

DYNAMIC MODEL OF ENTREPRENEURIAL UNIVERSITY: CASE OF VENTSPILS UNIVERSITY COLLEGE DEVELOPMENT VISION

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Abstract. The production of new knowledge, to become an economic activity with high value added, has to become embedded into new combinations of resources. This requires a structural coupling of science with the economic development level of society. The traditional division of labor and functions between academic science and academic teaching, industry and society (applied research, development, innovation, societal benefits) becomes insufficient. Today university activities cross traditional boundaries through linkages with the socially economic development level, it should develop new ways to interact between each other. The role of efficient technology transfer (TT) system, providing conducive to spillovers environment and society ready to promote technological adoption, implementation and application determines new role for regional universities or research centers. Less developed countries have an advantage to adopt new knowledge created by technology leaders. The ability and capacity to absorb secondary or tacit knowledge may increase competitiveness on different levels. In this paper we analyze what should be done in the case of a small regional university (VUC) in order to satisfy regional enterprise and at the same time fulfil the common university requirements in Latvia. The VUC research program is a mid-term planning document that has been created in the framework of the project "Strengthening of Excellence and Capacity of Ventspils University College as a Scientific Institution" and which supplements the VUC development strategy for 2016-2020. The VUC research program is a concise, but comprehensive review of the main research fields, including a short description of the situation and topicality in a specific research field as well as providing information about the scientific experience the resource base VUC has in the exact field its main partners of cooperation and planned tasks. The prepared model links BSC mapping and system dynamics modelling and shows new assessment of effectiveness factors of VUC strategic development on its way to introduce top-down, or better bottom-up approach.

Keywords: entrepreneurial university, system dynamics, modelling, strategy maps.

Introduction

Balancing score card (BSC) strategy maps [1-4] and systems dynamics [5; 6] are two powerful strategy building tools. It is very important in strategy building because of its possibility to modelling organization performance over time. Strategy maps describe how the four perspectives: financial, customer, internal process, learning and growth are linked and how they create a balance between the more tangible outcomes through intangible resources. System dynamics is very important in strategy building because of its possibility to modelling organization performance over time. Here we use jointly both approaches in strategy building for an educational institution (VUC) in its development towards the entrepreneurial university. We will introduce dynamic elements in the strategy map and perform modeling of system dynamics.

Materials and methods

Several research methods have been used while carrying out research: empirical/experiential method, questionnaires, analysis of student, academic personnel and research dynamic data. We use the visual modeling tool Vensim* (<http://www.vensim.com>). Vensim is system dynamics simulation software based on flow and stock diagrams. Vensim is used for developing and analyzing of dynamic systems with feedback loops and also in strategy planning of educational institution policy [7-11]. We use BSC and strategy mapping methods.

Results and discussion

As knowledge became the driving force underlying economic growth and performance, a new and significant economic role for the university emerged. However, just undertaking scholarly research in basic disciplines did not suffice in generating sufficient knowledge to contribute to economic growth and performance [8]. The emergence of the entrepreneurial university was the need to create new interdisciplinary fields and research areas devoted to providing solutions to specific societal problems and challenges, along with a series of mechanisms and institutions dedicated to facilitating the spillover of knowledge from the university to firms and other organizations.

Almost all public universities in Latvia have the structure of departments where research institutes with few exceptions are sub-structures of departments with a highest priority to provide qualitative education services up to PhD level studies. Research activities are more integrated within PhD studies with the aim to renew university's professorship and to keep education – research linkages, thus getting feedback to the teaching process. The large emigration outflow of young talents and graduates abroad and low birth rates with followed essential decrease in the number of students, aging professorship with limited rotation caused by the requirement to provide lectures mainly in Latvian, determine the need for strategic changes in local university policies and administrative mindset. Estonian and Lithuanian universities, not speaking about other more developed Baltic Sea Region countries, show much higher flexibility, will, operate with larger resources and outperform the Latvian ones. The comparatively new regional university colleges (established in average 15-18 years ago) have a role of catalysts of regional growth and might be more adaptive to new situations compared to less flexible national-wide universities with slow decision time and lack of willingness to change.

