Innovation Management and the Role of Controlling

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As *president and founder* of the *International Institute of Enterprise - Heidelberg (IIOE-Heidelberg,* www.iioe.eu), a think tank and training organization, he develops and promotes innovative concepts for enterprise management and entrepreneurship for organizations in Europe and provides impulses and practical concepts for "management innovation" and for strengthening the entrepreneurial and innovation power in organizations.

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Introduction

Numerous studies have shown that innovation is now the main driving force behind business value creation or the production of value-added. But what exactly is innovation, and why has it become so critical to business success? In this article, the author addresses these questions and many more: What makes an innovation successful, and what managerial challenges does the innovation process present? What role does controlling play in this process? What constitutes best-practice innovation controlling? And to what extent does innovation management impact on controlling?

The article starts by setting out the basic principles of effective innovation management and goes on to formulate best practice requirements in innovation controlling. It then introduces some of the "next practice" trends in innovation controlling and concludes with a discussion of whether we need an innovation management process in controlling.

1. The Growing Importance of Innovation to the Economy

Over the past decades, there has been a significant rise in public and private-sector investment in innovation – particularly in research and in the development of new products and methods – both in absolute and relative terms. Thus as far back as 1999, the OECD countries were already spending as much on research and development (R&D) as they were on tangible assets[1]. And "innovation activity" has also been growing as a proportion of the total output of the industrial economies.

In 1975, the direct manufacture of goods and services ceased being the occupation of the majority of workers in the United States. At the same time, the number of professional creative workers – managers, engineers, and other experts involved in creative activities and thus in innovation activity in the broader sense – has also increased, rising from 200,000 in 1900 to 1.1 million in 1950, and to 7.6 million in 1999[2].

Europe has witnessed a similar development. According to Eurostat, there was an almost threefold increase in the number of research staff employed in all sectors[3] of the Eurozone countries between 1981 and 2003 (increase of 2.7 times)[4]. Over the same period, total expenditure on R&D in the German economy grew at the same rate (increase of 2.7 times), rising from €20.2 billion in 1981 to €54.6 billion in 2003[5]. The German economy's expenditure on R&D has also increased in relative terms. Thus, innovation activity – measured as the percentage of R&D expenditure in the German gross domestic product (GDP) – has grown as a proportion of overall productivity, rising from 2.31 percent of GDP in 1998 to 2.55 percent in 2003[6].

These figures clearly demonstrate the significant economic importance of innovation activity in the developed economies. They also raise the question of what drives businesses and public institutions to increase their investment in innovation.

1.1 Investment in Innovation as the Driver of Value and Growth

Numerous studies have shown that innovation is now the main driving force behind business value creation or the production of value-added – and this applies both to businesses and economies.

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[1] cf. *OECD* 1999, P. 2
[2] cf. *Nakamura* 2000, P. 15-17
[3] industry, state sector, and higher education
[4] cf. *European Commission/Eurostat* 2006
[5] cf. *German Federal Ministry of Education and Research (Bundesministerium für Bildung und* Forschung) 2005a, P. 14
[6] cf. *German Federal Ministry of Education and Research (Bundesministerium für Bildung und Forschung)* 2005b

The European Union's Lisbon Agenda[7] had good reason to set the objective of increasing to three percent the proportion of R&D expenditure in the EU's GDP. A quantitative analysis performed on behalf of the European Commission concluded that if the EU actually succeeded in increasing the percentage of R&D expenditure in its GDP by 2010, the European economy would benefit from additional economic growth of 4.2% and 3.1 million more jobs by 2015[8].

The concept of innovation as a driver of economic growth had become an integral part of established theories of economic growth by the 1950s, when American economist Robert Merton Solow[9] accounted for the development of long-term economic growth by supplementing Adam Smith's input factors of labor and capital with a third, more important factor. This factor was technological innovation, which Solow termed "total factor productivity"[10]. Solow confirmed his theory – known as the "Solow Model" – with empirical data from the U.S. economy, and was awarded the Nobel Prize in Economics for this achievement 30 years later, in 1987. His theory has since been confirmed by a number of other empirical economic studies, which have shown a clear correlation between increased economic growth and increased total factor productivity (technological innovation) and vice versa in the major industrial countries[11].

The clear relationship between investment in innovation and business success, growth, and productivity is particularly apparent in the business sector.

A survey conducted by PricewaterhouseCoopers among more than 800 CEOs and board directors in the UK, France, Germany, Spain, Australia, Japan, and the United States revealed that stock corporations that generate 80 percent of their revenue from new products – and thus from innovations – typically doubled their market capitalization in a five-year period. High-performing companies – that is, those which generate annual total shareholder return in excess of 37 percent and which saw consistent revenue growth over the previous five years – averaged 61 percent of their turnover from new products and services. For low performers only 26 percent of turnover came from new products and services[12].

Furthermore, investment in innovations is often the only type of investment to provide returns far above costs of capital. A study looking at 83 U.S. chemical companies over a span of 25 years revealed that their R&D investments returned 17 percent after tax, while traditional capital investments just earned (after tax) the cost of capital / WACC[13] of chemical companies of around eight percent[14].

It is not surprising that innovation is high on the business agenda. Thus companies account for most of the R&D expenditure in the European Union[15], and more than 90 percent of all researchers in Germany are working in the business sector[16].

The growing importance of innovation to business success has been driven primarily by the transition from a seller's to a buyer's market and the globalization of markets.

1.2 Innovation – The Differentiating Factor in Today's Buyers' Markets

Up until the 1970s, the industrial countries were characterized by sellers' markets, in which consumer demand for products was usually greater than supply. Customers were mainly concerned with product availability at the lowest (absolute) price, and efficient (mass) production at the lowest possible cost

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[7] In March 2000, the EU heads of state and government agreed to make the EU the "the most competitive and dynamic knowledge-driven economy by 2010". The main component of this strategy is to increase to three percent the proportion of R&D expenditure in the member countries' GDP by 2010. However, it now does not look likely that this target will be achieved.

[8] cf. *Brécard et al.* 2004

[9] cf. *Solow* 1957

[10] According to Solow technological innovation influences total factor productivity (the relationship between input factors and output/growth). Technological innovation therefore must be viewed as a "productive factor". For more information on total factor productivity, see *Daum* 2003 and *Lev/Daum* 2004

[11] See, for example, *Maddison* 1987

[12] cf. *Milton/Davis* 2000

[13] WACC = Weighted Average Cost of Capital

[14] cf. *Aboody/Lev* 2001, P. 18-21

[15] cf. *Frank* 2005, P. 6

[16] cf. *Frank* 2006, P. 5

was therefore a critical success factor and source of competitive advantage to businesses. This drew the attention of management mainly on internal efficiency. It was also particularly important in creating value for customers and stockholders.

