THE INNOVATION CAPACITY TEST

Innovation metrics with insight
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Author       Sander van Reijzen (9691359)
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Committee    Dr. ing. Marc Zegveld  Chairman  DUT
             Dr. Erik Den Hartigh  First supervisor  DUT
             Drs. Ronald Dekker  Second Supervisor  DUT
             Djeevan Schiferli  External supervisor  IBM
             Drs. Tijs Wilbrink  External supervisor  IBM
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EXECUTIVE SUMMARY

This research deals with innovation metrics, the measurement of innovativeness of companies. At the start of the research, two main downsides of current popular innovation metrics have been identified: they do not completely cover the field of modern innovation and they do not give insights into the internal innovation processes of the firm. These metrics (patent publications, new product announcements, sales from new products) are found to have a mediator function between the firm and the ultimate (financial) performance. The scope of this research is the earlier steps in the process that deal with how to achieve this innovative output. A deliberate choice has been made not to include market conditions but only elements that are really under the influence of the firm and that determine a firm’s innovativeness from an inside-out perspective.

In an elaborate review of the available literature, through quantitative meta-studies and qualitative reviews, a total of 17 of the most important determinants of innovativeness have been identified. For each of them, a description of the ‘best practice’ that a company should aim for has been provided. The determinants have been put into a framework that consists of four domains: resources, capabilities, network and culture. Every domain consists of 3 to 6 dimensions; together these are the original 17 determinants. Based on this framework, a measurement tool has been developed.

The Innovation Capacity Test consists of a total of 100 statements that together address every element of the best practice framework of determinants of innovativeness. Respondents are asked to indicate on a five point Likert scale to which degree they agree to a certain statement. Based on these responses, the tool calculates the level of fit to the best practice for every one of the domains and dimensions in the framework. The test can, and should, be conducted on multiple respondents within a company or unit to get the best result.

The test results give insight into the strengths and weaknesses of a company’s innovative capacity. If there are more respondents, the test gives a good overview of the general tendency of how people experience and deal with innovation. But the test results tell a lot more. Since the actual translation of the framework into the test needs to be validated with further research, the nominal measurement of innovativeness is not the most valuable. It is the differences in insights and the striking elements within dimensions and on a lower level, that are the most interesting. In various pilot tests, it has been established that the test results can indeed give new insights that are very interesting to be discussed further with the company under investigation. In that sense, the test is very suitable as an agenda for further discussion, a kind of gap analysis. Next to that, there are many other applications imaginable for the Innovation Capacity Test, ranging from intra-industry comparison to performance indicators and the study of group dynamics.

After all, the development of this test started as an attempt to create a new set of innovation metrics and it evolved into the development of a very versatile tool of which the results can deliver important insights. Some further study is required, but the test is almost ready to be used by IBM and to become the start of valuable client relationships for the company. I hope it will.
"But in capitalist reality as distinguished from its textbook picture, it is not...(price) competition which counts but the competition from the new commodity, the new technology, the new source of supply, the new type of organization...competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the outputs of the existing firms but at their very lives. This kind of competition is as much more effective than the other as a bombardment is in comparison with forcing a door."

(Schumpeter 1943, p. 84)

**INTRODUCTION**

Schumpeter’s early recognition of the need for innovation is still very much alive today. As we will see later on in this research, innovative firms generally outperform other firms in terms of economic performance. Even more so, the principles of Schumpeter’s ‘creative destruction’ (Schumpeter 1976) are also still very much alive and therefore innovation is key to the survival of many companies. A firm has to be able to renew itself and its products or it will face an uncertain future. No wonder then, that there is great attention for how innovative a firm really is and how to assess that. This thesis will deal with this subject but will also take it a step further and explore the question of how a firm can actually do that, be innovative. We start however with the basics, the assessment of an organization’s innovativeness; in other words: innovation metrics.

**Main points from this chapter**

- Innovation metrics are used to assess the innovativeness of companies; the downside of current metrics is that they do not completely cover the field of modern innovation and they do not give insights into the internal innovation processes of the firm

- The goal of this thesis is to develop a measurement tool that gives managerial insight into the innovativeness of companies by assessing the determinants of innovative capacity of that company
1.1. Problem statement

Innovation metrics are used to assess the innovativeness of companies. How does this work in practice, how can one actually assess the innovativeness of companies? There are quite some rankings and charts being published throughout the popular management literature, but also in scientific (innovation) management literature. If one looks at this literature on the assessment of the innovativeness of companies, the same indicators are present throughout the studies. The prominent European innovation study CIS (Community Innovation Survey) for example, uses traditional indicators like R&D efforts, patents and patent applications and some newer indicators like total innovation expenditures or sales from innovative products. Consequently, the literature using these kinds of figures also defines innovativeness in these terms (Kleinknecht et al. 2002). There are however a number of downsides to these kinds of measurements.

