Implementing inbound open innovation in the CE industry. A case study of Philips-branded Televisions

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Abstract. Successful innovation requires a company to participate in open innovation and to be connected with the ecosystems around it. For consumer electronics industry, this article distinguishes knowledge, experience and legislation/certification ecosystems. In order to draw the necessary knowledge from ecosystems for inbound open innovation, companies should involve all functional areas in the gathering information and trends from the ecosystems. While most companies involve marketing, development, and production, two key areas for ecosystem knowledge gathering often remain untapped: purchasing and the participation in external standardisation bodies. Successfully using all functional areas to gather ecosystem knowledge will lead to the right innovations at the right time. Regular cross-functional meetings ensure the appropriate translation of collected information and knowledge into portfolio and development choices. The article illustrates this by the example of TP Vision, the makers of Philips-branded televisions, which has successfully applied this innovation process in the consumer electronics (CE) industry.

Keywords. Cross-functional, Ecosystem, Innovation, Open innovation Organisation of research, Product design, Purchasing, Research programme, Research and development, Standardisation

1 Introduction

Innovation accelerates rapidly and the speed of change is a challenge for every innovation manager. Many markets change so fast, fuelled by innovation, that it is hard to anticipate changes throughout the product development stages. The lead-time of new product development often exceeds the change rate in the market place. In order to innovate successfully, it is of utmost importance that businesses map-out their innovation ecosystem and track their partners and potential adopters (Adner, 2006; Iansiti and Levien, 2004). This approach mitigates the risks of offering the wrong product at the wrong time. Although the need for close monitoring of the innovation ecosystem has previously been identified (Adner, 2006), the most effective way to do so is still under debate. This paper describes a multi-disciplinary innovation approach and the benefits, when applying it in a fast changing environment like the Consumer Electronics (CE) market. The exemplary case used in this paper is the development of Philips-branded televisions in the company TP Vision. TP Vision concentrates on developing, manufacturing and marketing Philips-branded TV sets in Europe, Russia, Middle East, Brazil, Argentina, Uruguay, Paraguay and selected countries in Asia-Pacific. Based in Amsterdam, the Netherlands, TP Vision is the exclusive brand licensee of Philips TV for the above listed countries. The TV Company is 70% owned by TPV, headquartered in Taiwan, and 30% by Royal Philips, headquartered in the Netherlands. TP Vision employs close to 2000 people in

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various locations around the world. (TP Vision, 2014)

2 The open innovation approach

Ever since Chesbrough (2003) coined the term open innovation, it has been a much-debated topic in the innovation literature. It can hardly be argued that in our international and interconnected world today, there still exists a pure form of 'closed innovation', in which a company innovates merely on the basis of their internal ideas and processes. Companies and research institutes are constantly subject to outside influences. Open innovation however requires a firm to consciously and purposely allow for information and knowledge in- and outflows to accelerate innovation (Chesbrough, 2006).

As open innovation is a broad term, it has since been used in many forms and situations, as noted by Huizingh (2010). An often-made distinction in order to structure the different forms of open innovation is the difference between inbound and outbound innovation, the former denoting the internal use of external knowledge, the latter denoting the external exploitation of internal knowledge (Huizingh, 2010). This case study focuses on inbound innovation: how can a company effectively use knowledge from outside its own circle in its innovation process. Sourcing ideas from the outside, does not warrant a company to abandon its own knowledge creation processes. As Dahlander and Gann (2010) note: "Internal capabilities and external relations are (…) complements rather than substitutes" (p.701). By sourcing the right amount, as well as the right sort of ideas, at the right time in the innovation process, open innovation can catalyse already existing innovation capabilities. This in turn can be valuable financially: "Firms that manage to create a synergy between their own processes and externally available ideas may be able to benefit from the creative ideas of outsiders to generate profitable new products and services." (Dahlander and Gann, 2010, p.704).

Current literature focuses on defining *what* open innovation is, *when* open innovation is practical and effective, and *how* to manage the open innovation process (Huizing, 2010). This case study aims to illustrate the latter: how to successfully implement open innovation. Generic frameworks have been offered in the literature, such as the five stage model by Walling and von Krogh (2010). However, although giving a guideline, such models still do not answer the question on *how* to specifically design and implement successful open innovation practices within an organisation. As Huizingh (2010) notes: "the internal process by which companies manage open innovation is still more trial and error than a professionally managed process" (p.6). Indeed, Dahlander and Gann (2010) note: "We have limited understanding of the process of sourcing this *(external knowledge)* into corporations" (p.707).