The picture is very different in today's buyers' markets, where supply generally exceeds demand, and customers can choose from a wide selection of products – at least in the industrial countries. Provided they have sufficient disposable income, customers will not simply choose the cheapest product, but the product that offers the best price/performance relationship from their subjective perspective and thus the most value-added.

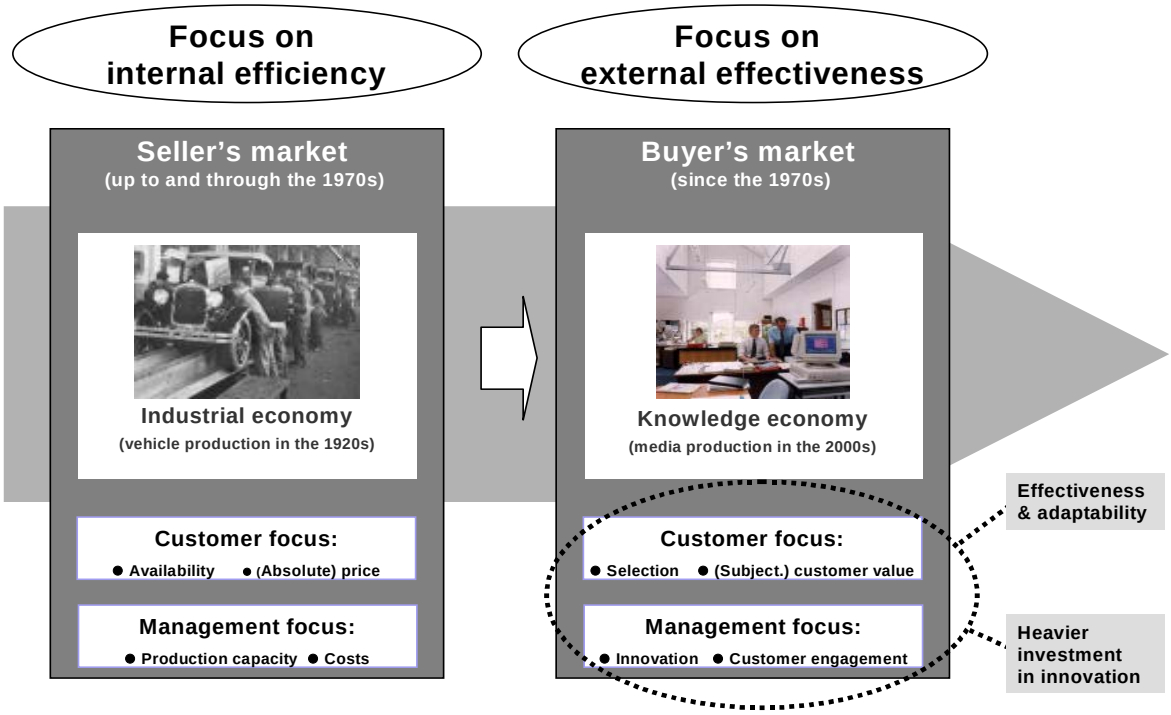

Figure 1: From an efficient industrial production to effective customer value creation: Customer and market-oriented innovation have become *the* drivers of growth and value-added

As a consequence of these developments, the management strategy of focusing on efficiency alone has outlived its purpose, and efficiency is now merely a necessary condition for business success and no longer a sufficient one. Today, it is essential that companies tailor their products to customers' tastes and differentiate themselves from their competitors. As a result, management's main attention has to be on external effectiveness (see Figure 1), because success hinges on increasing effectiveness in customer value creation and in gaining competitive differentiation in order to boost attractiveness – which ultimately facilitate buying decisions. Companies are therefore not only renewing their focus on customer relationship management, but also investing in ongoing innovation or R&D and constantly tailoring their products, methods, and organization to meet emerging customer needs and market changes. This trend is reflected in the fact that nowadays almost every company has an R&D department, whereas 50 years ago these were almost non-existent.

The opening of markets and accelerated global competition have been added to the mix, resulting in a need for vendors to increase their competitive differentiation and make themselves and their products more attractive to customers – a success factor that companies cannot achieve without investing in ongoing innovation in all areas of the business. Furthermore, growth has now been firmly at the top of

the agenda for CEOs worldwide for the past two years and is set to be accompanied by innovation, agility and flexibility, adaptability and creativity, and entrepreneurship[17].

But what constitutes successful innovative activity, and what challenges does it pose? And what actually is innovation and what is it not?

2. What Innovation Is and What It Is Not

To deal with the most important point first: Innovation is not simply "having a new idea". One of the main components of a successful innovation is the market success of a new "concept", with the emphasis being on "creation" (transforming the product into a marketable reality) and not just on "invention" [18].

This concept was suggested as far back as 1911, in the first edition of "The Theory of Economic Development" by Joseph Schumpeter, an Austrian economist who subsequently became a professor at Harvard[19]. While Adam Smith's economic theory held that change or innovation was at most an external or exogenous "random factor", Schumpeter was the first to view innovation activity as an independent productive factor and an endogenous measure of an economic system. He was also the first to show that innovation is the engine that powers economic progress and the growth of businesses and economies.

Schumpeter's concept of economic production is essential to our understanding of his theory. He views "production" as "changing the existing state of the satisfaction of our wants"[20], meaning that we have to combine the productive forces and factors within our reach in a certain way: "Technologically as well as economically considered, to produce means to combine the things and forces within our reach"[21].

Schumpeter demonstrated that the economic theories of the day only considered the production of goods and services as a "circular flow" that essentially followed the same path year after year and was therefore conditioned by "given circumstances". These theories cannot account for the evolution and progress of production itself (as a result of the industrial revolution, for example), but focus solely on the conditions that maintain the existing "circular flow".

This position contrasts with innovation, which *Schumpeter* defines as the "carrying out of new combinations"[22] or "the different employment of the economic system's existing supplies of productive means"[23]. By necessity, the new combination deprives various old combinations of the resources they need. Therefore, for Schumpeter, innovation always entails "creative destruction": A new combination displaces an old one, often destroying the institutional framework of the old combination in the process (for example, driving from the market the companies that are built on the old combination).