First of all, the way in which companies innovate changes continuously. Since the foundation of large-scale Research and Development labs in the 1900’s, at least four generations of R&D have been present (Rothwell 1994; Niosi 1999; Ortt and Van der Duijn 2005). For many industrial firms, the main trend has been that they have moved from doing research in ‘closed’ laboratories to a situation in which they are faced with a networked market, in which innovation is much more an ‘open’ process. This shift, as described by Chesbrough (2003), has at least three consequences: 1) Firms cannot do everything themselves so they have to collaborate, 2) Knowledge flows because people leave the company and better knowledge may be available outside the firm and 3) Different products, processes or services require different approaches to innovations. This all means that the successful innovators of today have to have a completely different approach towards innovation. This also means that traditional metrics like R&D spending and patent applications no longer completely cover the concept of innovativeness.

Secondly, these metrics all only deal with inputs and outputs of the company and regard what is happening within the company in terms of innovation processes as a black box. From the point of view of availability and ambiguity of data it is not strange that these measures are being used extensively in econometric studies. Especially, because these internal processes in the firm may be ‘softer’ and therefore much more difficult to quantify. Nevertheless, it is a shame that these metrics do not give insight in the internal processes of the firm, since that is most likely where a company has to make the difference if it wants to be more innovative.
Summarizing, the problem with current innovation metrics is that they do not cover the complete area of the innovation landscape and they do not really give insights into the processes behind the innovative output. In other words: you have a certain level of innovativeness, but what does that tell you; is that good or bad; can you improve; and if so, how and where?

1.2. Research design

The goal of this research is to build a measurement tool that assesses an organization’s innovativeness without the downsides of current innovation metrics. To get there, the available literature on this subject will form the foundation. As a starting point, the resource-based view of the firm will be used and linkages with the innovation literature will be identified. To construct the tool, the available literature on what determines a firm’s innovativeness will be reviewed and a concise framework that is used as the foundation for the assessment tool will be developed.

There are a few main challenges in this research: First of all, the available determinants have to be generalized into a limited set of dimensions that still cover the underlying theory. One can probably make up an endless list of possible determinants that can somehow influence innovativeness. Based on the literature, the most important determinants will have to be selected and developed into a reference framework that forms the foundation of the tool. Secondly, many of the researches on these determinants are qualitative. Appropriate measurements will have to be found for each of the determinants to come to a sensible assessment. One can think of many ways to assess these aspects and those will have to be reviewed to come to a workable method.

The ultimate objective is thus to construct a tool in which the most important determinants of innovativeness of the firm are assessed. This assessment will result in a score that embodies the capability of a firm in terms of innovativeness. This score can and should be divided into scorings on different dimensions since it is exactly the strengths and weaknesses and differences in scorings that are an interesting point of analysis.

An important starting point for designing the tool will be the design specifications that set the boundaries for the tool. These specifications will be agreed upon with IBM, the issuer of this assignment. Because it is the goal of this research to let it be meaningful and useful, the requirements of the issuer are important.
Research statement
The main objective of this research can be summarized as follows:

To develop a measurement tool that gives managerial insight into the innovativeness of companies by assessing the determinants of innovative capacity of that company.

This objective can be split up into a number of (sub) research questions that need to be answered:
1. What is the relationship between determinants of innovative capacity, innovativeness, innovation indicators and (financial) performance?
2. Which determinants are crucial for the innovativeness of companies according to literature and other sources, i.e. IBM professionals, consultants, business literature?
3. How can these determinants be put into a framework?
4. How can these determinants be measured?
5. What conclusions can we draw from this measurement?

Scope
As is pointed out in the research statement, the research will first be confined to companies. The aim is to let the tool be applicable to any kind of company in any kind of industry. Ideally, the tool should give an ‘innovativeness score’ for every kind of company. We do have to realize however, that the tool will be based on literature that investigates innovative companies. Usually, these studies investigate certain types of innovative companies in a certain type of industry and it is therefore inevitable that there is a bias in these studies.

The most important confinement is the fact that this research will only consider determinants that are under the direct influence of the company. Other determinants, like market circumstances or power of competition are not regarded. It is the explicit aim of this research to give an overview of the strengths and weaknesses of the internal organization of the firm. Obviously, this has some consequences for the results and the interpretation thereof. Chapter 0 will elaborate more on this issue.

Research methodology
To reach the objective as just defined, various activities have to be carried out. These phased activities form the methodology of the research.
1. Build a complete picture of existing prominent measurements
Based on literature review, case studies and interviews with experts in this field (could be within IBM or external), an overview of the available measurements and determinants of innovativeness will be constructed. There is quite some research in this field, with different accents and focuses. Therefore, meta-studies and literature reviews are the starting point for data gathering. In general, these meta-studies should give a less biased picture than for example expert interviews.

