COMPETENCY FRAMEWORK TO SUPPORT NEED SEEKER INNOVATION TRAINING

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ABSTRACT
Empowering key competencies to support a specific innovation strategy becomes a critical issue to the long term survival of many today's firms. This imperative reflects a challenge for design and innovation education, in properly preparing students. In this article, we present a competency framework to guide the implementation of a competency-based learning of design and innovation. In particular, we focus on skills required to implement an innovation strategy derived by a 'superior end-user understanding' to get first to market, namely the Need-Seeker Strategy. Our methodology combines an extensive literature review, an empirical study on project-based learning and expert interviews to result in an original competency framework supporting the need-seeker strategy. We believe that this is the first competency framework specifying conjointly individual and collective competencies as well as leadership competencies supporting a need-seeker innovation process.

Keywords: Design Learning, Innovation Learning, Innovation Skills, Innovation Strategy, Competency Framework Need Seeker Innovation, competency-based education

1 INTRODUCTION

Strategy positions a company for sustainable competitive advantage to achieve long term superior performance. After Porter, a strategy consists in "choosing a unique and valuable position rooted in systems of activities" [1]. Setting up a suitable innovation strategy is therefore, a way to differentiate a company from other firms in the same industry [2]. A statistical analysis of a representative sample of 2007 'global innovation 1000' study, profiles companies into three distinct categories of innovation strategies [3]:

- *Techno driver strategy*: drive innovation through leading edge new technology
- *Market reader strategy*: drive innovation through market research and competitive intelligence
- *Need seeker strategy*: drive innovation through superior end-user understanding

Cited in more than 450 publications, this study is well recognised for its comprehensive assessment of the relationship between innovation strategy and corporate performance. The competency framework that we build in this study aims at supporting in particular, the need-seeker strategy. This strategy turns out to be the best performing strategy because generating superior profitability in the long term and for its potential to produce radical innovations (see [3]). Interrogating end users for capturing their pains is not sufficient anymore. Indeed, imagining new usage situations in the future is needed; this is how need-seeker firms as Apple, Procter & Gamble, and Tesla proceed to get a deep end user understanding. This envisioning ability also gives the need-seeker firms the advantage of being the first mover to market. In addition to its propensity to generate radical innovations driven by usage, the need-seek strategy naturally conducts to highly differentiating value propositions. At the same time, the market reader strategy is most of the time limited to incremental innovation and the techno driver strategy is often more expensive in terms of R&D investments. However, choosing the need-seeker strategy puts firms in the face of two challenges. The first is to establish a 'cross-organisational alignment' between *business strategy*, *innovation strategy* and *corporate culture*. The second challenge is to develop specific skills for achieving a superior performance. After Leifer et al. "people who drive radical innovation have different characteristics from those in more traditional roles" [4]. This brings a second challenge, to develop specific skills for achieving a superior performance [3]. In

this study, we propose, to our knowledge, the first competency framework supporting the need seeker strategy. Through each stage of the innovation process, we specify the individual and collective competencies as well as critical strategic leadership competencies to support the need seeker strategy. In the literature review section, we address the concept of competency, the possible methods for designing a competency framework, and the models of competency framework existing in literature that inspired us for our context of need-seeker innovation. In Section 4, we propose an original qualitative multi-method (Figure 1) combining extensive literature review, expert interviews, and empirical study on student project-based learning. We present in Section 5 the competency framework designed to support the need seeker strategy (Table 1 and Figure 2). Finally, we discuss the next validation steps we are considering, as well as the implementation of this framework in curriculum development process.

2 LITERATURE REVIEW

To build the competency framework supporting need seeker innovation training, we mainly addressed the following three questions: What are the specific concepts related to the notion of competency? What methods for designing a competency framework? What are the existing competency frameworks that may be of particular interest in the context of need-seeker innovation?

2.1 The notion of competency

We outline in this paragraph underlying concepts that are useful for understanding the notion of competency and so for designing a competency framework. *Individual competency* is defined as a combination of "visible 'competencies' of 'knowledge and skills' and 'underlying elements of competencies', as 'traits and motives'" [5]. A team's *collective competence* "consists of trust, commitment, communication and joint problem solving" [6], and it appears in the literature under wordings such as 'collective mind ', 'shared leadership' or 'collective capacity building'. To highlight collective competencies in organisations, Prahalad and Hamel introduce the concept of 'core competence' as "the collective learning in the organisation" [7]. Given our context of need-seeker innovation, we introduce the concept of 'strategic leadership' reflecting the ability to share values and clear vision for a minimal controlled day-to-day decision-making, enabling immediate impact and preserving long-term goals, which is different from managerial and visionary leadership [8].