Schumpeter categorizes innovations or the "carrying out of new combinations" in five classes (explanations in parentheses are the author's)[24]:

1. The introduction of a new good – that is one with which consumers are not yet familiar – or of a new quality of a good (product innovation)
2. The introduction of a new method of production (process innovation)
3. The opening of a new market (marketing innovation)

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[17] See, for example, *The Conference Board* 2006. This study confirms that these topics are currently at the top of the CEO's agenda.
[18] The term "creativity", which has its roots in the Latin verb "creare" is quite appropriate in this context.
[19] The book is now in its 9th edition. See *Schumpeter* 1997, particularly the second chapter, The Fundamental Phenomenon of Economic Development, P. 57-94
[20] cf. *Schumpeter* 1997, P. 14
[21] cf. *Schumpeter* 1997, P. 14
[22] cf. *Schumpeter* 1997, P. 67
[23] cf. *Schumpeter* 1997, P. 68
[24] cf. *Schumpeter* 1997, P. 66

4. The conquest of a new source of supply of raw materials or half-manufactured goods (supply chain innovation)
5. The carrying out of the new organization of any industry (organizational innovation or business model innovation)

According to Schumpeter entrepreneurs "whose function it is to carry out new combinations" are critical to innovation[25], for innovation is not based on the presence of "(market) opportunities for innovation", which, according to Schumpeter, are in constant supply, but on the ability to create innovations that target market opportunities, by using "new combinations" and, more importantly, to bring these to market in the face of resistance. This is the main function of an entrepreneur in the Schumpeterian sense.

This is why the entrepreneurial function is so important to effective innovation, for innovation always entails a departure from the status quo and what is already being done, and only true "leaders" have the ability to endure the associated uncertainty and risk.

Therefore, innovation is not possible without entrepreneurs or "leadership" ability. Schumpeter considers an entrepreneur to be a special "type" of person, distinct from a mere "manager", who is responsible for ongoing operations ("circular flow"). In his view entrepreneurs have rare personal qualities, such as[26]:

- The courage to take risks and the ability to make decisions in the face of uncertainty (that is, about things and situations that are untested by experience),
- The ability and the will to depart from forces of habit and fixed habits of thinking, and the mental freedom to break away from everyday constraints,
- The capacity to endure social resistance to those who wish to do something new and to overcome opposition to change.

This "entrepreneurial function" is therefore distinct from the function of the inventor: "Economic leadership in particular must hence be distinguished from 'invention'. Although entrepreneurs of course *may* be inventors just as they may be capitalists, they are inventors not by nature of their function but by coincidence and vice versa."[27]

Innovation – in the *Schumpeterian* sense and as used in this article – means the success of new products in the market and not technological invention.

3. Challenges in Innovation Management

As *Schumpeter* established, technological and business concerns can not be given equal weight in the innovation process, for "the economic best and the technologically perfect need not, yet they often do, diverge, not only because of ignorance and indolence but because methods which are technologically inferior may still best fit the given economic conditions"[28]. The crucial factor is whether an innovation stimulates demand and satisfies needs among customers and potential customers and is perceived as an innovation. Thus it must be geared to the "given economic conditions" (from the perspective of potential buyers) that were previously overlooked by other vendors.

Factors other than technology are often critical in this process, for the attractiveness of the finished solution – which facilitates buying decisions and for which customers are willing to pay money – is usually made up of a whole bundle or "combination" of different factors. These include technology, but also design, specific manufacturing processes to ensure that the decisive product characteristics are of high quality, a brand that instills confidence in the new, unknown product, and a specific distribution channel or the product's combination with other products or services, which offers the buyer an additional advantage. The innovation will not be commercially viable in its respective market (and at satisfying prices for the vendor) until all these factors are combined. And the 'combination' with the

[25] cf. *Schumpeter* 1997, P. 74
[26] cf. *Schumpeter* 1997, P. 85-87
[27] cf. *Schumpeter* 1997, P. 88
[28] cf. *Schumpeter* 1997, P. 15

most commercial potential does not have to be the best solution technologically. As Schumpeter states: "Economic logic prevails over the technological"[29]. Nonetheless, people generally assume that innovation is the engineer's job.

One of the key challenges in innovation management therefore lies in regarding innovation as a function to be carried out by **all** the core process areas in the company and entire virtual company – which includes suppliers and marketing partners – and not just by researchers, engineers, and product developers.

The development department and suppliers' laboratories can undoubtedly generate good ideas, and the company might have the in-house marketing facilities and the branding or marketing power that it needs to make the finished product a commercial success. However, if there are snags during the process from idea conception to manufacture of the finished product – or the process takes too long and the company is unable to communicate the benefits to potential customers quickly or well enough – a good product idea and marketing power will not be enough to stave off disaster. The innovation will either fail or will not achieve its potential.

3.1 The Race for Time-to-Market Leadership

In the early 1990s, researchers and developers at the Nestlé Research Center in Lausanne, Switzerland, cultivated the lactobacillus bacterial strain for the first time and brought it to market as "LC1", the first ever probiotic yoghurt. However, the Swiss Nestlé group soon lost its early lead to its French competitors Danone[30].

The crucial factor in Danone's success was the company's ability to gain a large enough market share and customer favor for its product, "Actimel", more rapidly than Nestlé could for LC1, despite launching Actimel later than LC1. Danone brought Actimel to a wide market more rapidly and made a point of adopting a different advertising strategy – making no attempt to teach consumers why they ought to "preserve a healthy balance of intestinal bacteria" (which is what LC1 or Actimel "technically" does), but simply promising "Actimel helps support your body's natural defenses" (thus focusing on the actual benefit to customers and on what is innovative about the product from the customer's perspective). Danone also named the strain of bacteria L. Casei Defensis, which even sounds like a natural defense. The consumers grasped the message and made Danone the leading vendor of probiotic yoghurts – with a market share just short of 62 percent in Germany[31]. Nestlé's researchers may well pride themselves on having created a multimillion-dollar market for probiotic yoghurts, but Danone was the main beneficiary.

In industries that are strongly innovation-driven, such as the software industry, the effect of time-to-market leadership is even more apparent: That is, only innovators who manage to quickly seize and dominate the market achieve true commercial success. If anything, "the winner gets it all" principle is particularly true of this industry. As a McKinsey analysis of the global software market revealed[32], the second and third biggest competitors in a new market segment do not usually obtain a large enough market share to be able to declare their innovations a business success – mainly because software sales benefit from platform and network effects[33]. These lead to a self-reinforcing growth cycle – but only for the vendor that can obtain the largest market share or installed base. As Henning Kagermann, Chairman and CEO of SAP AG, commented in the McKinsey study: "Achieving market leadership draws in even more customers. It's a self-reinforcing growth cycle – the more customers you have, the

[29] cf. *Schumpeter* 1997, P. 14-15
[30] For more information on this case study, see *Rohwetter* 2004
[31] cf. *Rohwetter* 2004
[32] cf. *Hoch et al.* 1999
[33] Platform effect: Users that have already deployed a particular software application tend to buy a new application from the same vendor because the application is compatible with the existing "platform" and usually offers integration and learning curve advantages and more. This decision is further compounded by the generally high costs of switching from one platform or vendor to another (for example, as a result of training and process reorganization). Network effect: Each new software user increases the value of the application for existing users because there are more users with which to exchange data or usage tips.

more you will get"[34]. McKinsey's consultants concluded that a vendor's sales and marketing network is the critical success factor in software innovation.