2. Create framework of the determinants of innovativeness
One of the challenges of this research will be to create the general dimensions that form the backbone of the tool. The goal thereby is to develop a concise number of dimensions that still cover the complete area of dimensions that have been determined in the first phase. Again, the findings from the meta-studies will be most prominent in deciding on which are the most important determinants.

3. Develop the first version of the tool to assess these dimensions
Before moving to assessment of each of the dimensions, an assessment method will have to be developed. Various types of assessment exist and various sorts of questions and data requirements can be drawn up. Based on theory on this subject and the methods used in the reviewed literature, an assessment method will be developed. To measure the dimensions that have been developed in phase 2, appropriate ways to assess these dimensions have to be constructed. The assessment could differ per dimension but could also be the same, for simplicity reasons.

4. Validation and testing of the tool
After development of the first version of the tool, it needs to be tested against certain requirements. Obviously, it needs to measure what it sets out to measure: the innovativeness of an entity. But there are more requirements, for example user-friendliness, completeness and availability of the required inputs. There are different possibilities for assessing these requirements:
- Discuss the tool with experts
  Experts can confirm whether the developed tool is indeed a good measurement method to assess the innovativeness of companies. Based on their insights from experience, they can judge whether there are maybe elements missing or that the chosen method is not correct. Furthermore, IBM experts could judge whether the tool could be a valuable tool for IBM itself and in the contacts with their clients.
- Do an analysis of (parts of) IBM with the tool and discuss the results
  An important test for the tool is whether the results in terms of strengths and weaknesses and other striking elements observed also match with reality. In a pilot test within one or more business units, the results could be discussed with the
respondents undertaking the test to see whether they think that the results really reflect their opinions and feelings. In such a pilot the user requirements could also be tested and based on the feedback of the respondents the test can be improved. Important feedback can regard the assessment method that is maybe not clear or the fact that information that is being asked for is perhaps not available. Finally, the results of the test can be interesting for IBM itself to get more insight into its own strengths and weaknesses.

- Test the tool on a number of companies (entities) on which other studies on innovativeness have been done so the results can be compared.

There is also a possibility to test the tool by comparing the scores with the traditional scores of innovativeness of the same companies. Obviously, there should be a relationship (linear regression) between the two. Based on the available time and resources, a decision will be made later on about what is the best method for this phase of the research.

5. Develop final version of the tool

Based on the results of the testing and assessment, the tool can be finalized. This is an iterative process rather than a linear one.

Relevance

The relevance to the scientific field of this research lies in the application of research results that have been achieved by combining two fields of research: The resource-based view and innovation-performance measurement. Only since a few years this combination gets attention in scientific publications. So far, only a few studies have performed quantitative and qualitative reviews from a perspective of the resource-based view. Nobody has, to the best of my knowledge, combined these studies into an assessment tool that can actually be used. In my view, this should happen more often: the value of academic research can be higher if it is actually applied in practice and used by those that can benefit most from it.

In this application lies also the value and relevance for IBM. Cooperating with universities to absorb scientific knowledge is part of IBM’s strategy. The company wants to be regarded as an innovator and wishes to position itself as the innovator’s innovator: it wants to help clients become more innovative. To do that, you obviously need to have two things in place: Know how innovative you are yourself and be able to tell the client the same. A clear and meaningful analysis of a client’s innovativeness could then be a valuable start of a relationship.
Deliverables

This research will have two main deliverables:

1. A framework of the determinants of innovativeness

The result of the data gathering based on literature will be an overview of the most important determinants of innovativeness. This framework will be used to base the tool on, but can also be used in other research as a reference framework for assessing these kinds of issues.

2. A tool to assess the innovation capacity

Based on the framework of determinants, the tool will assess to which extent the company under investigation fits the best practice that was established in the earlier phases of research. The tool will provide insights into strengths and weaknesses of the company as well as show differences in views and opinions that are alive within the organization. Based on the assessment, recommendations can be given to the company under investigation. The results of the test will form an agenda for further discussion with the company.

1.3. Structure of the thesis

The following chapter will explore the basic literature that forms the foundation for this research. After that, chapter 3 consists of an elaborate review of the applicable literature that will be shaped in the description of a best practice framework of determinants. Chapter 4 describes how a measurement method and tool have been developed based on this framework. Chapter 5 deals with the validation and field testing that has been executed with the tool. The thesis ends with conclusions in which the questions that accompanied the research statement will be answered. Conclusions will be drawn about what the most important determinants of innovativeness are and how they are related. Also, the assessment method that was developed as well as the different applications of the tool and the meaning that can be given to the results will be discussed. Finally, some statements will be made about the limitations of the research and directions for further study.
**NOTE**

The remainder of this report is confidential. If you wish to have access to it, please contact Dr. Marc Zegveld.

Sander van Reijzen
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