Assessing the usefulness of an early idea development tool among experienced researchers

Ulla A. Saari[1*], Leena Aarikka-Stenroos[1], Stina Boedeker[2], Leena Köppä[3], Jörg Langwaldt[4].

[1]Tampere University of Technology, Department of Industrial and Information Management, Center for Innovation and Technology Research, Tampere, Finland
[2]University of Tampere, Research Services, Tampere, Finland
[3]Tampere University of Technology, Innovation Services, Tampere, Finland
[4]Tampere University of Technology, Research Services, Tampere, Finland
* Corresponding author: ulla.saari@tut.fi

ABSTRACT

We test a novel ideation tool developed for early idea development among experienced academic researchers. We presented the Impact Canvas® tool to experienced researchers who assessed the usefulness of the tool in early idea development. This paper analyses their perceptions of the tool: its usability and visual appeal, content elements, ability to facilitate collaboration and motivate them personally. Our findings imply that the employment background of experienced researchers has an impact on how useful they consider the tool. Researchers with a background in the public sector appreciate the tool significantly more than researchers who do not have similar working experiences.

Keywords: Canvas tool; early idea development; ideation process; ideation tool.

INTRODUCTION

There is mounting pressure currently posed on universities to produce more sustainable and viable business solutions for the markets that are partly burdened by non-efficient technologies and costly solutions impacting negatively both on society and the environment. Science and researchers have been called for to deliver more impactful findings for society, and governments and media are observing more closely than before the outcomes of investments in research projects (Edler and James, 2015, McNie et al., 2016). Science is most valuable to society when it is not purely freely driven by researchers, but when it truly has impact and solves real world problems (Sarewitz, 2016). Still, very few practical tools support cooperation in academic research teams in the early idea development phase and effectively assist researchers in transforming research results into innovative business solutions that would also have significant impact on the market and on the societal level. In most cases, a team is essential for developing viable business ideas that are also impactful. To fill this gap, practitioners from three universities developed a novel tool, the Impact Canvas (IC) (Aarikka-Stenroos et al., 2016). The IC is targeted for early idea testing and idea development done by researchers as well as pre-start-up team members.

In the early idea development phase, the existing popular business planning tools, e.g. Business Model Canvas (BMC) (Osterwalder and Pigneur, 2010), do not offer the needed support for the academia to process research results into business innovations and further into realistic and implementable business solutions (Aarikka-Stenroos et al., 2016). In the BMC, the focus is on planning and developing a business in practice and the tool addresses how to formulate a strategy with regard to the main areas of its business, i.e. offerings, customers, infrastructure and finances (Osterwalder and Pigneur, 2010). Even though these aspects are also important in the early idea development phase for business and societal impact, early ideation calls for particular focuses (Reid and de Brentani, 2012), and thereby even more important are the basic existential questions on the reasons for developing a certain research result into a business idea. Researchers and pre-start-up team members need to start by finding answers to questions related to business vision, initial customer requirements, possible competition on the markets, initial resourcing as well as developing the idea into a viable and valuable solution for the markets (Impact Canvas® tool 2016).

The IC was developed to cover the most critical key areas that need to be developed when ideating business-related opportunities, and more specifically when the focus is on building a socially relevant business idea (Aarikka-Stenroos et al., 2016). The IC is a practical tool for early idea development and it has been tested in its earlier formats among research application facilitators, researchers, research grant applicants, and students (Aarikka-Stenroos et al., 2016). However, there is still no clear understanding on

how an early idea development tool such as the IC would support the work of senior researchers, including professors that already have extensive research experience in the academia and have been working in the business environment or public sector. With small user groups, we test whether experienced senior researchers consider the IC usable and visually appealing, content-wise useful and understandable, and whether it supports collaboration with others and motivates the users to be creative on a personal level.

THEORETICAL BACKGROUND

Ideation is a very important part of the innovation process, and in business development it is linked to the market visioning phase focusing on the early ideas that offer business opportunities (Markides, 2008). O'Connor and Veryzer (2001) present three factors that are crucial for the formulation of visions: motivation, insight and elaboration, which means that feasible visions are not created at one go, but they need to be developed over time. In the case of radical innovations in New Product Development (NPD), the role of individuals and their personal abilities to network and communicate with others, both internally in the team and externally, is important to form an early vision for the markets (also referred to as a market vision) (Reid and de Brentani, 2012).