They cite the market for PC word processing applications as an example. When IBM launched the personal computer in 1981 and created a market for PC software applications, there were soon an array of word processing applications on offer, but no one product clearly led the market. Today the picture is much different. With its "Word" package, Microsoft clearly leads the market and is way ahead of its competitors, who have only a very small market share. Microsoft's success was driven by its platform strategy – which is built on the Windows operating system – and by its commercialization focus, which is based on partnership strategies (with hardware vendors, for example) and heavy investment in marketing.

The authors of the McKinsey study also reported that the world's most successful software companies rated the importance of partners almost 30 percent higher than less successful software companies did[35]. SAP AG's partnership strategy, which was a significant factor in SAP's outstanding success in the ERP software market, is a prime example. Dietmar Hopp, co-founder of SAP AG and long-time CEO and chairman of the supervisory board at the company, confirmed that SAP's tremendous growth after the launch of SAP R/3 would not have been possible without the company's partners[36]. After launching SAP R/3, which soon became the world's leading ERP software product, SAP intensified its partnership strategy, and ever since, partners have been handling 80 percent of the consulting business in connection with SAP implementations – leaving just 20 percent of the business for SAP's own consultants. This strategy led to an immediate fivefold increase in SAP's sales and consulting team – a critical success factor in an emerging market segment in which the success of a software innovation ultimately depends on the company seizing market position early on and rapidly increasing its installed base in the race for market leadership.

These examples show that R&D is not the most challenging aspect of the innovation process – and this is especially true in today's buyers' markets. A good idea or new concept in itself is not a guarantee of market success, even if substantial sums have been invested in researching and developing the concept over many years. With regard to true innovations – meaning new products that fulfill a previously unmet need and create a completely new market – it is particularly critical that companies not only bring these to market rapidly enough but also gain a large enough market share or market leadership, for the success of these products depends on generating enough profit to cover the often substantial costs involved in their development.

To this end, businesses deploy a whole arsenal of ideas – starting with the involvement of potential users in the product development process, through partnership strategies for sales and marketing, to platform strategies that offer customers a whole "service platform" rather than a single product. Organizations bolster the development process with business development strategies that integrate important lead users early on and provide new business models that offer advantages or temporary quasi-monopoly powers in sales and marketing and advertising that is focused on customer benefits. The objective is not just to reduce time-to-market but, more importantly, to achieve the fastest time-to-market – for the globalization of markets, the ability of consumers in almost all market segments to use the Web to buy across borders, and the trend for system solutions for products and services are giving rise to rather traditional industry network or platform effects that are leading to a "winner gets it all" phenomenon.

3.2 Customer Benefit-Oriented Product Development

The significance of sales and marketing should in no way detract from the importance of "invention" (that is, the R&D phase) in the innovation process, for it is at this stage that the idea or concept is first generated – and without it there would not be an innovation. The buying decisions of customers or potential customers determine a product's market success. This raises the following questions: Does

[34] cf. *Hoch et al.* 1999, P. 123-124
[35] cf. *Hoch et al.* 1999, P. 181
[36] cf. *Hopp* 1996

the new cluster of offerings spark customer interest, and are they willing to pay the necessary price? Have they even noticed the new product, and do they appreciate its potential benefits?

An innovation cannot be a success if the whole innovation process – from the initial idea, through product development and implementation, to marketing – is not focused on achieving the desired market result. Companies must first address all the customer benefit-oriented activities in the product development process to ensure that the innovation process delivers a new product with features that are attractive to potential buyers and that the company's sales and marketing partners or own marketing department can communicate the benefits to the customer properly. An effective innovation process therefore starts by focusing on what is to come out at the end. Thus it concentrates on customer benefit and on how to get customers to pay a high enough price for the new product.

It is therefore vital that organizations focus on customer benefit as early as the R&D phase. It is well known that engineers determine more than 70 percent of a new product's manufacturing costs during the design phase, but the essential value components from the customer's perspective are also defined at this point, and it is often impossible to make substantial changes at a later stage due to technical restrictions. Unfortunately there is often a lack of systematic focus on customer benefit and value during the early R&D phases.

This is because technical concerns are naturally predominant at the start of the innovation process because the product is being created for the very first time. The focus subsequently shifts to checking if and how the product works, and there is less emphasis on "what it does" for the customer. However, effective innovation processes begin with an intensive customer value analysis, which highlights the features that actually create value for customers and the features for which they are willing to pay money. The systematic involvement of customers and consumers in the development process (for example, through user groups and communities of practice) has proved to be a valuable strategy.

One of the main challenges of the innovation process therefore lies in maintaining a systematic focus on the finished product across all stages and subprocesses, which means making the product attractive, creating value-added for buyers relative to the competition, and getting buyers to pay a high enough price for the innovation.

3.3 "Disruptive Innovations"

True innovations – in the Schumpeterian sense and as used in this article – are putting beside the old something new and often represent a radical departure from the status quo, and fundamentally change the "existing order": that is, previous market regulations, expected buyer and consumer behavior (by developing new target markets, for example), the competitive position, and so forth.

The PC is an example. Its launch in the early 1980s opened up a whole new target group for computers – the private consumer. This gave rise to a completely new computer and software market, offering start-up companies a chance to gain a foothold in the market but causing difficulties for established computer vendors that were unable to launch their own offerings rapidly enough. The advent of the PC also brought about significant changes in the business world. By opening up the market to a whole new group of users, the PC dramatically increased computer penetration and the automation level in companies. The PC itself was then instrumental in bringing about other disruptive innovations, such as those in the PC software and disk drive markets.

Clayton M. Christensen, professor at Harvard Business School, carried out a thorough investigation of the phenomenon of disruptive innovations and its internal logic in his 1997 book, "The Innovator's Dilemma"[37], which was prompted by his observation that market leaders are repeatedly usurped by new players that offer innovative technology. This phenomenon affects even the best-managed companies – irrespective of industry – despite their intensive customer focus and ongoing investment in new technologies. And this is precisely the problem. For as *Christensen* observed, a company's

[37] See *Christensen* 1997. In this book Christensen was still using the term "disruptive technology" rather than "disruptive innovation", which he introduced in "The Innovator's Solution" (cf. *Christensen*, 2003) because he then correctly observed that a disruptive technology does not cause a disruption until it is combined with an appropriate business strategy.

existing customer base – which represents its mainstream business – traps it in its established business model, thus preventing it from embracing new technology early enough and harnessing it to produce its own offering.