Moreover: "There is less research focused on the underlying decision process, which is important as firm face difficulties in maintaining large number of relations" (p.707). This paper aims to help fill such gap in the literature by providing a case study of precisely *how* open innovation can be professionally, systematically and successfully managed when involving a large number of external relations. First, the studies research question and methodology will be defined. Second, the open innovation practices at TP Vision will be structurally addressed, respectively discussing a) the mapping of the innovation ecosystem, b) the translation of knowledge from ecosystem to organisational knowledge, c) the portfolio decision process, and d) the measurement and monitoring practices. Lastly, the implications and limitations of the study are considered in order to make way for further research.

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3 Methodology

They key questions to be addressed by this research is how to organise open innovation successfully, and how to optimise the decision process. As opposed to the often seen trial-and-error approach within the open innovation field, this study aims to provide a systematic example of successful open innovation, from information and knowledge sourcing up to final product decision.

The authors have chosen to select the case of TP Vision, a large (about 2000 employees), international (European and Asian innovation sites) company that operates in the fast-paced-innovation consumer electronics (CE) industry. The TP Vision method of organising open innovation has been used and developed for over 10 years and led to many successful innovations, such as Ambilight TV. Due to its success, the method has been copied by a number of business units within its former mother company, Royal Philips (e.g. the audio division). It is judged by many CE insiders as best practice, and can therefore offer good insides and examples for other companies on how to implement and organise open innovation. Up until now, its practices have not been described systematically, which is what this paper aims to bring to the table.

One of the authors has been responsible for the execution and improvements of the innovation process and, as such, has insights in the process. Furthermore, he was key stakeholder in the yearly process evaluation and effectiveness analyses. These internal effectiveness analyses (based on structured interviews with more than 10 key participants) were base on performance indicators such as "number of successful open innovation initiatives" and "business impact (success rate) of started innovation projects". The proven track record of TP vision's innovations, it's "example role" for different business units, as well as the consecutive positive internal evaluations warrant TP Vision to be an interesting and valid case study. Nonetheless, one has to take into account its context specific environment, such as the consumer electronics industry, when extrapolating its methods to other corporations, something that will be further addressed in the section 5.

4 Case study TP Vision

The innovation approach of TP Vision is described in this section. We start with a description of innovation ecosystems, in the light of the fast changing environment of the consumer electronics industry. Next, the question of how to translate knowledge from ecosystems into organisational knowledge is addressed. Based on this organisational knowledge, the management of a company has to make portfolio choices in the innovation programme. An organisational model to set priorities in the portfolio is described. As the lead-time of new product development often exceeds the change rate in the marketplace, an organisation has to organise it self to deal with this dynamics. Continue measurement, which will result in either adaptation of the portfolio or an improved decision process, does exactly this and is discussed in the last part of this section.

4.1 The Innovation Ecosystem

A business never operates as a stand-alone, but is always part of the environment around it. This (business) environment is the ideal source of information and knowledge that fuels open innovation. Before one can start harvesting the information

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and knowledge from outside the company (see section 4.2), one has to first define where to look for this information: one has to define the business ecosystem. Using the words of Iansiti and Levien (2004), business ecosystems are loose networks- of suppliers, distributors, out-sourcing firms, makers of related products or services, technology providers, and a host of other organisations- that affect, and are affected by, the creation and delivery of a company's own offerings. The ecosystem therefore consists of a very wide variety of stakeholders relating to your business. It is the interaction with this ecosystem that can work as a catalyst with one's own capabilities to enhance innovation. There are several approaches to mapping such ecosystem, among others the Technological Innovation System developed by Utrecht University in cooperation with other European institutes like Chalmers University in Sweden and EAWAG in Switzerland, which offers 5 steps to a complete business ecosystem analysis. Although such comprehensive mapping might be academically desired, it can be superfluous in a real business situation. Mapping out the ecosystem has to serve a purpose: it has to identify those areas in which you can source the information and knowledge for future innovation. TP Vision has restricted the innovation ecosystems of its core business, the consumer electronics industry, to merely three sub-ecosystems that best capture the majority of the company's ecosystem. This way, there are three clear areas in which the company monitors activities and actively participates in knowledge and information gathering. In the case of TP Vision, those three ecosystems are: the knowledge ecosystem, the experience ecosystem and legislation/certification ecosystem. In other industries, the ecosystem might be simplifiable to other amounts of sub-ecosystems: the subdivision has to serve the purpose of clarity and parsimony; subdividing for the sake of subdividing is never recommended. The definition of the ecosystems for the consumer electronics industry as used in this case study are:

