USING THE BUSINESS MODEL CANVAS IN A SOFTWARE ENGINEERING COURSE

Edward David Moreno, Universidade Federal de Sergipe, edward@dcomp.ufs.br
Maria Elena Leon Olave, Universidade Federal de Sergipe, mleonolave@academico.ufs.br
Paulo Afonso, University of Minho (Portugal), psafonso@dps.uminho.pt
João Miguel Fernandes, University of Minho (Portugal), jmf@di.uminho.pt

INTRODUCTION

Most of the courses offered by universities and focused on entrepreneurship provide some tools for students to learn and apply when developing their projects. The Business Model Canvas (BMC) appears as one of the most used tools for the development or documentation of new or existing business models. As mentioned by Krakauer *et al*. (2015), most university programs use only BMC as a tool for the business modeling. In Chanin *et al.* (2017) the authors argued that one of the biggest advantages of using the Business Model Canvas is that it gives the entrepreneur a holist view of his/her business.

On the other side, in Huang-Saad; Morton; Libarkin (2018), the authors demonstrated that the current literature on engineering entrepreneurship indicates that the scope of engineering entrepreneurship programs focuses on general concepts of entrepreneurship instead of really business creation. But, given the very applied scope of engineering entrepreneurship, teachers should promote skills such as creativity, product development, opportunity identification, teamwork, and communication.

In this paper, we discuss the benefits, satisfaction degree and difficulties found by students using these business tools in an informatics engineering course taught at University of Minho (Portugal).

ENTREPRENEURSHIP IN AN INFORMATICS ENGINEERING COURSE

The course ‘Project in informatics engineering’ was launched in the academic year of 2009/2010 (FERNANDES *et al*., 2017). It is part of the last academic year of the Informatics Engineering master’s degree, promoted by the School of Engineering at the University of Minho (Portugal).

In the edition of 2019/2020, the number of students reached 109, organized into 13 groups. **The process typically starts** with a general presentation made by the academic coordinator of the course. In this meeting the students receive the task of constituting the teams, electing a team´s leader, and thinking about possible projects.

After that, in the following two weeks, there are made periodic meetings to discuss the business idea proposed by each team. **The first phase ended** with the presentation of a first pitch, where each group must present the selected idea, brief research on the targeted market, competitors and similar products. **In the second phase**, the monitoring process continues, with weekly meetings. At these meetings, business artifacts and tools are used particularly the Business Model Canvas (BMC), to help the teams improving product requirements in order to achieve a more feasible solution from both a technological and a market perspective. It is also recommended that teams get the help of a mentor with experience and knowledge on the market or/and the technology used in the product/service under development. **This second phase ended** with a second pitch and the delivery of a first technical report of the project, which, in addition to the business plan, should contain technical information about technologies and computational tools that should be used in the development phase. In this second pitch, external elements are invited to give feedback on the technical feasibility, value proposition and market potential of each project. **In the third phase** of the project, the students are going deeper into the technical part of the project's development, and the teachers continue to follow the entire process, with weekly meetings.

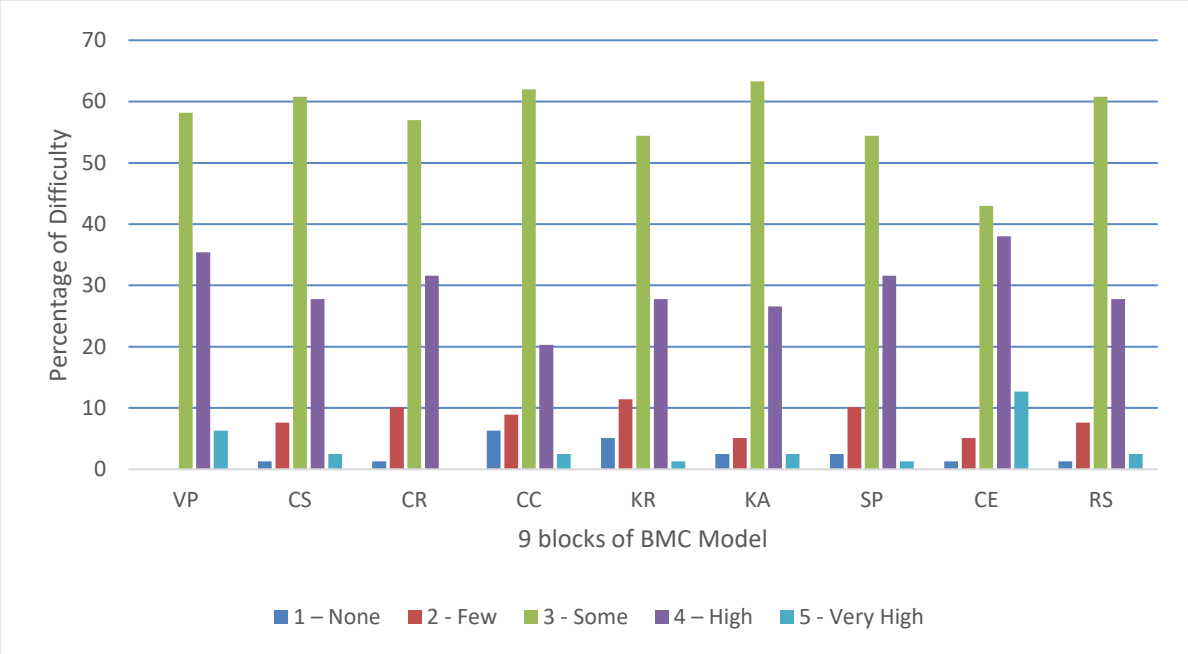
This **third phase** ends with the third pitch and a final report. In this presentation, a functional version of the product/service should be presented, as well as more accurate and complete information about the market and the competitive advantage of the product in relation to the actual products and competitors. Finally, an analysis of the economic and financial viability of the project should be also made. This final presentation is always open to the public, with guests from companies, the city hall, startups, etc., and it occurs outside the university. Local media follow these events turning them an important and special moment of the entire process.