The fatal thing about a disruptive innovation is that it initially does not appear to fit into a company's existing business model, and the company cannot justify building a business case for investing in it. The new product seems to fall far short of generating the volume and profits that the management expects and achieves from its established products, and it looks as if there is no way of justifying the associated opportunity costs (in tying up company resources that would no longer be available for other projects) – particularly in view of the fact that the new technology does not spark interest among (existing) customers. As a result, the company does not investigate the new technology any further – with fatal consequences.

The thing about disruptive innovations is that they have a tendency to initially develop slowly in terms of performance and market acceptance. However, it is also crucial that companies "get on board at the outset" so that they can develop the technical and commercial expertise they need to subsequently incorporate the innovation in their business model. And this is precisely where established companies go wrong – they often vastly underestimate or unwittingly ignore the longer-term significance of the innovation until it is too late and entrant companies are about to upend the market.

Christensen makes a distinction between "low-end disruptions" and "new-market disruptions". Low-end disruptions are innovations that target customers who do not need the full performance usually valued by customers in the established market segment, whereas new-market disruptions target a whole new group of customers or users who could previously not be served profitably. Low-end disruption occurs when the rate at which products improve exceeds the rate at which customers can adopt the new performance. Therefore, at some point the product's performance overshoots the needs of certain customer segments. At this point, a disruptive innovation may enter the market and provide a product that has lower performance but far lower manufacturing costs and a lower sales price. And the consequence? The disruptive innovation squeezes the established product out of the market.

The disk drive industry, which *Christensen* thoroughly investigated, is one example of this. *Christensen* found that innovative products in this industry were much smaller than incumbent technologies, but were considerably more expensive and offered less storage capacity. As a result, there was initially no market for disk drives among mainstream customers – ancestral mainframe vendors – but there was among PC vendors, who set greater store by size than by price or capacity (because the drives had to fit into PCs, which are much smaller). However, the speed and intensity with which PCs and minicomputers spread ultimately paved the way for the new technology to take over the market, and it continued to improve in terms of performance and manufacturing costs while driving the old mainframe-based technology further and further out of the market.

Minimills are another example. These are small steelworks that process only scrap steel, allowing them to work more cost-effectively and offer cheaper products than large integrated steelworks, though initially they served only the low-end market in concrete reinforcing bars, which are used to produce reinforced concrete. The minimills were able to produce the materials in this market segment so cost-effectively that the established steelworks were unable to compete and they withdrew to concentrate on the high-value market segments. However, the minimills continued improving their production methods, enabling them to eventually move upmarket to the next segment and thus gradually displace the incumbent steel producers in each consecutive market segment (see Figure 2).

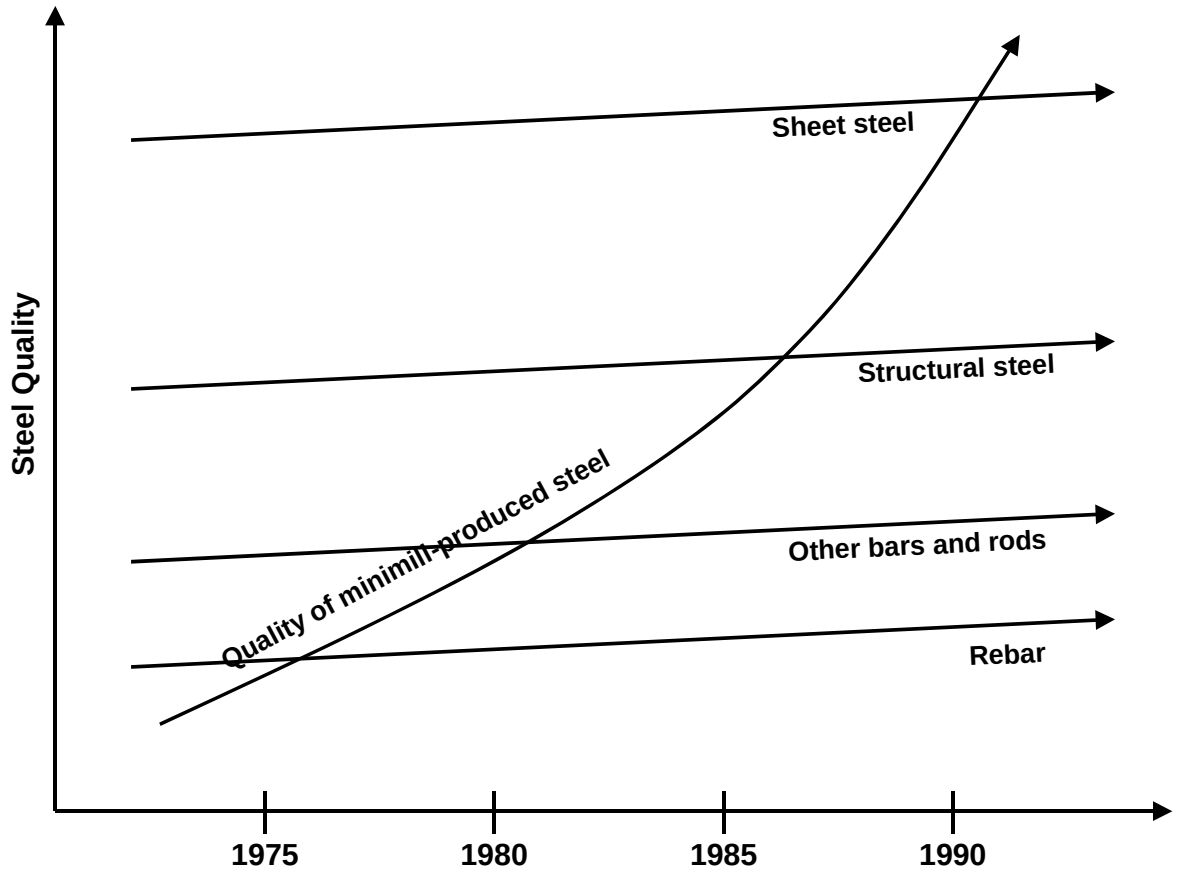

Figure 2: Minimills as an example of disruptive innovation and its march upmarket (source: *Christensen*, 1997, p. 90)

The incumbent steel producers fell victim to the logic and force of the minimills' disruptive innovation precisely because they were focusing on the most profitable market segments, products, and customers and were therefore making rational business decisions.