- Knowledge ecosystem: the environment to leverage the knowledge economy
- Experience ecosystem: the environment in which new use cases and new business models are defined
- Legislation/certification ecosystem: the technical environment in which the consumer electronics equipment is functioning (interfaces, content and services)

In consumer electronics, in-depth knowledge of all three ecosystems is needed to offer the best experience in every use case to the consumer. However, when developing a new feature for a consumer electronics product, a link to one of the ecosystems will be likely to be most dominant. However, the other ecosystems will also always play a role in the process, and are therefore equally important to monitor. In the next sections, each of the three ecosystems will be addressed in turn based on TP Vision examples. For every ecosystem a use case example in which the respective ecosystem prevails will be presented.

Knowledge ecosystem

The knowledge ecosystem in the consumer electronics industry is the environment of enterprises and knowledge institutions, which hold key expertise needed to improve the product performance. Good access to knowledge ecosystem is essential to reach breakthrough innovations.

An example of TP Vision in which the knowledge ecosystem was dominant, was concerning Ambilight, an innovation in which the TV picture extends with supporting surrounding light. In the case of Ambilight innovation, it all started with a project called Ambient Intelligent Lighting (Diederiks and Hoonart, 2007). This project started in 2002 as cooperation between Philips Research and Philips Lighting. Later the Business Unit TV was involved in the project. The role of Philips Research was to make the link to the academic world. The role of Philips Lighting was to support the

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project with knowledge collected during the development of several lighting systems. Business Unit TV brought both parts of the Knowledge ecosystem together and introduced in 2004 the first Ambilight TV.

Experience ecosystem

The experience ecosystem concerns the environment in which new use cases and new business models are defined. The environment for TVs has changed drastically in the past 10 years, from analogue TV with a limited number of channels, towards the digital era with many digital channels and where a growing amount of information on internet can be accessed from the TV. This environment of services and content is named the experience ecosystem, and focuses to consumer experience. For more than a decade, companies are moving away from product and service, and focus towards consumer experience (Prahalad, 2003). Todays' customers do not only want to consume "experience", but they would like to co-create experience and have a personalised interaction. Making the right technology choice is fundamental to make a product ready for these services and to match the ease of use and ease of accessing content as required by the consumer. A wrong choice leads to a delay in market introduction and as a consequence to a significant drop in earnings.

An example of TP Vision in which the experience ecosystem was dominant, was concerning SMART TV, the integration of internet and user-interaction to the TV world. More than one third of the TVs sold today in Europe are SMART TVs (GfK, Q2 2013). SMART TVs are connected to the home network and/or internet. This enables the consumer to not only watch traditional TV (linear broadcast), but also to interact with social networks or a second screen. In figure 1, an example of elements of ecosystem used by TP Vision is given.