USING THE BUSINESS MODELS CANVAS

Regarding the difficulties experienced by students in developing each one of the Canvas components, some aspects can be highlighted, as shown in Imag1. A questionnaire was sent to all students composed by a set of questions answered using a five-point Likert-scale. There were got 79 answers. Regarding the gender, 16 of them are females and regarding the age, 90% are students between 21 and 25 years. It was found that above 87% of the students presented some degree of difficulty using the

BMC. Indeed, 34% of the students answered that they have high difficulty to deal with what is required to complete the BMC. Other relevant result is related to which components students consider harder to be answered. From the 9 components of the BMC model, the most difficult are the cost structure (51% of the students have medium or high difficulty to answer this block), and the value proposition (42%). For the other seven components, around 30% of students had any difficulty (Figure 1).

Figure 1 - Difficulties found by students in the components of the BMC model



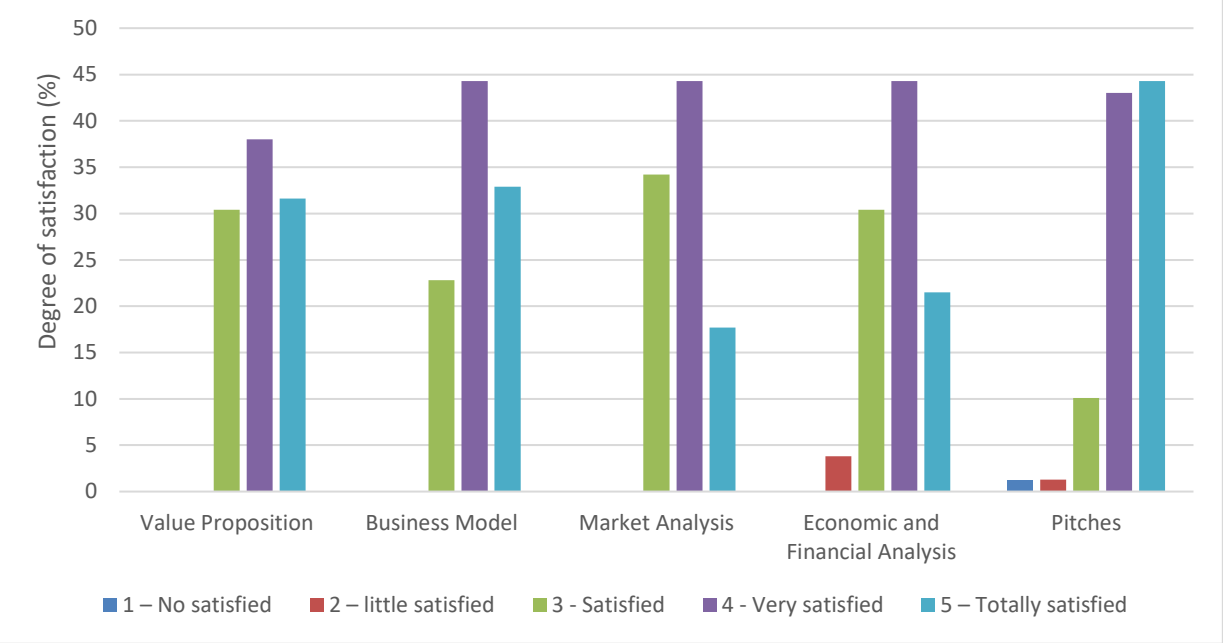
Source: from authors.

The process of achieving a good fit between the product and the market is developed in 4 main stages called in this course “validations” each represent more or less a gate to proceed with the project. These validations should be got by this order: validation of the value proposition (product and customer needs and expectations must fit), validation of the market (a good knowledge of the market must be achieved namely its potential dimension, pricing, competitors’ strategies, etc.), business model validation (i.e., a proper business model must be designed to allow the creation and the delivery of the value proposition), and finally, an economic and financial validation must be made to understand if and how the business can be profitable and sustainable.

The answers obtained for the degree of satisfaction with the project carried out are shown in Figure 2. Observing these results, we can highlight the following aspects:

(1) In relation to the “Value Proposition” validation, the answers highlight that 70% were satisfied with the result obtained ; (2) Regarding the “Business Model Design”, it can be seen that the satisfaction´s degree is also high (77%); (3) for the “Market Analysis and Validation”, the degree of satisfaction is high also but lower than the previous ones (62%); (4) and the level of satisfaction with the “Economic and Financial Analysis” is 66%. Finally, related to the pitches, 87% of students were very satisfied with what they did and presented.

Figure 2 - Degree of satisfaction using the four-validations model



Source: from authors.

CONCLUSIONS

In this paper we showed that students have difficulties to deal with what is required to complete the BMC. Although the business model is apparently easy to understand and to fill in, students from engineering and computing sciences courses have difficulty in designing an adequate business model to support their projects. Students also experienced more difficulties to tune the cost structure and the value proposition blocks. Finally, students agreed that using the 4-validation model helps to develop technology-based projects with a good market fit.

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