2.2 The design of competency framework

A competency framework "identifies the skills, knowledge, personal characteristics, and behaviours needed to effectively perform a role in the organisation and help the businesses meet its strategic objectives" [9]. Lévy-Leboyer sums up in his book 'La gestion des compétences' [10], six methods for designing a competency framework. We did not identify any additional methods in the literature. In our study, observations, questionnaires and self-description of tasks are methods that we have realised by adopting the 'Jobs to be Done' mindset [11]. In addition, we have used the 'Behavioural Events Technique' (BET by Boyatzis in 1982) [13], which is a variant of the 'Critical Incident Technique' (CIT by Flanagan in 1954) [12], to identify empirically the leadership skills in our context of need seeker innovation. Although the BET and CIT methods, lack a strong theoretical underpinning, they are particularly adapted to develop a conceptual frame or to follow a 'grounded' approach [12]. To validate the resulting competency framework, we are considering as a next step the use of the Kelly Grid technique developed by Kelly from the 'construct theory' [13]. Although this method is demanding for the interviewed experts as for the competency framework designer, however, it has the advantage of being an effective technique to complement the methods we have combined.

2.3 Competency frameworks: existing models in the literature

The competency framework supporting the need seeker strategy – given our description of the need seeker strategy below – is at the intersection of two dimensions. First, the *user-centricity* of the new product development process, to reach deep end-user understanding. The second dimension, is the radical level of the innovation "for which the market is not clearly identified (…) riskier and (…) with the potential to move the organisation in new directions that provide rich platforms for growth" [14]. An extensive literature review allowed us to identify 22 models of competency frameworks, not given here for reasons of brevity. Let us evoke two of them. First, the innovator's DNA model [15], designed by Dyer, Gregersen and Christensen. This competency framework analyses: how known

innovative entrepreneurs came up with and implement new ideas. The second example is a model designed by Veryzer and Borja de Mozota, studying how user oriented design skills contributes to the new product development, without positioning this analysis in the specific case of radical innovation [16]. Several studies have focused on innovation competencies. However, specific skills supporting a need seeker innovation project derived by a superior end-user understanding, generating highly differentiating value propositions and giving the advantage of being the first mover to market, have not yet been clarified.

3   STRUCTURE OF THE COMPETENCY FRAMEWORK

The structure adopted for the competency framework has an important role in highlighting and organising the critical competencies over the various phases of the innovation process. To enable the implementation of the competency framework in curriculum development, we have defined the following main specifications:

- **1st: Supporting different processes that can structure a need seeker strategy** such as the 'Radical Innovation Design Methodology' [17], 'Blue Ocean Strategy' [18] and 'Design Thinking process' [19]. For this goal, we organise our competency framework by drawing on the pattern used by Howard et al. [20], to compare different creative innovation processes through the four following phases: *Analysis phase*, *Generation phase*, *Evaluation phase* and *implementation phase*.
- **2nd: Including a New Business Development phase** to allow "student design teams to assess the impacts of different design variables on the market success of a product". Besides, the "issue of whether or not a market exists for an innovation is an early, critical differentiator in the challenges that project teams face in managing this process" [16].
- **3rd: Simplifying the classification of competencies to operationalise the competency framework in curriculum development.** Therefore, we use the following two dimensions: the *innovative behaviour* as addressed by Scott [21] and the dimension of ability to describe the ability to exercise' knowledge [22]. To classify collective and leadership competencies, we use the notions of *collective competencies* and *strategic leadership* as defined in Section 2.1.

In the following section we describe the method that combined with the above criteria allowed us to design the competency framework supporting the need seeker strategy.