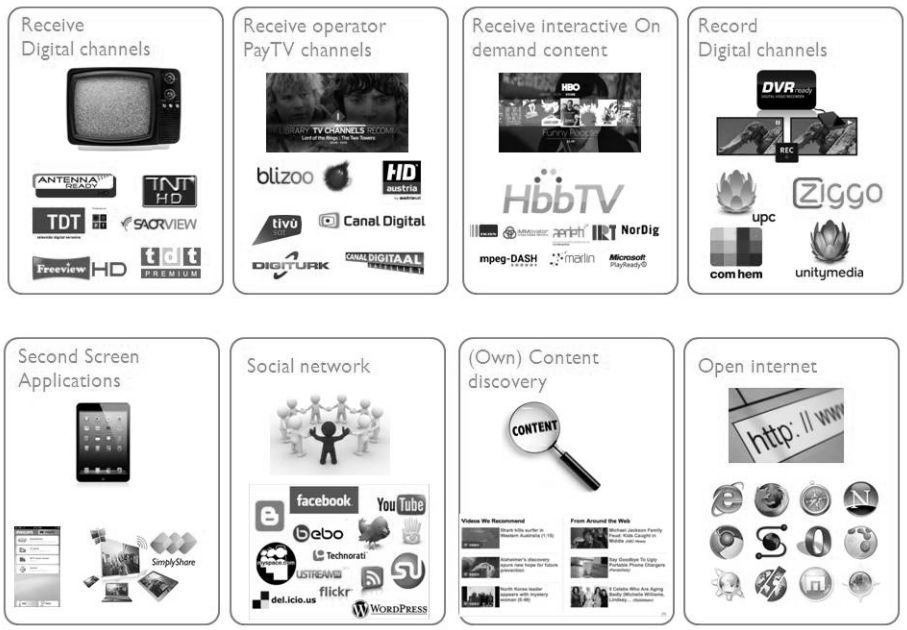

Fig. 1. The experience ecosystem of a TV. In the first line the more traditional use cases can be found. They show content which is also available via linear broadcast. In the second line the new interactive use cases together with examples of the ecosystem are illustrated.

The experience ecosystem is very dynamic. It is however influenced by marketing

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campaigns of market leaders in the (adjacent) market (Dumenco, 2013). Knowing the consumer, competitor and substitution services/products is essential to create appealing products. Also knowledge of the main actors in such a system is essential. To act in such an environment, you need relations with the main companies in the ecosystem. This can be your supplier (e.g. Videoland), but also the supplier of your supplier (e.g. Disney).

Legislation/certification ecosystem

The legislation/certification ecosystem concerns the technical environment in which the consumer electronics equipment is functioning (interfaces, content and services). To bring a product to the market in time, this is the most important ecosystem. Every CE product has to pass certain certifications. Some basic certification related to safety or electromagnetic compatibility (EMC), but also certification requested by service providers (e.g. Netflix). The importance of this ecosystem is illustrated by Han van der Meer (2007). His research shows that 30 percent of the participating companies in the (Dutch) National Innovation Survey say that "legalisation, standards etc." are important factors, which hampers innovation in their companies. For a consumer, certification is an important buying criterion. For example, a Ziggo or UPC certification guarantees that a cable supplier gives you the needed support in case of bad signal quality or other artefact. Some certification or logos give the consumer the feeling to buy a future ready product (e.g. HD ready). Being able to offer products with such a logo is important for every CE suppliers. The legislation/certification ecosystem is influenced by governmental standardisation and defacto standards of large market parties. In many cases these standards are influenced by trade organisations (e.g. Digital Europe) or large companies (e.g. Dolby).

An example of TP Vision in which the legislation/certification ecosystem was dominant, was concerning Digital Right Management (DRM). Change of a certain DRM system has a major impact on the hardware and software architecture of a TV. Being able to predict the legislation/certification ecosystem is of utmost important to bring the right product on the right moment in an efficient way, especially during the early phases of product development, when key decisions on the product architecture are made.

4.2 Knowledge management

Having defined the innovation ecosystem for the consumer electronics industry, the question arises: How do you translate the information available in the eco-system in to organisational knowledge? This are in fact two questions. How do you get access to right information, and secondly, how do you translate this knowledge into organisational knowledge.

It is evident that it is impossible for one person or even one function to gather information and knowledge from all the innovation ecosystems. Most innovation organisation therefore involves the development, marketing and production departments, in order to leverage on ecosystem knowledge. At TP Vision, those departments are also used as a source of ecosystem information and knowledge. However, TP Vision puts emphasise on two extra and vital input modes, which are often untapped: the purchasing department, and participation in standardisation bodies. Both are important areas of information and knowledge sourcing and will be discussed in turn. Subsequently, the second question, how do you translate this knowledge into organisational knowledge, will be addressed. TP Vision's organisational structure, including so-called 'Triangles', will be outlined as an example for other companies. Moreover, a special focus is put on the embedding of standards knowledge in the innovation process.

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Extracting knowledge from the ecosystems: the role of purchasing

In many companies product development is handled by development, marketing and production. Knowing the external environment is often assumed and organisations seldom have a specific function/role to stimulate the leverage of the knowledge of the ecosystems. The role of purchasing is often limited to negotiating the contract with component or knowledge suppliers. However, at TP Vision, the role of (initial) purchasing is extended into all phases of the development process, including product concept and feasibility. The main role of purchasing (in this context) is to research known ecosystems.