The clarity of the vision for a business idea also indicates the strategic direction of the innovation (Reid and de Brentani, 2012) and thus it needs to be formulated methodically among the innovation team members. However, impactful business ideas do not necessarily always occur in ideal and similar circumstances, especially in the case of radical and novel technology development in so-called "double unknown situations" where both the technology and future possible markets are novel and still unknown (Kokshagina et al., 2016). It is in the very initial stages of development and exploration that teams would benefit from a tool or framework for helping to make the ideation phase more effective (Kokshagina et al., 2016, Heising, 2012). Visioning involves linking ideas to possible market opportunities and this visioning process can be supported in organizations by several drivers including the correct processes and tools (O'Connor and Veryzer, 2001).

The effectiveness of the methods used to develop technological applications and finding markets for them are crucial in the initial phases of the innovation process, and more research on methodology for creative design for science-driven innovations has been called for (Gillier and Piat, 2011). In addition it has been highlighted that for scientific research to have a beneficial influence on society as a whole and help solve real problems in the world, researchers should have a vision which highlights the meaningfulness and accountability of the research initiatives (Sareqitz, 2016). However, in the ideation phase the boundaries of technological knowledge and usage of novel emerging technology may still not be properly

defined, and thus, the exact application of the technology may be only on the level of the "identity of the technology" (Gillier and Piat, 2011).

The innovation education literature refers to many business modelling and innovation tools that support research and development teams in the early ideation phase (Doganova and Eyquem-Renault, 2009, Hixson and Paretti, 2014)). For example, the theory of inventive problem solving or TRIZ methodology has earlier been promoted as a logical approach that boosts creative and innovative problem solving, however, it has also been criticized for being very complex and due to lack of structure it is confusing for users and it is difficult to apply (Ilevbare et al., 2013). In addition, the so-called C-K (Concept-Knowledge) Design theory has inspired the creation of a strategic design tool for innovation projects. A tool called OPERA that is associated with the C-K theory requires that is used over a longer period of time regularly by the team members as a decision-making tool and to share and vote for favourite concepts and knowledge among team members (Gillier et al., 2010). Thus, this tool is not as such an early phase ideation tool that would help to discuss and create a vision and other essential elements for a socially impactful business idea.

The BMC has received the most attention in innovation and entrepreneurship studies (McNie et al., 2016). The format of the tool being a canvas allows it to be used as a collaboration tool, and it is also referred to as a boundary object that builds common understanding, facilitates communication over disciplines and specialist areas, thereby nurturing communication with others and co-creation for innovation that is crucial particularly at this phase (Aarikka-Stenroos et al., 2016, Akkerman and Bakker, 2011). On the BMC, the visualization of the key elements that need to be taken into account in business planning and modelling cover the value proposition, customers, finances and infrastructure (Osterwalder and Pigneur, 2010).

Ideation focuses on particular questions and themes to be addressed in a team. When promoting the development of viable business ideas in the early stages of the innovation process among researchers that do not necessarily have any background in business, one challenge is how to explicitly present with a usable tool the key content elements that are required to develop an idea into an impactful business idea and eventually a marketable business solution (Aarikka-Stenroos et al., 2016). In innovation activities, in addition to the actual research and development and later commercialization of a technical solution, the visioning and ideating in the front end is critical for the future success of the innovation (Markides, 2008), for example, the consideration of the possible future customer should be done in the early idea development phase (Prenkert, 2012).

The appearance and usability of a tool is also relevant, as visualization enables the simple extraction and synthesis of information, which also helps to easily find, understand and interpret information. The visual presentation of information has cognitive, social and emotional benefits:

cognitively the information is easier to understand, socially it facilitates communication with others, and emotionally individuals are more inspired and interested in working on the topic (Gavrilova and Alsufyev, 2015). The visualization of a tool in the format of an aesthetic graphical template has been found to have a positive impact on the development of business models as it enables people to understand business models easier and faster and construct in their minds a clear and understandable view of the business idea (Gavrilova and Alsufyev, 2015).

When a tool is used in the early idea development phase it is supposed to boost the beginning of the innovation process, and ensure that the team develops an idea that is good enough for the following phases in the process (Aarikka-Stenroos et al., 2016). This requires that the research team members can collaborate effectively inside the team and with outsiders. An early development tool should also motivate the individual team members on a personal level, so that they can individually contribute and bring forth their expertise in the team.

THE IMPACT CANVAS TOOL (IC)

The IC tool consists of seven different content elements that represent the different key areas that are considered to be relevant in the early ideation phase and need to be developed: vision, customer, solution, competition, resources, actions, and team (Aarikka-Stenroos et al., 2016, Impact Canvas® tool 2016) (see figure 1). Each content element on the IC includes three to four guiding questions (see Appendix 1).

