Technological Forecasting & Social Change 123 (2017) 108–119

Contents lists available at ScienceDirect

Technological Forecasting & Social Change

journal homepage: www.elsevier.com/locate/techfore

Reducing front end uncertainties: How organisational characteristics influence the intensity of front end analysis

Patrick Spieth*, Verena Joachim

University of Kassel, Nora-Platiel-Str. 4, 34109 Kassel, Germany

ARTICLE INFO

Keywords:
Front end of innovation
Uncertainty
Organisational characteristics
Qualitative research
New product development

ABSTRACT

Front-end (FE) of innovation is crucial for the success of companies' new products. In this research stream, the concept of FE activities has become central to the whole discipline. It describes how the process of finding new product opportunities, as well as enhancing and assessing them, can be implemented. This paper builds on results that FE processes should be flexible and context-specific. It addresses the current need to understand how organisations can influence FE activities so as be more efficient. By conducting semi-structured interviews with 24 FE experts from German material science and engineering (MSE) companies, we identified three organisational factors that impact on FE activities: organisational capabilities, strategic orientation, and organisational culture. Findings indicate that organisational capabilities and strategic orientation could directly reduce the uncertainty rate in the analysis of FE activities. Further, organisational culture and soft skills have moderating effects, and the initial extent of uncertainty has a mediating effect on this rate. Overall, our research contributes to the discussion about FE proficiency, which refrains from the FE life-cycle perspective and demands project-specific and complete execution of FE activities.

1. Introduction

To achieve and maintain an effective innovation process, new product development (NPD) has been identified as having high potential (Cooper and Kleinschmidt, 1986; Stockstrom and Herstatt, 2008). NPD describes the transformation from a recognised opportunity to the commercialisation of a new product (Achiche et al., 2013; Schoonmaker et al., 2013). Further, NPD performance depends on successful front-end (FE) work. The results of FE work are the basis for the final FE decision, they answer whether a new product's concept should be developed, rejected or placed on hold (Markham, 2013). Achievements or setbacks in further development and commercialisation activities are subject to the quality of FE work and decisions taken at the FE (Reid and de Brentani, 2004). Thus, improving the FE's positive effects has been identified as highly beneficial and has become central to FE research.

Further, work at the FE is characterised by high initial uncertainty. Different uncertainty types are discussed in the literature (Carson et al., 2012; Frishammar et al., 2011; Hammedi et al., 2011; Oliveira et al., 2015). A generally accepted FE uncertainty concept is outlined by Souder and Moenaert (1992). They argue that uncertainty occurs owing to missing information concerning user needs, a firm's technological and competitive environment, and its resources. Since innovating firms seek to avoid wasting their resources on the wrong projects, this risk must be reduced by generating new knowledge and information, which then also reduces uncertainty. Frishammar et al. (2011) show that successful new products are characterised by significant uncertainty reduction at the FE. Further, Rice et al. (2001) conclude that a high number of these uncertainties at the FE is already recognised by experts.

To choose a successful new product concept, FE work seeks to reduce uncertainties by collecting information in FE activities (Rice et al., 2001). To increase overall product performance, researchers and firms face the challenge of optimizing the links between FE activities (Khurana and Rosenthal, 1997). According to Eling et al. (2013), the FE process provides different characteristics compared to the rest of the NPD process (the formal part): The FE part is characterised by low formalisation and experimental, creative work, while formal NPD provides a structured and systematic order of actions and a high amount of resources (Kim and Wilemon, 2002). Thus, according to a definition by Oliveira and Rozenfeld (2010), the FE "… comprises the activities that precede the formal development of new product projects. This phase defines the new products that should provide competitiveness and revenue for the business, which makes it a critical phase for NPD process performance" (p. 1339). Further, it is becoming more difficult to ignore the discussion on how to assess FE activities in a formalised

* Corresponding author.
E-mail addresses: spieth@uni-kassel.de (P. Spieth), verena.joachim@uni-kassel.de (V. Joachim).

http://dx.doi.org/10.1016/j.techfore.2017.07.001
Received 3 January 2017; Received in revised form 30 June 2017; Accepted 4 July 2017
Available online 11 July 2017
0040-1625/ © 2017 Elsevier Inc. All rights reserved.

process.

Extant research builds on heterogeneous findings about framing FE activities in a formal FE processes (Nobelius and Trygg, 2002). On the one hand, Markham and Lee's (2013) comparative performance assessment study shows that the most successful firms differ from the rest, having formally planned FE activities to fill identified new product gaps. On the other hand, there seems to be no general FE process that demands more managerial flexibility (Nobelius and Trygg, 2002). For instance, uncertainty reduction problems can be solved through time-consuming analysing activities, requiring significant resources, or through a person's unprompted idea (Eling et al., 2013). Thus, innovating organisations need to accept the challenge to manage individual trade-offs between executing activities, which are in accordance with generally valid formalisation regulations, and situational freedom for enhancing or neglecting FE activities (Akbar and Mandurah, 2014; Frishammar et al., 2012). Thus, FE process rigidity can cause inefficiency; FE activities should therefore be assessed differently, depending on the project's context (Tippmann et al., 2013). We address the current need to understand how organisations can navigate FE activities so as to become more efficient (Akbar and Mandurah, 2014; Carson et al., 2012; Duin et al., 2014; Kijkuit and van den Ende, 2010). We follow the idea that FE proficiency is not represented purely by the time spent at the FE, but also the capability to complete needed FE activities to reduce uncertainty (Eling et al., 2013). Thus, the research objective is to answer the question: *How do organisational determinants influence the uncertainty reduction rate through analysis at the FE?*