Next to the traditional role to monitor the cost price, purchasing plays a key-role in discussions during a project gate meeting. At TP Vision, purchasing has to ensure the outward looking attitude from the first gate meeting onwards. Initial purchasing facilitates analyses of the three ecosystems. Aspects they focus on are:

- Assessment of the momentum of an upcoming technology or standards
- Assessment of strength of content partners, to facilitate a new use case in the experience ecosystem
- Assessment of knowledge partner's capability to deliver the right functionality, in time against the right costs (insight in cost drivers and cost curves)
- Scouting, in case capabilities are found to be missing
- Long term partnership opportunities with key suppliers

Including the purchasing department as described above, can significantly increase the uptake of knowledge from the ecosystems, and is likely to be an underused knowledge source by many companies.

Based on more than 10 years of experience, we can say that including purchasing results in the following advantages:

- Additional view on the external environment
- Better prediction of trends, due to the contacts with second and third tier suppliers
- Constructive challenge to the attitude in development to choose an in-house solution (Not Invented Here)
- Triggering early supplier involvement during the product concept or feasibility phase

Extracting knowledge from the ecosystems: the role of standardisation

Standardisation is, within TP Vision, an area where ecosystem linkage is the lead theme. Participation in standardisation committees is an, often undervalued, opportunity to predict the trends in the innovation ecosystem.

Some companies use the knowledge collected during standardisation activities only during the final phase of the development process. In this final phase the knowledge is used to check the conformance with the requirement specification approved by marketing. In case of a TV product, certifications with the latest standards/logo requirements are essential. In many cases product requirements change during the development phase of a TV product, due to new legislation or new certification requirements. Not meeting these requirements will lead to a drop in sales. The only way to avoid delay in market introduction is to predict these changes and prepare the architecture/software for these adjustments. The prediction of changes in the ecosystem is done before a project is actually started.

Another important factor to ensure the assimilation of the knowledge of people working in standardisation is the choice of having part-time standardisation roles.

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Next to a knowledge-gathering task and influencing the external environment, every participant in standardisation activities also participates in internal projects in his field. In this way, TP Vision assures that the filtering of information is done based on the actual needs of the organisation. People participating in standardisation bodies can be found in marketing, but in most cases they work in the development function. They collect and assimilate information from the (legislation/certification) ecosystem in the CE industry, and the assimilation of the knowledge is done via discussions in the relevant triangles (see next section).

Translating ecosystem knowledge into organisational knowledge

Having collected the information and knowledge from your ecosystems, the next step concerns translating this knowledge into organisational knowledge. This part of knowledge management is a critical element in the innovation process. In order to make the right selection when information is abundant, the inclusion of all disciplines/functions in this process is essential. This has to be combined with a good knowledge management system and good interaction with key players in the organisation (Rothberg and Erickson 2005). The use of the gained knowledge starts already when filling in the details of the strategic innovation plan. At TP Vision this is made explicit in a document: the Long Term Product Plan. Next to the strategic plan, roadmaps and analyses of the relevant ecosystems should be used.

As previously discussed, in order to fully anticipate changes in the innovation ecosystem, businesses should include main actors in the relevant eco-systems in their innovation process. When involving development, marketing, production, as well as, purchasing and standardisation, elements like human interactive capabilities and experience on knowledge transfer on interpersonal or departmental levels are important (Rothberg and Erickson 2005). TP Vision therefore organises cross-functional meetings for knowledge management, which will be described below. Dependent on the dominant ecosystem, different disciplines are involved. In the specific case of TP Vision, it typically concerns:

- Knowledge ecosystem: research group, purchasing, development
- Experience ecosystem: marketing, purchasing, development, new business development
- Legislation/certification ecosystem: development, marketing, production

At TP Vision, a structure with monthly meetings forms the fundaments of the knowledge management system. Multiple meetings run parallel, each focusing on part of TV use case. An example is the “viewing experience” use case, focusing on all aspect of an optimal viewing experience. A (triangle) meeting consist of 5 till 10 people, who are active on the senior level in their discipline. Examples are system architect, senior designer, product manager or initial purchaser. Participants of these monthly “Triangle-meetings” discuss the trends in the relevant ecosystems. The word Triangle is chosen to emphasise the three pillars responsible for innovation at TP Vision: marketing, development and purchasing. For companies competing in the CE space, the function of purchasing is important, as for most CE companies following the cost-curve is essential to survive. Equally important is the aspect that purchasing stimulates the outward looking attitude. In a business so depending on ecosystems, outward looking attitude is essential to gain market share. The buying decision of a TV consumer is not only based on the basic function (watching linear content), but also on the promise to be part of a (personalised) ecosystem (driven by social media). Having future-proof partners is necessary to have an effective development process. One of the standard agenda points of a “Triangle-meeting” is the assessment of (potential) partners.