Firstly, we draw the VUC strategy map denoting the main causal links and introducing the time factor through time delays (so introducing dynamics into the map) (see Fig. 1). Because of lack of place we sketched here only the main ideas of the model. Studies, R&D and lifelong learning are depicted separately. Corresponding VUC units involved in the process are shown. The existence of several processes with the different time scales and reinforcing and balancing loops are taken into account in the system dynamics models, but indication of them on the strategy map gives more real picture of the overall strategy and shows corresponding time delays and possible failures. For example, establishing of a new doctoral program requires time (additional personnel recruitment or VUC own new doctors, additional funding, which depends on the number of students in VUC). Results of the corresponding initiatives will appear only after a certain time, 3-5 years.

A lot of interconnections between different items in reality denote that every separate item is immersed into the effective media or field, which is created by other items and the considered item. In some sense, all interconnections have to be self-consistent so that the main university objectives should be reached [10]. In spite of the fact that some interactions are more important than others and they may appear after different times, the role of them cannot be neglected because of their resonant effect through the effective media (internal and external). Strategy map becomes more complicated if the dynamic effects (growth and different time delays on causal links of different connections) are included. Here we integrate the strategy map with the system dynamics approach.

There are several critical requirements to be fulfilled in order to bring VUC into entrepreneurial stream. Some minimal requirements should be fulfilled:

- critical mass of researches (number of available for TT development researches);
- research quality;
- research relevance to the regional business;
- extra funding;
- corresponding infrastructure;
- university administrative and organizational capacity;
- effective management taking into account an internal media reaction during the organizational changes.

Part of them has a historical aspect. VUC was built on the academic base with no connections with the regional enterprise. At this condition the academic personnel might be involved into the enterprise by using their consulting potential. This process should be guided as following.

1. First steps were successfully done with organization of the Engineering and Research Centre in 2005. Additional possibilities appeared with the invited scientists granted by the Ventspils University and the EU base.
2. New possibilities appeared when the first graduated IT students were involved in the local regional firms (5-year delay).
3. At the initial stage TT in essence is knowledge processing and transferring. Requirements to success are the same as in knowledge management and TT success depends on the initial conditions.

4. In the case of insufficient initial critical mass of researchers' collaboration with the regional universities and colleges should be activated.

It is desirable to create a new technology transfer unit (TTU) (consists of less than 4 persons) in order to coordinate all incentives (science and enterprise integration), see the TT implementation model (Fig. 2).