And this is typical of disruptive innovations. Initially the management teams of the incumbent vendors are not inspired by the new technology, and they cannot justify building a business case for investing in it. These companies therefore usually miss the opportunity to get on board at the right time, for it is usually too late by the time the management notices that there is actually a market for the disruptive innovation among the company's mainstream customers. By this time the disruptive innovation is in the process of driving the existing product from the market, and the company is unable to come up with an alternative of its own.

The only way that organizations can avert this logic is to analyze the market for disruptive innovations and strategically incorporate these in their own innovation process by:[38]

- Specifically targeting customer groups that have a particular interest in the disruptive innovation's initially limited performance features
- Using prototyping and trial and error to find out the best time to enter the market instead of relying on traditional market research
- Building a business plan based on ongoing learning and customizing rather than on a finished strategy, and scheduling the resources needed for multiple trials.

When dealing with disruptive innovations, companies should include both their existing customer base and non-customers in their market analysis. For this is where they can usually find their target group in

[38] cf. *Christensen*, 1997, P.240-241

the critical initial phase of a disruptive innovation. To ensure that they identify the emergence of disruptive innovations early enough, companies must therefore incorporate non-customer segments in their market research or strategic planning – at least defensively if not offensively, as they can generally exploit a whole range of growth potentials at this stage.

3.4 "Creative Destruction"

As the topic of disruptive innovations has just illustrated, investing in a new technology at the right time represents a major challenge for innovation management. However, investing in a new technology usually means that all companies do is strategically siphon resources from existing business lines that are selling well and pour them into a new business line that is not yet up and running. Innovation therefore always entails "creative destruction". The new creation destroys established products by depriving them of customers and resources. The only question is: Is the company the instigator of this process or a victim of it?

Schumpeter established that innovations are rarely driven by the companies, organizational entities, and people who produce and sell the "old combinations": "[...] it is not essential to the matter – though it may happen – that the new combinations should be carried out by the same people who control the productive or commercial process which is to be displaced by the new. On the contrary, new combinations are, as a rule, embodied, as it were, in new firms which generally do not arise out of the old ones but start producing beside them"[39]. In his view, innovation is therefore something that takes place outside the organization, when the company or its products are displaced by those of an entrant as the innovation takes hold of the market.

However, he simultaneously pointed out that the growth of big business will inevitably lead to companies making innovation and creative destruction an internal affair[40].

If companies and their management teams intend to avoid falling "victim" to other people's innovations, and want to play an active part in shaping and harnessing these innovations, they will have to bring creative destruction into the company, so to speak. This means that they need a process for discontinuing established product lines and business areas in good time so that they can divert the freed resources to the new products and business areas.

While giving a presentation on innovation management at a recent event moderated by this author, a well-known German top manager expressed it this way: "The actual challenge facing innovation management is not the new products ("the invention"), but the old ones ("discontinuing old product lines")." Or, in the words of Peter F. Drucker: "For to be a change leader requires the willingness and ability to change what is already being done just as much as to do new and different things. [...] The first need is to free resources from being committed to maintaining what no longer contributes to performance, and no longer produces sales. In fact, it is not possible to create tomorrow unless one first sloughs off yesterday."[41]

A company's current business lines tie up not only a vast number of operational resources, but also management capacity. To actively manage the creative destruction process, a company's management strategy must incorporate regular and systematic analyses to determine whether it should continue investing in its existing product and market portfolio or should merely maintain or abolish it.

In theory, this sounds simple. However, in practice this process often fails due to mental blocks to innovation: that is, to the power of the status quo or what is already being done. To innovate therefore means to overcome the power of the status quo in our minds or to at least consciously sidestep it.

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[39] cf. *Schumpeter*, 1997, P. 66
[40] cf. *Schumpeter*, 1997, P. 67
[41] cf. *Drucker*, 1999, P.74

3.5 The Power of the Status Quo

It is well known that our perception is selective, but so too is our imagination. Things with which we are familiar because we see them in front of us every day dominate our imagination and provide us with a sense of security. This makes it both difficult and unsettling to imagine things that we have never seen or thought before, so we tend to perpetuate the status quo. Thus the power of the status quo, or our perception of it, often stands in the way of innovation.

Because the status quo is so dominant, customers – contrary to popular opinion – are also rarely able to formulate which new products companies should develop or produce for them. They are much too concerned with solving their actual tasks and problems (sometimes with the company's existing products) to be able to take a step back and think about how a (new) product could be redesigned to achieve a better solution. For instance, who would have come up with the idea of using a small device with a roller ball and two buttons – i.e., a computer mouse – to make it quicker and easier to operate a computer than it is with a keyboard?

Sometimes customers can even give manufacturers the wrong signals or demand the "wrong" new products because they do not have much product development experience (which is not their job after all) or insight into the vendor's technology and industry and therefore do not have a realistic impression of how a technology or industry will develop. This is also why traditional market research usually fails in the innovation process.

Product managers and development engineers therefore cannot rely on the results of market research or customer surveys, but have to observe market trends for themselves, remain in close contact with important lead users and other industry and non-industry experts, and trust their own professional competence – and sometimes their intuition, too.

During the innovation process, companies must be able to "tolerate" the unknown and endure uncertainty, meaning that they must not give in to the tendency to try to explain or solve an open problem or issue too quickly on the basis of existing knowledge. The best developers are often those that can live for long periods of time with the uncertainty of not knowing a solution or approach to a problem until the right method is found.

Lead users can play a very important part in this process, and 3M is a company that became know for its systematic involvement of lead users. These are people at the forefront of their field, who have specific requirements of a product before the wider market can even conceive of such a product and who try to solve problems that have never been encountered before. Let us assume, for example, that a company intends to research a new substance. It looks at the spectrometers on the market, but finds that none of them satisfies its requirements, and it cannot find a manufacturer that is able to make the spectrometer. It therefore produces the spectrometer itself. If a spectrometer manufacturer can identify this type of user early enough and exploit this company's experience and knowledge of the new spectrometer, it can launch the new product at the exact point in time when there is a demand for it in the broader market due to the lead customer's technology having since become the industry standard.

However, there is more than one answer to the challenge of "overcoming the power of the status quo". Companies and development managers normally use a number of different methods. These include applying specific creativity and brainstorming techniques to deal with innovation activities – through deliberately setting up a mixed project team with different personalities and systematically incorporating lead users or rule breakers as project advisers – to outsourcing particular development tasks to external organizations that do not have the same "blinkered thinking" as people in their own company.