Having a number of parallel (experience focused) triangle groups has a number of

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advantages. On one hand it supports active involvement of purchasing and marketing in the triangle meetings, as the discussion are related to the same type of topics. The time spend on these meeting is perceived as well invested. On the other hand each experience domain gives a different weight to the three eco-systems as can be seen in in figure 2. Having focused triangle teams ensures that the external analysis is relevant for all participants.

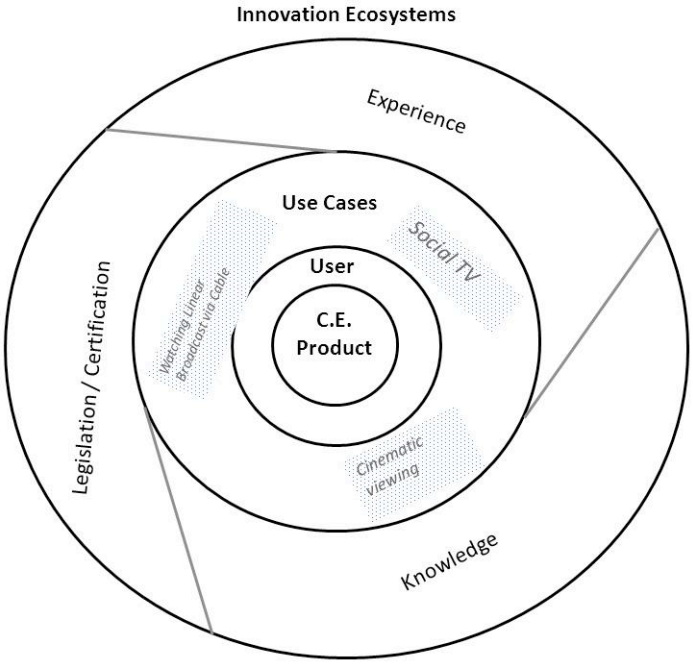

Fig. 2. Innovation ecosystems in the consumer electronics industry. In the centre the product and user can be found. Based on the use-cases the relevant environment is defined. The relevant ecosystem is separated into knowledge, experience and legislation/certification ecosystems.

TP Vision recognises that information collected by participating in standardisation is relevant for a (experience) domain as well for business strategy. Next to triangle meetings an extra cross-functional meeting is organised to leveraging the many valuable contacts standardisation participants have within the innovation ecosystem. In for example marketing working groups, people have valuable knowledge on trends in the experience ecosystem. In the technical working groups, people are connected to the knowledge ecosystem. Quarterly meetings between TP Vision standardisation people and management of development and marketing are planned to align business strategy and standardisation policy. In these quarterly meeting the portfolio of standardisation projects is assessed. If needed, the meeting leads to new initiatives to create industry standardisation (e.g. SMART TV alliance).

4.3 Portfolio choices

Today we live in a time of information abundance and making the right choice (what "to do", or "not to do") is difficult. The same holds for portfolio management for innovation. Portfolio management can become a competitive advantage if a company uses all the knowledge available in the company to make the right portfolio choices.

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This means that all functions involved in innovation should also be consulted in case of portfolio choices. Elicitation, the process of capturing the tacit knowledge, i.e. knowledge that is a mixture of deliberation, subjective insight, intuitions, heuristics, and judgments, is salient in this respect (Bayney and Chakravarti, 2012). Once captured, this knowledge should translate in clear strategic choices.

Within TP Vision the aforementioned "Triangle-meetings" are an essential input for program management to make decisions. The monthly "Triangle-meetings" are also used to review the progress of the product concept and feasibility portfolio and they advise program management to stop or change the projects based on changes in the environment.

Strategic shifts in priority between the several domains are made on a half yearly *Golden Triangle*. In the half-yearly meeting, main decisions related to the innovation portfolio are made. The domain triangles present the trends in their domain, and based on a SWOT analysis and business assessment, a project portfolio is proposed. A business management team, representing development (e.g. CTO, Chief Technology Officer), marketing (e.g. CMO, Chief Marketing Officer) and purchasing (e.g. CPO, Chief Purchasing Officer) decides in the Golden triangle for shifts in the total innovation portfolio.