4   METHODOLOGY

To study the addressed research questions, we conducted a study combining concurrently: extensive literature review, empirical study and expert based knowledge. Firstly, we have identified by combination of keywords (e.g. *need seeker innovation*, *human-centred innovation*, *radical innovation*, competency *framework*) a selection of articles on the ASME database and using Google scholar and through it Wiley, JSTOR and ScienceDirect. A first screening of the articles was made according to the title and the number of quotations. Then, we made a second selection by reading the abstract, summary and figures titles'. Finally, we have identified 22 models belonging to one of the two dimensions described in Section 2.3. However, no framework was found in the literature addressing in a single competency framework, the competencies needed to support new product development, which is radically innovative and driven by deep end-user understanding. The empirical study consisted of a series of observations and interviews carried out during a project-based learning of radical innovation processes at CentraleSupélec engineering school. For four months, 29 students from engineering school, business school, and design school worked in a multidisciplinary team on six industrial projects, proposed by four major companies and two research institutes, on topics related to smart building, shared mobility, comfort in cars, and intelligent data management for car manufacturer. In these innovation contexts, students applied the Radical Innovation Design Methodology® [17] to structure the innovation process in need seeker mode (what this methodology particularly claims). The observation consisted of describing and characterising the impact of project team members' behaviours and skills, on the progress of the innovation projects. So far, critical competencies impacting the progress of the project were experimentally reported. Furthermore, to identify the competencies of team leaders, we also used the appropriate behavioural events technique during the gates of the innovation process [23] (see also Section 2.3). The third approach for identifying the critical competencies was through eight semi-structured interviews of one to three hours plus four

face-to-face exchanges, with industrials experts in the field of New Product Development and R&D strategies. As illustrated by Figure 1, for each skill identified – in a competency framework present in the literature – we observed its existence in the field (student projects), then we interviewed the experts on it through detailed interviews. If a skill was not identified through existing models but rather through field observations or expert interviews, we were then looking for whether this skill was individually present in the literature.
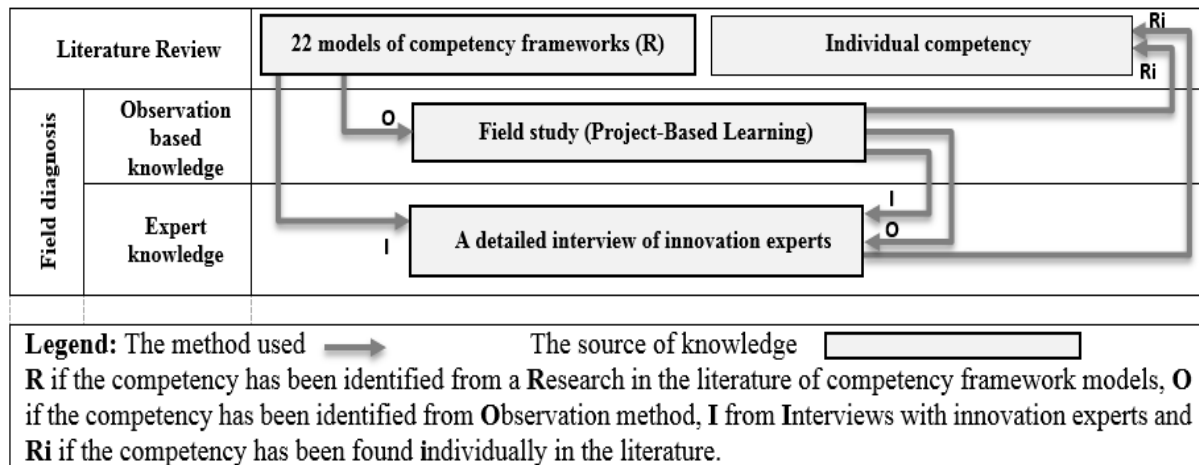

Figure 1. All the possible paths we took to identify a competency

Surprisingly, this search by individual innovation competency has led us to multidisciplinary fields of research, in particular: *Management Science*, *Managerial Psychology*, *Change Management*, *Knowledge Management* and *Cognitive Science*. For example, 'independent thinking' (illustrated in the result Table 1) is a competency that we have not identified in the 22 competency models; however it has been expressed by innovation experts during detailed interviews. We have also noted the importance of this competency through student projects and afterwards, we identified its presence individually in literature. By now, we present the results obtained through the process described below.