Fig. 1. The layout of the Impact Canvas® tool[5].

We examine below how well the IC tool actually facilitated experienced researchers with its guiding content elements, its usability and visual layout, as a collaborative

instrument and a motivational driver on the personal level to develop further the impacts of research initiatives. When introducing the IC tool to researchers they are instructed to use the tool iteratively and to go through the different sections in the order that is beneficial for the idea development. The groups of researchers used the tool for a small case study after a short introduction, and thus the analysis of the tool is based on the initial impression and first use experience that the researchers get from the tool. The intention is to study whether the researchers consider the tool useful for independently developing a business idea based on their own research findings in their future research projects.

METHOD AND DATA

We pilot tested the usefulness of the IC among experienced academic researchers who have doctoral degrees and at least 10 years of experience in academic research (N=46). First, the IC was introduced shortly to the participants in IC workshops. The workshops were held in 4 different events in several European countries. The researchers had not seen the IC tool before the workshop and they were not aware of the format of the workshop beforehand.

After the introduction to the IC tool, the participants in the workshop formed smaller groups to discuss and develop an idea in 30 minutes according to the content elements on the IC. At the end of each workshop, the groups shared their ideas with the rest of the participants in the workshop. After the workshop, the participants participated in a short survey on the usability and visual appeal, content, collaborative and personal motivational aspects of the tool.

The survey was distributed as a short questionnaire in paper format to the respondents after the workshop. The response options follow a 5-point Likert scale, the response options ranging from Strongly Disagree (1) to Strongly Agree (5). The responses were analyzed with SPSS. The aspects of the tool that were measured in the survey are the following: Usability and Visual appeal, Content, Collaboration and Personal level motivation.

All of the respondents are involved in research activities in various different roles, ranging from coordinator and advisor roles to research manager or director and professor roles. Most of the respondents have worked for a university (85%), but some have also worked in the public sector (22%), as an employee in a company (15%), or in a company of their own (11%). Approx. 56% of the respondents are women and approx. 40% are men and 4% have not stated their gender. The majority of the respondents are in the age groups of 35-44 year olds (41%) and 45-54 year olds (46%), and only a few of the respondents fall in the age groups of 25-34 (6,5%) and 55-64 year olds (6,5%). Most of the respondents have very extensive experience in business development: 54% of the respondents have over 10 years' experience of working with business and 26% over 15 years.

RESULTS

In general, all of the respondents considered the usability and visual appeal, guiding content questions, collaborative approach and personal motivation aspects of the IC tool to be fairly positive, as the means for all of the statements are close to 4 (=Agree) ranging from 3,57 to 3,96 for all of the respondents. Some statistically significant differences in the views of the respondents can be seen when one analyses the employment background of the respondents.

The fact whether the researchers have worked in the public sector has significant impact on the way the researchers think about the IC tool compared to those who have not. Researchers with a background in the public sector have a more positive view on how the IC supports the ideation phase for all the four aspects: Usability and Visual appeal (U+V), Content (CON), Collaboration (COLL) and Personal level motivation (PERS) (table 1).

Table 1. List of statements that significantly differ for researchers who have worked in the public sector (Yes, N=10) and those without this experience (No, N=36).

	P.S.	Mean	SD	CI 95%	Sig.
IC is easy to use. (U+V)	Yes	4,00	0,471	3,66-4,34	0,086
	No	3,53	0,810	3,25-3,80	
IC is aesthetically pleasing. (U+V)	Yes	4,50	1,780	3,23-5,77	0,052
	No	3,69	0,889	3,39-4,00	
IC serves its purpose very well and helps with the early idea development. (CON.)	Yes	4,40	0,516	4,03-4,77	0,021
	No	3,69	0,889	3,39-4,00	
IC helps me to involve my team members in the idea development. (COLL.)	Yes	4,30	0,675	3,82-4,78	0,091
	No	3,83	0,775	3,57-4,10	
IC inspires me to work on an idea. (PERS.)	Yes	4,30	0,483	3,95-4,65	0,013
	No	3,64	0,762	3,38-3,90	
IC boosts my creativity. (PERS.)	Yes	4,00	1,054	3,25-4,75	0,079
	No	3,44	0,809	3,17-3,72	

P.S. = Worked in the public sector, SD = standard deviation, CI = confidence interval for mean, Sig. = significance level.