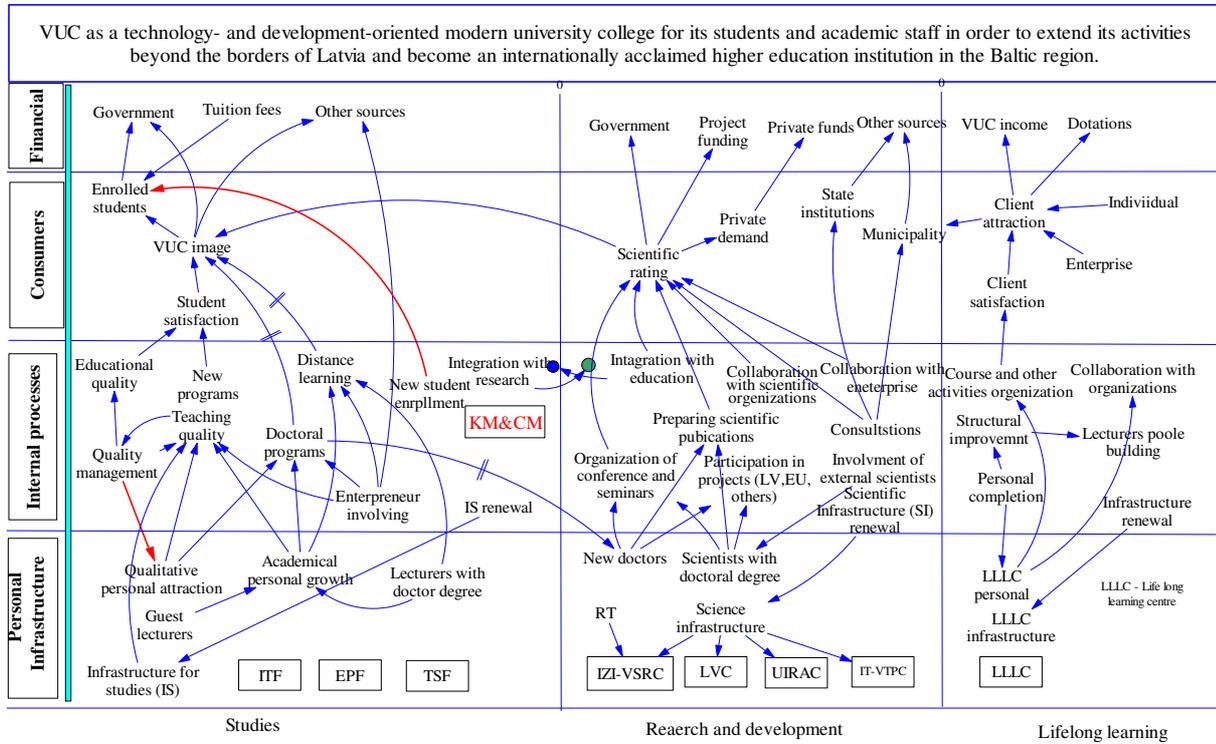


Fig. 1. VUC strategic map: ITF, EPF, TSF – units of studies; IZI-VSRC, LVC, UIRAC, IT-VTPC – units of research; LLLC – unit of Lifelong learning; essential time delays are marked by ||