There are now a number of businesses providing "innovation services" to other companies. One such example is the internationally-recognized, award-winning American product design and development company, IDEO[42], which developed products such as the computer mouse for Apple and the handheld for Palm. BIG IDEA GROUP[43] is another. This organization provides innovation services for both small companies that cannot afford a large R&D department and large companies that – due to internal and external forces of inertia – tend to either miss innovations entirely or fail to transform a

[42] cf. http://www.ideo.com/
[43] cf. http://www.bigideagroup.net

good idea into a marketable product rapidly enough. It also offers inventors a marketing platform and helps them to get their innovations market-ready and to license them to established companies for marketing.

However, outsourcing the innovation process can also hold dangers. Companies may loose about customers, business practices and technologies and the company may cease developing this knowledge further. When the company integrates the finished product into its business model, there may also be hitches in the process if its employees suffer from "not invented here" syndrome and reject the product or do not give it sufficient support.

The large multinationals in particular are therefore increasingly using mixed forms of outsourcing. This means that they collaborate both with external partners and with smaller, innovative firms in which they have acquired a stake or even a controlling interest, without integrating them into the corporate group or curtailing their autonomy. One such example is the Swiss pharmaceutics group, Roche, whose innovation strategy is based on the "Roche Cosmos"[44]. This strategy links the two operative divisions – Pharmaceuticals and Diagnostics – with a number of autonomous alliance partners and collaborators, spin-offs, and affiliates to achieve common developmental goals and gives each party plenty of scope for creative entrepreneurship. This allows Roche to drive innovation across the entire healthcare spectrum by harnessing the creativity and innovative power of a multitude of smaller entities and companies.

The Swiss Nestlé group will also be adopting a similar product development strategy. To this end, it has set up an external growth fund with a committed capital of €500 million to be managed by Wolfgang Reichenberger, who resigned as CFO on January 1, 2006 to devote himself to this task. The capital is to be invested over five to seven years to help Nestlé grow promising smaller businesses in the area of science and nutrition into a size that could allow them to be integrated into mainstream business units of the Group. This strategy is intended to foster and accelerate the Group's expansion into Health, Wellness and Nutrition[45].

3.6 An Integrated Innovation Process

As the article has already discussed, innovation hinges on a combination of various factors – marketing capabilities mainly, but also "technology" in R&D and production capabilities. In practice, however, things do not always run smoothly. For example, collaboration and communication between the development department and sales and marketing or production might be poor, leading to missed milestones, poorly planned product launches, production startup problems – or worse still, a new product with the wrong features. At very best, these complications would eat up valuable time and resources – if not the entire investment in the new product, which would ultimately have to be written off.

The time factor – meaning the speed of the innovation process across all the phases of the research, development, manufacturing, and market launch process – is particularly critical to the market success of many innovations. As the Nestlé/Danone example above illustrates, a company that launches a new product later than a competitor can still conquer the market.

To outmuscle the competition, the product-related activities in the innovation process must be tightly integrated with those that are market/customer-related: From R&D – through product management, purchasing, production, business development and marketing – to sales and customer service.

Integrating these activities is not just a challenge for process design and flow. It is just as important, if not more so, that all the activities and areas have a clear, common focus on what is actually to be achieved. For example, if the company is aiming for market leadership in a new market or product

[44] For more information, see http://www.roche.com/, under "Our Strategy" and "The Roche Cosmos".

[45] For more information, see the Nestlé S.A. press release dated September 26, 2005 "Nestlé S.A. To Launch New Growth Fund of EUR 500 Million To Be Run By Wolfgang Reichenberger – Paul Polman Appointed as New Nestlé CFO" at http://www.nestle.com/Media_Center/Press_Releases/All+Press+Releases/26sep05NewGrowthFund.htm

segment, all the areas must concentrate on the factors that will help the product attain market success and thus on creating more attractive products and better value-added components than the competition from the customer's perspective. In practical terms this means, for example:

- The product management team must collaborate with sales or sales partners and potential pilot customers to define in clear terms which problem the new product is actually intended to solve from a user's perspective
- The development department tries to solve only this problem, without getting bogged down with other "nice-to-have" product features that customers do not even want and that would complicate the product and make it unnecessarily expensive
- The production and purchasing departments, or rather the supplier relationship management team, have a precise understanding of the qualitative and technical priorities arising from the consumer use scenarios to allow them to make good trade-off decisions (between technical, customer value, and cost issues) when negotiating with vendors and part suppliers and when developing and planning the manufacturing process for the new product
- The marketing department clearly communicates the message to the market and to internal departments; that is, it communicates the value that the new product represents from a user's perspective and what differentiates it from competing products
- The business development department gears all its activities (for example, the partner strategy) to this product differentiation strategy
- The sales and customer service departments do not just understand the message, but can also get it across to the customers and potential customers.

To enable the employees in each of the functional areas to work concurrently and thus accelerate the overall process, the objective of the innovation process must be clearly defined and responsibilities precisely assigned. An efficient project management team and multidisciplinary "new product team" are required to coordinate the process. This also helps companies to more easily control the risk inherent in the innovation process and to systematically exploit opportunities that arise.

Investments in innovation are typically very risky. One reason for this is that there is sometimes a very long time span from investment decision to return – 15 years in the pharmaceutical industry. Pharmaceutical companies do not usually generate sales revenues for a new drug until it has been approved by the relevant agencies, some 10 years after the R&D phase began. By this stage, there are only five years left before the drug's patent protection expires, and a lot can happen in 15 years. The anticipated market demand can change, other companies' new technologies and innovations can make your own new product obsolete before it is even launched, and there may be technical problems or delays in the new drug's approval, and so forth. And other industries are similarly affected.

The risk associated with innovation projects and investments is highest at the beginning and gradually reduces as the product's launch approaches and more specific information is available about market demand and potential market success.

It is essential that companies use a systematic procedure for information and opportunity/risk management to support the process of decreasing risk and increasing opportunities. For risk in itself is not a bad thing – it is by taking risks that opportunities become possible. Risk can even generate value, as options theory demonstrates – but only if companies can limit risks and take advantage of opportunities, or in other words, potential "upsides"[46]. For this reason, there must be a way of feeding information from the end of the process (about potential market success, i.e., technological and market trends, and technical and commercial feasibility) into the initial stages to inform decision-making as early as possible. One such method is early prototyping, which is used to obtain quick information about the technical feasibility and market acceptance of an innovation before it has been fully developed, thus allowing companies to make adjustments at a stage when this is still relatively easy and uncomplicated. A good way of minimizing risks in the innovation process and exploiting opportunities (for example, in the shape of new market trends) is to leave open as many options as possible – or rather, to be flexible[47].