The fact whether a person has worked in a company of their own or not does not have any significant impact on how the respondents view the IC tool. However, if the respondent has worked as an employee in a company it has a significant difference on how useful the IC is seen for some aspects. Researchers who have worked in a company have a more negative view on how the IC serves its purpose and how helpful it is for discussing the business idea outside the team (table 2).

Table 2. Statements that significantly differ for researchers who have worked in a company (Yes, N=7) and those without this experience (No, N=39).

	Co.	Mean	SD	CI 95%	Sig.
IC serves its purpose very well and helps with the early idea development. (CON.)	Yes	3,29	1,113	2,26 - 4,31	0,062
.	No	3,95	0,793	3,69 - 4,21	
IC helps to discuss an idea with others outside my team. (COLL.)	Yes	3,43	0,535	2,93 – 3,92	0,053
	No	4,05	0,793	3,79 – 4,31	

Co. = Worked in a company, SD = Standard Deviation, CI = Confidence Interval for Mean, Sig. = significance level

There were some differences in the way the different age groups appreciated the tool. Especially for the layout of the IC ("*The layout is logical and can be quickly understood*") there were significant differences in the way the 25-34 year olds (mean 2.67).and the 55-64 year olds (mean 4,33) assessed the tool. Also for the collaborative aspect ("*IC helps to discuss an idea with others outside my team*") the 25-34 year olds do not agree with this statement (mean 3,00) similarly as the 55-64 year olds (mean 4,67). However, as the sample did not include many of representatives for these age groups (N=6), it is not considered to be more than indicative of this tendency for younger researchers to be more critical of the IC tool. For the other age groups (35-44 and 45-54 year olds) there were no significant differences in the responses for the items. There were no significant differences in the way women and men assessed the tool.

DISCUSSION AND CONCLUSIONS

The results indicate that researchers who have worked in the public sector consider that the IC tool would be especially helpful in the early idea development phase. These researchers have possibly not gained much experience in business ideation and product innovation in collaboration with other teams, and thus they think that the

IC would help to discuss the idea with others. It could also be that the IC is more understandable and relevant for those people who have worked in the public sector. The societal impact of research is a topic that these researchers may have been considering more than those researchers who have not worked in the public sector. Therefore, they identify that there is clearly a need for such a tool.

Researchers who have worked in a company show significantly lower appreciation towards the content ("*IC serves its purpose very well and helps with the early idea development*") and collaboration aspects ("*IC helps to discuss an idea with others outside my team*") of the tool. This could be an indication that they are more familiar with business ideation and finding suitable customers and markets, thus they may not consider that a tool would help in the process as much as those people who have not worked in a company (Aarikka-Stenroos et al., 2016). Maybe they do not consider that it reflects the true complexity of the ideation process content-wise and it does not offer that much support for discussing with others as they are already familiar with collective exploration in teams (Doganova and Eyquem-Renault, 2009) within a company in a similar manner that is facilitated by the canvas (Osterwalder and Pigneur, 2010).

One limitation of this study is the small sample size. In addition, the portion of people who have worked outside the university, in the public sector (22%) or as an employee in a company (15%), is not very high, however, the findings of this study can be taken as an indicative sign of the views of these respondents. The findings suggest that there are different kinds of needs for an early idea development tool depending on the work experience of the researcher.

A more comprehensive research and experimentation regarding the usability and understandability of the IC should still be conducted in the future. The tool should be assessed and experimented with different kinds of user groups in more detail especially content-wise to test whether the tool helps the users to identify and solve their main problems in the ideation phase (Gillier and Piat, 2011). For example, dedicated scientists/engineers/student teams as part of Challenge Based Innovation Program at IdeaSquare@CERN (http://ideasquare.web.cern.ch/) could be ideal for testing this approach.

However, as the ideation phase is still a very fuzzy phase where the technology and markets can be still unknown (Kokshagina et al., 2016), it may be very hard for the team even to identify all the main problems. The main challenge in the early ideation phase is to iteratively develop the business idea, which is what the IC is ideal for. However, the IC could be further enhanced so that it serves different kinds of needs of researchers depending on their background. The researchers who have experience in working in a company might need some other more developed versions of the guiding questions for the different elements in the IC tool.

REFERENCES

Aarikka-Stenroos, L., Boedeker, S., Köppä, L. & Langwaldt, J. 2016. How to develop a new innovation education tool: A Case Study. The ISPIM Innovation Summit, Kuala Lumpur, Malaysia 2016.