Figure 3 below gives an overview of the triangle structures at TP Vision. The monthly triangle meetings discuss trends in the relevant ecosystems concerning a particular domain among the senior management. The half-yearly Golden triangle meetings then set out the choices in portfolio management, based on the domain triangles' input.

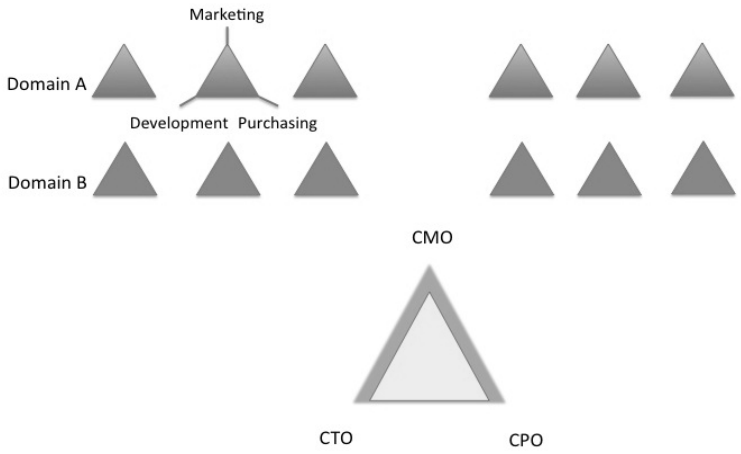

Fig. 3 The triangle structure of TP Vision, with the monthly domain triangles on top and the half-yearly golden triangle below.

4.4 Adapting the development process to the fast changing environment

Making the portfolio choice is based on the available knowledge. In a dynamic environment these choices have to be adapted in case of major changes in this environment occur. At TP Vision therefore measures and checks at several moments, whether the ecosystem feedback is still incorporated in the product development, as will be described this section. Moreover, in order to ensure a lasting winning innovation strategy, the knowledge management process is tuned regularly to the new environment, based on rigorous evaluations.

Adjustments of the choices during development

As many companies, TP Vision uses a stage-gate method during the development of its new products and services. During this process, it is important to check the link to the ecosystem for feedback and input at the correct moment. Proper and timely linking of the ecosystems to the stage-gate process is key to reaching market success. Each ecosystem will play a varying role in at the different stages of the process. In the figure below, a stage-gate process (as in among others: Alexio (2009)) is shown with the respective involvement of the pre-defined ecosystems, as based on experience.

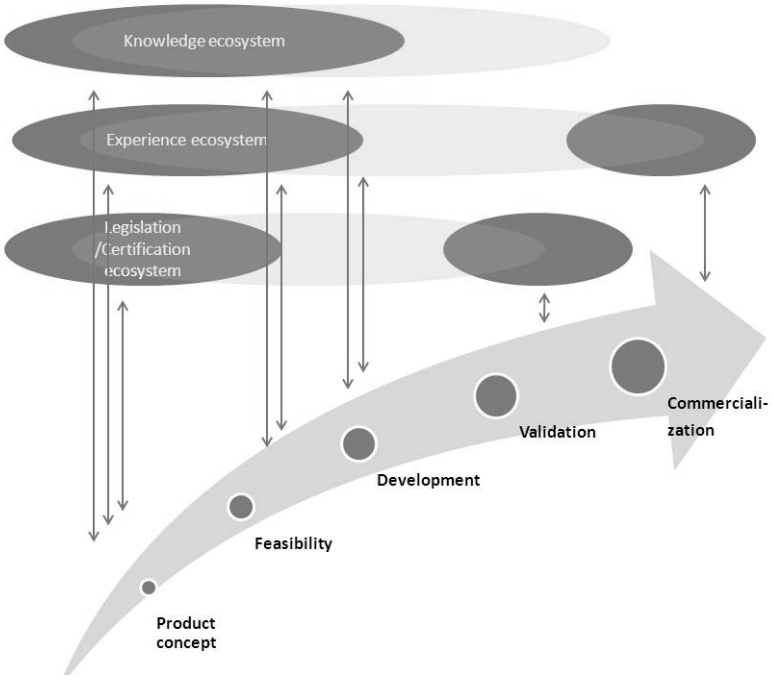

Fig. 4. Stage-gate process interacting with the ecosystems.