To address this question, we first systematically reviewed the FE literature in order to frame FE's key constructs, including organisational FE characteristics and uncertainty-reducing analysis activities. Based on this understanding, we interviewed FE experts, who are able to recognize missing information at the FE, in a highly uncertain environment, to able to understand the relationships between constructs (Rice et al., 2001). We contribute to the FE literature in two ways. First, our elaborated construct on organisational FE characteristics has been derived into three aggregated dimensions: organisational capabilities, strategic orientation and organisational culture. Our results indicate that the themes *patent and IP strategies* and *continuity of values and artefacts* have been underestimated in FE activity research. Second, we build on discussions on how organisations can navigate FE activities so as to be more efficient (Akbar and Mandurah, 2014; Carson et al., 2012; Duin et al., 2014). By exploring the effects of organisational FE characteristics on the proportion uncertainty is reduced at the FE, named FE analysis intensity, we gain a deeper understanding of how FE activities are influenced by organisational aspects.

The remainder of this article is structured into four parts: first, driven by the heterogeneous understanding of FE processes, we begin by outlining the conceptual background of FE uncertainty. We then conceptualise FE elements, consisting of five constructs from the most cited FE studies. The two concepts organisational FE characteristics and analysis represent the theoretical conception needed for our abductive methodological approach. Next, we explain the methodology of our qualitative analysis, outlining the steps in order to address the objective: they are characterised by an abductive, systematic matching procedure (Dubois and Gadde, 2002) of the interviews based on the pre-study's aggregated dimensions and second-order themes. We group aggregate dimensions using Gioia and Ford's (2000) procedure to combine qualitative research results. Further, we inductively assess the interviews to explore the interdependencies between organisational FE characteristics, uncertainty and analysis (Creswell, 2012). We then present the results, which contain the substance of the aggregated dimensions, second themes and first-order concepts of organisational FE characteristics, along with a discussion and an outline of our propositions. Finally, we discuss implications, limitations and future research possibilities.

2. A conceptual background to front-end research

Uncertainty is defined as an exogenous variable that describes the situation of missing information at the FE; an environmental circumstance that managers cannot control (Song et al., 2007; Zhang and Doll, 2001). This definition is in line with that of Galbraith (1973) – that FE uncertainty is the difference between required and available information. Thus, the more radical an FE project is, the more uncertainty there is in the early stages of innovation (Verworn and Herstatt, 2008). FE uncertainty differs from FE equivocality. The latter describes the existence of different – and potentially conflicting – interpretations of the same information among FE team members. While organisations can react to equivocality by communication to find consensus and a shared understanding, FE uncertainty can be reduced by collecting and processing information (Galbraith, 1974). Research into uncertainty reduction has been motivated by the finding that successful new products and product executions are characterised by a significant reduction in uncertainties at the FE (Frishammar et al., 2011; Verworn, 2009). Thus, uncertainty is defined as a multidimensional construct (Carson et al., 2012; O'Connor and Rice, 2013; Sicotte and Bourgault, 2008; Souder and Moenaert, 1992; Yan and Dooley, 2013), encompassing for instance customer, technology, and competition uncertainty, as conceptualised by Frishammar et al. (2011). First, customer uncertainty describes the situation of missing information about a customer's portfolio, preferences, product life-cycle or product demand. Second, uncertainties about the fulfilment of material standards, product specifications and as a supplier's delivery can be a measurement of a technological information gap. Third, missing information about competitor behaviours concerning the development and adoption activities represent the dimension of competitor uncertainties.

It is hard to take a FE decision against the background of missing information, which will influence a firm's overall success (Kim and Wilemon, 2002). Wrong FE decisions can lead to significant resource misinvestments and high opportunity costs. Thus, with the objective of reducing risk, FE activity processes have been studied in many ways. While for instance Khurana and Rosenthal (1998), Cooper (2000), Koen et al. (2001) and Florén and Frishammar (2012) focused on FE activities and their gates, few have compared. To incorporate technology roadmapping and project portfolio management into an existing FE process, Oliveira and Rozenfeld (2010) compared the most-cited FE concepts. With the aim of finding the most complete and precise FE description, they state that the assessed FE processes prioritise differently and that the results are heterogeneous.

Thus, to understand the underlying structure in heterogeneous FE process literature, we assessed the six most-cited comprehensive FE concepts by conducting a qualitative pre-study. We chose a systematic literature review, and used the Web of Knowledge database for data collection (de Bellis, 2009; Jacso, 2005). According to Fink (2005), a search strategy has been elaborated to find these FE papers. For this purpose, we used a list of FE synonyms according to Langerak et al. (2004). This led to 209 FE papers. After a diligent review of the abstracts, considering limited availability and deep-diving into the remaining papers, we finally included 33 papers, which offer a thorough overview of the concept of FE for ranking and selection. Each of these papers examines and describes an individual FE process, without citing other authors' FE findings or building a new FE activity concept. Concerning our study design, we searched for FE papers that offer diverse aspects of FE process research. Using papers that build on previous findings would offer only minimal input for our purpose. Further, the number of citations indicates the extent of acceptance in the discipline (Oliveira and Rozenfeld, 2010). Thus, we chose the six most-cited papers for a qualitative assessment. This assessment represents the basis for our systematic combining procedure, described in our methodology section. Thus, the pre-studies results are the ‘preconceptions’ derived from theory. We applied an open-coding procedure using in vivo codes (Corbin and Strauss, 1990; Gioia et al., 2013) for every FE aspect

Download English Version:

https://daneshyari.com/en/article/5036804

Download Persian Version:

https://daneshyari.com/article/5036804

Daneshyari.com