Akkerman, S. F., & Bakker, A. 2011. Boundary crossing and boundary objects. *Review of educational research*, 81(2).

Doganova, L. & Eyquem-Renault, M. 2009. What do business models do?: Innovation devices in technology entrepreneurship. Research Policy, 38(10), 1559-1570.

Edler, J. & James, A. D. 2015. Understanding the emergence of new science and technology policies: Policy entrepreneurship, agenda setting and the development of the European Framework Programme. *Research Policy*, 44(6): pp. 1252-1265.

Gavrilova, T., Alsufyev, A. 2015. CAVIS Versus Canvas: Two Approaches Comparison. 16th European Conference on Knowledge Management; Kidmore End: 303-312. Academic Conferences International Limited. (Sep 2015).

Gillier, T., Piat, & G. (2011). Exploring Over: The Presumed Identity of Emerging Technology. Creativity and Innovation Management, 20(4), 238-252.

Gillier, T., Piat, G., Roussel, B., & Truchot, P. (2010). Managing Innovation Fields in a Cross-Industry Exploratory Partnership with C-K Design Theory. Journal of Product Innovation Management, 27(6), 883-896.

Heising, W. (2012). The integration of ideation and project portfolio management - A key factor for sustainable success. International Journal of Project Management, 30(5), 582-595.

Hixson, C. & Paretti, M. C. 2014. Texts as tools to support innovation: Using the business model canvas to teach engineering entrepreneurs about audiences. *IEEE International Professional Communication Conference (IPCC) October 2014,* pp. 1-7.

Ilevbare, I. M., Probert, D., & Phaal, R. (2013). A review of TRIZ, and its benefits and challenges in practice. Technovation, 33(2-3), 30-37.

Impact Canvas® tool 2016.

Kokshagina, O., Le Masson, P., Weil, B., & Cogez, P. (2016). Portfolio Management in Double Unknown Situations: Technological Platforms and the Role of Cross-Application Managers. Creativity and Innovation Management, 25(2), 270-291.

Markides, C. 2006. Disruptive innovation: In need of better theory. *Journal of Product Innovation Management*, 23(1): pp. 19–25.

McNie, E.C., Parris, A., & Sarewitz, D. 2016. Improving the public value of science: A typology to inform discussion, design and implementation of research. *Research Policy*, 45(4): pp. 884-895.

O'Connor, G.C. & Veryzer, R.W. 2001. The nature of market visioning for technology-based radical innovation. *Journal of Product Innovation Management*, 18(4): pp. 231–246.

Osterwalder, A. & Pigneur, Y. 2010. *Business model generation: a handbook for visionaries, game changers, and challengers*. John Wiley & Sons.

Prenkert, F. 2012. Commentary to "From new-product development to commercialization through networks". *Journal of Business Research*, 65(2): pp. 207–209.

Reid, S. E., & de Brentani, U. 2012. Market vision and the front end of NPD for radical innovation: The impact on moderating effects. *Journal of Product Innovation Management*, 29(S1): pp. 124–139.

Sarewitz, D. 2016. Saving Science. The New Atlantis. *A Journal of Technology and Society*, Spring/Summer, 5-40.

APPENDIX 1

The guiding questions for the different elements in the IC tool:

Vision: *"Why do we exist? What would the world miss if our idea would not be realised? How does our idea link to the current and/or future societal challenges? What would our tomorrow's world look like?"*

Customer: *"How can we prove that there is an important need? Why would someone pay for this? How any customers share this important need? When and where are the first ones to utilise our solutions?"*

Solution: *"How do we solve the need? What is the current level of our solution? What could be the minimum viable product/service of our solution? Where is our solution in the value chain? What and who is needed to produce, deliver, sell etc. our solution?"*

Competition: *"How does our solution to the customer's problem differ from the other alternatives? What can we learn from benchmarking the alternative solutions and/or their business models? How could the competition evolve in the future?"*

Resources: *"Who invests in us – and why – now and in the future? What are the ways to benefit from our social networks? What intellectual properties, IP, (as background and/or result material, patents etc.) is needed and/or available to utilise our solution? Who owns the rights of the IP?"*

Actions: *"What do we need to do to reach the next level of our solution and take into account the customer view? How do we reach/communicate with the key stakeholders? What is our roadmap to utilise the results? If there are results that need to be protected: what, why and how to do and pay for it?"*

Team: *"Who do we need in our core team to execute our idea? Who are the key partners and/or stakeholders needed for implementing our idea? What is our core team's role in the utilisation?"*