Although varying case by case, the product concept and feasibility phase usually encompass monitoring of, and interaction with, all three ecosystems, as all ecosystems need to align in order to make the idea conceivable. During the development phase, the knowledge and experience ecosystems prevail as the leading force of development. Once the product has been developed, the legislation/certification ecosystem will be intensively utilised, in order to ensure compatibility. Finally, during the commercialisation phase, the experience ecosystem takes the upper hand. Figure 4 gives a typical example of the linkage of the ecosystems with the development phases.

TP Vision uses the gate meetings to validate if the prediction of the ecosystem is still valid and if changes in the ecosystem need to be taken into account. This implies that it is essential to involve all disciplines in the preparation of gate meetings. The results of the previous phase, is presented with regards to the future ecosystem. During the project gate meetings, program management decides whether to continue with a project programme or not.

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Tuning the knowledge management process

The Triangle system has been applied for several years and a yearly effective analysis has been done. The purpose of the Triangle system is, to validate the knowledge gained from the ecosystem and translate this knowledge into the best innovation initiatives.

During the yearly evaluation the effect of the last year's innovation cycle is evaluated. During the same evaluation also the effect of the innovation started three years ago is evaluated. The main criterion of the assessment is: Has the programme contributed to the competiveness of the key product range?

The effectiveness of the Triangles is per domain assessed and the learnings are applied to improve the quality of the monthly triangle meetings (meeting agenda, underpinning of proposals and assessment/reporting of trends in the eco-system). To guide the improvements, key metrics are collected per triangle (e.g. number of open innovation project started with external partners).

5 Implications and limitations.

In section 4, the case of TP Vision illustrates, how to map your ecosystems, how to translate ecosystem knowledge into organisational knowledge and how to organise the decision process. The methods have been successfully tested by several Business Units of Royal Philips. Based on their experiences, several context specific factors have been determined that make the described approach successful. Elements that prove to contribute to a successful application of this system are:

- A fast changing environment like consumer electronic industry
- A short product lifecycles and fast feedback of the market
- A flat organisation structure, where bottom up initiatives are valued
- A culture where cross-functional cooperation is encourages
- Incremental innovations are taking large part of the innovation budget
- A strong strategic purchasing role

Companies and industries that can familiarise themselves with the aforementioned factors are likely to benefit from implanting a similar approach to open innovation as TP Vision. There are however also elements, which make the application of the described process more difficult. Specifically:

- A top down culture
- Organic organisation growing via entrepreneurial behaviour of a few individuals.
- Business units with less than 40 persons based in one location (e.g. focusing on one breakthrough innovation).
- Business with mainly outsourced research and development activities.

As the implementation of open innovation strategy is always context specific, it would be beneficial if future research identifies the approaches of companies in other industries and environment. Building a literature of multiple cases of how to implement open innovation, will allow researchers to identify parallels and key concepts that can be applied generically, as well as more context specific elements. Lastly, more systematic research on the involvement of purchasing in collecting ecosystem knowledge, as well as the involvement of standardisation bodies, is warranted, as the current literature seems to large ignore its importance in the innovation process.

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6 Conclusion

An active link to relevant ecosystems is essential in inbound open innovation. Every discipline should have a defined role in linking to these ecosystems. A good elicitation procedure and usage of this collective knowledge is needed for an optimal innovation process. While most companies involve only marketing, development and production in the innovation process, the TP Vision case shows the potential of also involving employees working in (initial) purchasing, as well as those employees representing a company in external (standardisation) bodies. This can lead to a big step forward in the innovation performance of companies working in the consumer electronics (CE) industry, as more salient information and knowledge is extracted from the relevant ecosystems.

In order to translate the ecosystem knowledge into organisational knowledge, the organisation of the knowledge management system plays a key role. The TP Vision case advocates monthly regular cross-functional triangle meetings at domain level, combining marketing, development and purchasing, to ensure structural access to the ecosystems. In turn, half-yearly Golden triangle meetings combine the different domain triangles in order to make strategic portfolio choices. As the CE environment is changing rapidly, regular alignment check-ups of the ecosystems and product development are planned during the several stages of the stage-gate innovation process. In combination with regular evaluations of the system, this ensures that the TP Vision open innovation approach stays up to date and remains effective.

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