5   RESULTS

Following the process described in the methodology section and given the specifications that we have established in Section 3, we get the results illustrated in Table 1 and in Figure 2. Figure 2 highlights critical strategic leadership competencies in particular, during the gates of the need seeker innovation project. As specified in Section 3, we have identified the six strategic leadership competencies by combining the behavioural events technique (Section 2.2) and the methodology described in Figure 1.
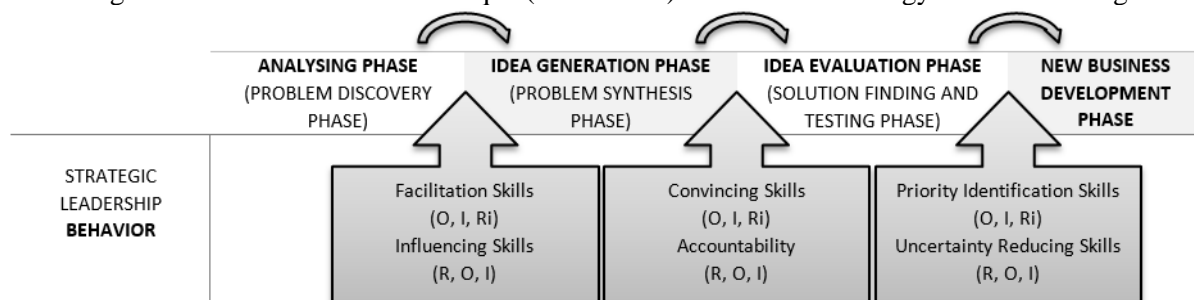

Figure 2. Strategic leadership competencies supporting need seeker innovation project.
(See Legend of Figure 1 for the signification of R, O, I and Ri)

On the other hand, Table 1 illustrated below cluster individual competencies (behavioural competencies and abilities) as well as collective competencies of the members of the need seeker innovation project. We have obtained the results summarised in Table 1 through the method illustrated in the figure 1.

Table 1. The competency framework supporting the need seeker strategy

(See Legend of Figure 1 for the signification of R, O, I and Ri)

	ANALYSING PHASE (PROBLEM DISCOVERY PHASE)	IDEA GENERATION PHASE (PROBLEM SYNTHESIS PHASE)	IDEA EVALUATION PHASE (SOLUTION FINDING AND TESTING PHASE)	NEW BUSINESS DEVELOPMENT PHASE
ABILITY TO EXERCICE A KNOWLEDGE	ability to tackle ill structured problem (O, Ri) [24] empathy skills (R, O) analytical skills (R, O, I)	synthesising skills (R, O, I) knowledge management skills (R, O, I) project portfolio management skills (I, Ri)	ability to grasp aspects of intellectual property (R, I) experimenting and prototyping skills (R, O, I) problem-solution pairing (R, O, I)	opportunity recognising skills (I, O, Ri) [25] system thinking skills (I, O, Ri) project time management skills (R, O, I)
ATTITUDES BEHAVIORAL COMPETENCIES	curiosity (R, O, I) perseverance (R, O, I) communication Skills (R, O, I)	networking (R, O, I) creativity (R, O, I)	'idea association' skills (R, O, I) independent thinking (O, I, Ri) priority management skills (R, O, I)	assertiveness (O, I, Ri) responsibility (R, O, I)
COLLECTIVE COMPETENCIES	collective motivation by the strategic intent of the project (O, I, Ri) openness (R, O, I)	mutual trust (R, O, I) collective knowledge sharing (R, O, I)	collective learning (R, O, I) collective intelligence (R, O, I)	team focused effort (O, I, Ri) team networking (O, I, Ri)

6   DISCUSSION AND CONCLUSION

In this paper we have presented to our knowledge the first competency framework supporting the need seeker innovation strategy. A novel approach has been proposed combining different design methods of competency framework and highlighting the work of other disciplines on innovation competencies. This study is a part of a broader design education research project aiming to design a competency-based-learning of innovation processes. The first validation method we are considering is to compare the performance and practices of learners before and after using this framework to guide the curriculum development process. The second method is by using the Kelly Grid technique, since it has the advantage of being an effective technique to complement the methods we have combined. The third validation method is to evaluate the competency framework, by innovation experts. In a second phase of this study, we consider future research using this competency framework as a basis of a diagnosis tool to build personalised training journey of innovation processes. It is our hope that these findings stimulate more research from multidisciplinary background, on the critical competencies supporting a need seeker innovation strategy. Specifying these competencies is a key factor to guide the implementation of a comprehensive educational curriculum about design and innovation processes.

All the more since, the empowerment of these specific competencies becomes for several businesses a critical factor to their long term success.

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