into economic outputs. The business model is thus conceived as a focusing device that mediates between technology development and economic value creation." Thus, the chosen approach to combine technology analysis with the business model concept for an *ex ante*, firm-level inspection could be justified. The focus is on technology analysis, and business model concept is used as a descriptive framework to evaluate the possible direction of changes in activities, resources and strategies inside the organization. The research uses Hamel's [19] business model definition that consists of four components: customer interface, core strategy, strategic resources and the value network. For the purposes of this research, the customer-interface element is replaced with customer benefits, to clarify the customer value aspect. Hamel's framework reflects the resource-based view of the firm by putting strategic resources as one key component. The value network of the company is another important part of the firm's resources, even though it is beyond the firm's boundaries. For these reasons, Hamel's framework was selected here as the one through which to analyze the effects of a potentially disruptive technology.