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Scenario-Driven Roadmapping to cope with uncertainty: Its application in the construction industry

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ABSTRACT

Roadmapping is widely considered as an appropriate approach for matching short-term actions to long-term goals. However, current roadmapping approaches fall short in effectively considering the uncertainty associated with future developments. In particular, existing methods cannot cope with uncertainty without destroying the communicative and directive strengths of roadmapping. This is especially a concern if roadmapping is to be widely used for strategic purposes. In this paper, we therefore introduce a comprehensible approach that enables firms to benefit from guiding their strategic innovation activities while still being able to consider a wide range of possible future business environments. To this end, we have developed the Scenario-Driven Roadmapping approach while aiming to ensure a robust roadmap. We present the results of an initial application of this approach in a major Dutch construction firm. The results showed that applying Scenario-Driven Roadmapping was effective in both reducing environmental uncertainty and in directing innovation towards promising business activities. In concluding, the paper makes recommendations on how to maximize the benefits of Scenario-Driven Roadmapping.

1. Introduction

Within the literature on strategy, various scholars have claimed that, in order to remain viable, firms need to continuously adapt to changing environments and need to cope with uncertainty (e.g. Grant, 2003; Mintzberg, 1978, 1994). Formal planning approaches have been considered as unsuitable for coping with uncertainty and several authors have advocated a more flexible approach to strategy formulation (e.g. Brown and Eisenhardt, 1998; Hamel, 1996; Mintzberg, 1994). At the same time, scholars have also commended formal strategic planning approaches since these create structure and offer the ability to develop capabilities (e.g. Lindgren and Bandhold, 2003; Mintzberg, 1994). Dibrell et al. (2014) showed the merits of combining a flexible planning approach that considers uncertainty with a less flexible formal strategic planning approach: both approaches could positively influence the performance of a firm. Combining both approaches would create an advantage over firms that emphasize either a formal approach or a flexible approach. In order to simultaneously cope with uncertainty and prepare for the future, several authors have argued that strategies need to be robust (Lindgren and Bandhold, 2003; Quinn, 2003). By robustness it is meant that the strategy is successful under a wide range of circumstances (Coates, 2000; Van der Heijden, 2005). As mentioned by Quinn (2003), "the essence of strategy … is to build a posture that is so strong (and potentially flexible) in selective ways that the organization can achieve its goals despite the unforeseeable ways external forces may actually interact when time comes" (p. 15).

Although an awareness of the need to cope with uncertainty within strategies is ubiquitous, it has received relatively little attention in the literature on business roadmaps. Nevertheless, some authors have acknowledged that a roadmap should be able to cope with uncertainty in the environment. Among these authors are Saritas and Aylen (2010) and Strauss and Radnor (2004), who have contributed to this topic by integrating the concept of scenario planning into roadmapping. However, a clear and convenient process that deals with uncertainty without destroying the communicative and directive strengths of the business roadmapping approach is still lacking. We argue that there is still a gap in terms of having a sound methodology to incorporate robustness into business roadmaps.

The aims of this paper are therefore twofold. First, we aim to bring greater insight into the topic of coping with uncertainty in business roadmaps. Second, we intend to provide a convenient approach that enables firms to benefit from guiding their strategic innovation activities while being able to be successful under a wide range of possible future environments. To this end, we build on the scenario planning literature and develop an approach that integrates scenario planning into business roadmapping. Our approach for integrating scenario planning and business roadmapping – termed Scenario-Driven Roadmapping – first involves the application of scenario planning to explore what future outlooks are possible. Following this, a business roadmap is developed that can cope with a range of future environments while retaining its

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communicative and directive strengths. Our approach has been initially applied and evaluated in a major Dutch construction firm.

2. Research methodology

This section describes the successive steps that were followed in this research. A preliminary phase of this research was spent on specifying the research objectives and research questions. We started with a review of roadmapping literature, which revealed a lack of a sound method that allows companies to effectively cope with uncertainty within roadmapping as we described in Section 1. Backed by our own expectations and suggestions in prior research (e.g. Phaal and Muller, 2009; Saritas and Aylen, 2010), we chose to combine scenario planning and business roadmapping to fill this gap in literature.

In the following phase of the research, we developed our approach for combining scenario planning and business roadmapping, and we applied and evaluated our approach during a case study to illustrate the value of our new method. We formulated three research questions to structure our study:

1. What insights on combining scenario planning and business roadmapping can be gained from literature?

We conducted a further literature study on business roadmapping, environmental uncertainty and scenario planning, and we gained more in-depth knowledge about existing methods that combine scenario planning and business roadmapping.

2. What approach could be developed for effectively combining scenario planning and business roadmapping?

Based on the literature insights, we developed our Scenario-Driven Roadmapping approach.