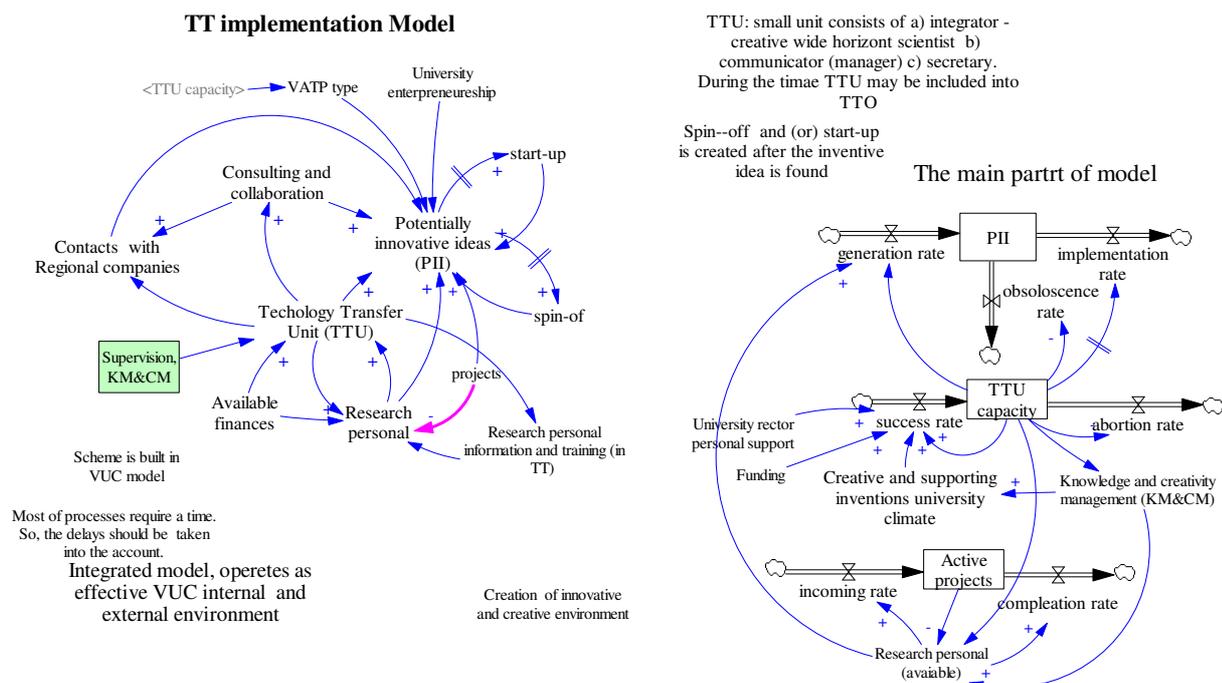


Fig. 2. TT implementation model and project management aspects in stock-flow form

Main functions of the model are knowledge and creativity management, organizing idea searching and generation, science – and regional enterprise interconnections. Additional problems appear with the work in the projects, because of the insufficient scientific personnel capacity (see Fig. 2).

During the present work the academic and scientific personnel development as well as growth of the number of students were investigated by simulating. The analysis highlights the problems with the personnel age structure, demographics and emigration. All these additional results will be announced elsewhere. Here we wish to stress the integrated approach to strategy building and the involvement of dynamic effects in the strategy map.

The proposed strategy map integration with systems thinking dynamics and simulation is very effective analysing the perspectives of the VUC development.

Conclusions

The necessity of strategic transformation is evident when taking into consideration the fact that VUC is not entrepreneurial. One of the fundamental characteristics of an entrepreneurial university is the relationship with its stakeholders. In the survey, all of the examined employees stated that the relationship and cooperation between the university and its stakeholders is very important, which implies that they realise the importance of the university-stakeholders' relationship. And when asked about the influence of the environment on the university, VUC is influenced by trends and affected by its environment, among which the negative environmental influences on the university itself are stressed. Therefore, it is important for the university to use this as an advantage and to regain, where needed, a closer cooperation with its stakeholders, especially with external stakeholders. In order to answer to these challenges and use environmental influences to its advantage, VUC needs to become more entrepreneurial.

The university is one of the world's most durable institutions and now it must pass a complex new test. The new quality of international competition dramatically changes the role and function of universities and research systems. An entrepreneurial university can mean three things [12]:

1. The university itself, as an organization, becomes entrepreneurial.
2. The members of the university (faculty, students and employees) are turning themselves somehow into entrepreneurs.
3. The interaction of the university with the environment, the structural coupling between the university and the region, follows entrepreneurial patterns.

It is important to support all contributors to entrepreneurial economy. Universities as centers for knowledge creation and diffusion can be leveraged to generate future economic growth.

Analysis of the VUC indicates that the university is still somewhat far from becoming an entrepreneurial one. This is mostly because of some key problems, like low level of university autonomy, inadequate organization and management capacities, lack of compatibility of the mission and development goals of the university, curricula, and compatibility of transferred knowledge. There are a number of activities which need to be undertaken. Some of them include activities aimed at: stimulation and encouragement of the process of change at the university, increase of institutional autonomy, change of the financing system of higher education institutions, creation of innovative, business-oriented curricula, introduction of up-to-date teaching methods, and activities aimed at strengthening the university-stakeholder relationship.

Creation of an entrepreneurial culture in a university environment is a complex task and a long-term process that requires the efforts of many dedicated individuals. All of them need to understand what an entrepreneurial university is and how important it is for the socioeconomic development of society. These individuals are located in industry, academia, and government, and often are only loosely coordinated with one another in their activities. But they all should share a common passion to provide new and expanded opportunities for the state's economy and citizens.

The future research will be devoted to investigate further the proposed whole VUC strategic map using the system dynamic approach. Technology transfer and absorption ability in line with increase of local and national innovation policy capacity building will be included in this model. The results of the paper can be also used for strategic planning in other small regional universities.

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