3. What are the results of applying Scenario-Driven Roadmapping within a business context?

The Scenario-Driven Roadmapping approach was initially applied at a major Dutch construction firm. Having applied the approach, the value that the company attached to it was captured through five semi-structured interviews with interviewees who had been involved in the design project.

The rest of this paper is structured as follows: The three research questions are discussed in Sections 3–5 respectively. In covering the results in Section 5, we provide one detailed scenario, and give a description and evaluation of other choices made during the case study to come to a robust business roadmap. In Section 6, we conclude the paper with a discussion of its contributions, the managerial implications, the limitations of the research, and we suggest several directions for future research.

3. Theoretical background

In developing the Scenario-Driven Roadmapping approach, we build on the literature of business roadmapping, environmental uncertainty, and scenario planning. We discuss the relevant literature on these topics for Scenario-Driven Roadmapping, and consider existing approaches that include scenario planning within roadmapping.

3.1. Business roadmapping

A business roadmap is a visual representation of the evolution over time of those markets that a company wants to serve in the future, the products it wants to offer on these markets, and the technologies and other capabilities that are necessary to make these products (Groenveld, 2007; Kappel, 2001; Petrick and Echols, 2004; Phaal and Muller, 2009). As such, a roadmap can be a useful tool in formulating and implementing (corporate) strategies (Vishnevskiy et al., 2015). The benefits attributed to the generic business roadmap as shown in Fig. 1 (Phaal and Muller, 2009), are communicative and directive in nature: the roadmap ensures that the right capabilities are in place at the right time and ensures that the firm can communicate complicated issues to both employees and external stakeholders (Albright and Kappel, 2003; Groenveld, 2007; Kostoff and Schaller, 2001; Phaal et al., 2003; Phaal and Muller, 2009; Probert and Radnor, 2003; Vishnevskiy et al., 2015).

The process for the development of a business roadmap involves two critical components: formulating a strategy and developing it into a roadmap (Goffin and Mitchell, 2005). The widely-tested roadmapping approach developed by Phaal et al. (2001), known as the T-Plan approach, integrates both the abovementioned components. This approach contains three stages: a planning stage, a workshop stage and a rollout stage. Albright and Kappel (2003) explained that, based on the analyses performed during the workshops for defining the firm's environment, focus areas can be identified. Within the focus areas, a firm can identify opportunities that should be expressed in the form of concrete products and necessary capabilities. This entire roadmapping process is generally considered to both require commitment within the company and to be very time-consuming (Groenveld, 2007; McMillan, 2003; Phaal et al., 2003; Probert and Radnor, 2003).

Phaal et al. (2001) and other scholars such as Albright and Kappel (2003) and Groenveld (2007), applied several systematic and formalized analyses within roadmapping. These analyses, originating from traditional strategic planning, are used to define the strengths and weaknesses in the internal environment and the opportunities and threats in the external environment of a firm. However, firms need to be able to cope with changing environments and environmental uncertainty if they are to remain viable, and therefore they should avoid a long-term commitment to a single technology, product or process (e.g. Brown and Eisenhardt, 1998; Courtney et al., 1997; Grant, 2003; Mintzberg, 1978, 1994). The formalized systematic analyses are not considered suitable for coping with unexpected discontinuous change as they inherently assume that the future will be more-or-less like the present (Grant, 2003; Mintzberg, 1994). Goffin and Mitchell (2005) indeed concluded that roadmapping and its preceding process are often conducted while assuming that there is a certain level of predictability about the future: firms assume a single future and map their innovative route based on this unique view of the future. Here, we consider environmental uncertainty a critical aspect when formulating a strategy. Hence, we consider it essential that the conventional roadmapping approach be adapted to cope with both changing environments and uncertainty.

3.2. Environmental uncertainty

Environmental uncertainty is considered to be made up of two elements. The first characteristic of environmental uncertainty is that there is a lack of information available for making accurate predictions about the future (Downey and Slocum, 1975; Duncan, 1972; Miller, 1992; Milliken, 1987; Rogers, 2003). Inherently, the second element is that the uncertainty is not a constant feature of the environment: rather it is "dependent on the perceptions of organization members" (Duncan, 1972, p. 325). That is, the perceived environmental uncertainty may vary between individuals (Downey and Slocum, 1975; Duncan, 1972; Milliken, 1987).

Milliken (1987) emphasized that there is a difference between changing environments and environmental uncertainty. As she explained, uncertainty is not created by a changing environment, or even by a fast-changing environment; rather, it is the unpredictability of changes that causes uncertainty. Hence, in this paper, we consider both predictable and unpredictable changes as vital elements to be included within the roadmapping approach. Nevertheless, we put the emphasis on including environmental uncertainty since predictable changes could be dealt with using regular roadmapping approaches.

Many authors have tried to classify environmental uncertainty and have attempted to identify sources from which this uncertainty stems.