[46] cf. *Daum*, 2001
[47] cf. *Daum*, 2001

Portfolio techniques are also used for this purpose. These apply various criteria to evaluate – on a regular basis – the global portfolio of all detailed product ideas, current development projects, and products on the market. This allows organizations to make optimal decisions with regard to expanding or discontinuing a product line, or continuing it without additional support, while taking opportunity costs into account (see below for more information). In this respect, too, a company needs to take an integrated approach to the innovation process (see Figure 3).

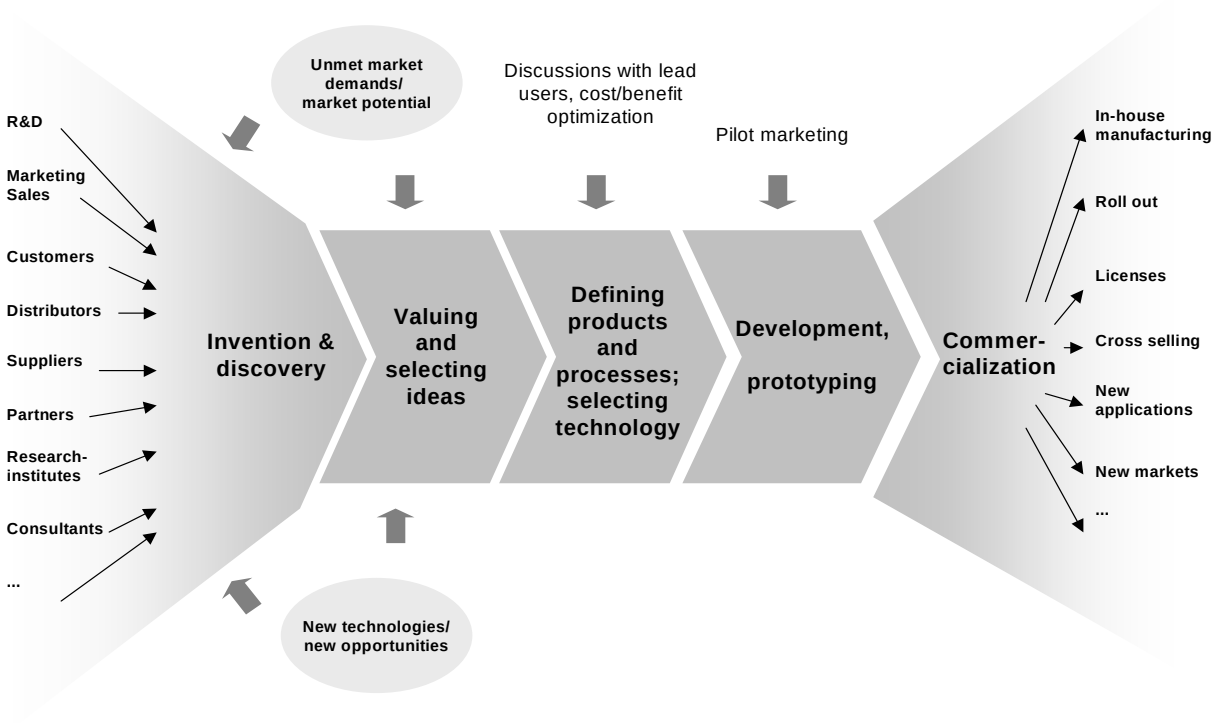

Figure 3: Example of the structure of an integrated innovation process in a European high-tech vendor

3.7 The Company as an Integrated, Dynamic Innovation System

Product innovation is just one form of innovation.

As *Schumpeter* explained (see Section 2), innovation also involves improving operational processes and structures **(operational innovation)**: that is, it opens up a new supply market (for example, geographically or by deploying new technologies, such as the Internet, to open commercial avenues to suppliers) and new sales markets and uses new methods to improve processes and new organizational forms to increase operational efficiency and effectiveness.

Another form of innovation is **strategic innovation**, which generates new business models and is becoming more powerful as a business differentiator and engine for growth. For this is the only way of gaining a true competitive edge in today's dynamic business environment and open markets.

This sequence – from product innovation, through operational innovation, to strategic innovation – can undoubtedly be regarded as an evolutionary path. At first companies typically aimed to differentiate themselves and gain competitive advantage by developing innovative products. In the 1990s, they then also started to differentiate themselves by introducing innovative processes (Business Process Reengineering). The next phase, which is in its infancy, will see companies mainly strive to innovate their business models or "strategic recipe". This will entail constantly realigning the company's entire value creation system – which includes the "value proposition" for customers, investors, and other

stakeholders – operational processes and structures, support functions, and partner relationships, to exploit emerging market opportunities and anticipate competitors' developments.

Gary Hamel, international management guru and Professor of Strategic Management at London Business School, believes that future business strategies will make this their main objective – more so than striving to increase efficiency and minimize costs: "Lowering costs isn't the answer to the two main issues facing businesses – how can they beat competitors whose costs are unbeatably low, and how can they retain customers who're better informed than ever before?"[48].

And managers agree. This was the conclusion of a research program sponsored by SAP and conducted by The Economist Intelligence Unit, a division of The Economist business magazine. The program, which incorporated more than 4000 senior executives worldwide, investigated the business world's expectations of the global business landscape between now and 2010 and found that business model innovation was the most important of the four competencies identified as being essential to survival. The majority of executives said new business models will be a greater source of lasting competitive advantage than new products or services, which are now seen as only a short-term source of competitive advantage. According to respondents, reviewing business models – that is, rethinking at regular intervals how products and services are created, delivered, priced, and maintained – will make the bigger difference.[49]

This will have far-reaching consequences on how businesses are managed and controlled in the future, for success no longer hinges on driving individual product innovations and managing profitability. Instead companies must be able to modify their entire value creation system (that is, their business model) in a proactive and synchronized way. This means that in the long term they will have to advance new capabilities so that they are always two steps ahead of the next innovation phase. In the medium term they will have to translate a new strategy into a suitable business model or value creation system design (including processes and structures), develop new products and services, and exploit short-term value creation and profitability potentials in operations through operational innovation.

This will only be possible if the enterprise is viewed as an integrated, dynamic innovation system that is able to foster and manage all three levels at once (see Figure 4).

This raises the question of how enterprise management – or rather, controlling – will evolve or be forced to do so.

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[48]cf. *Welp* (2005)
[49]cf. *The Economist Intelligence Unit* (2005), P. 2 and P. 9-11

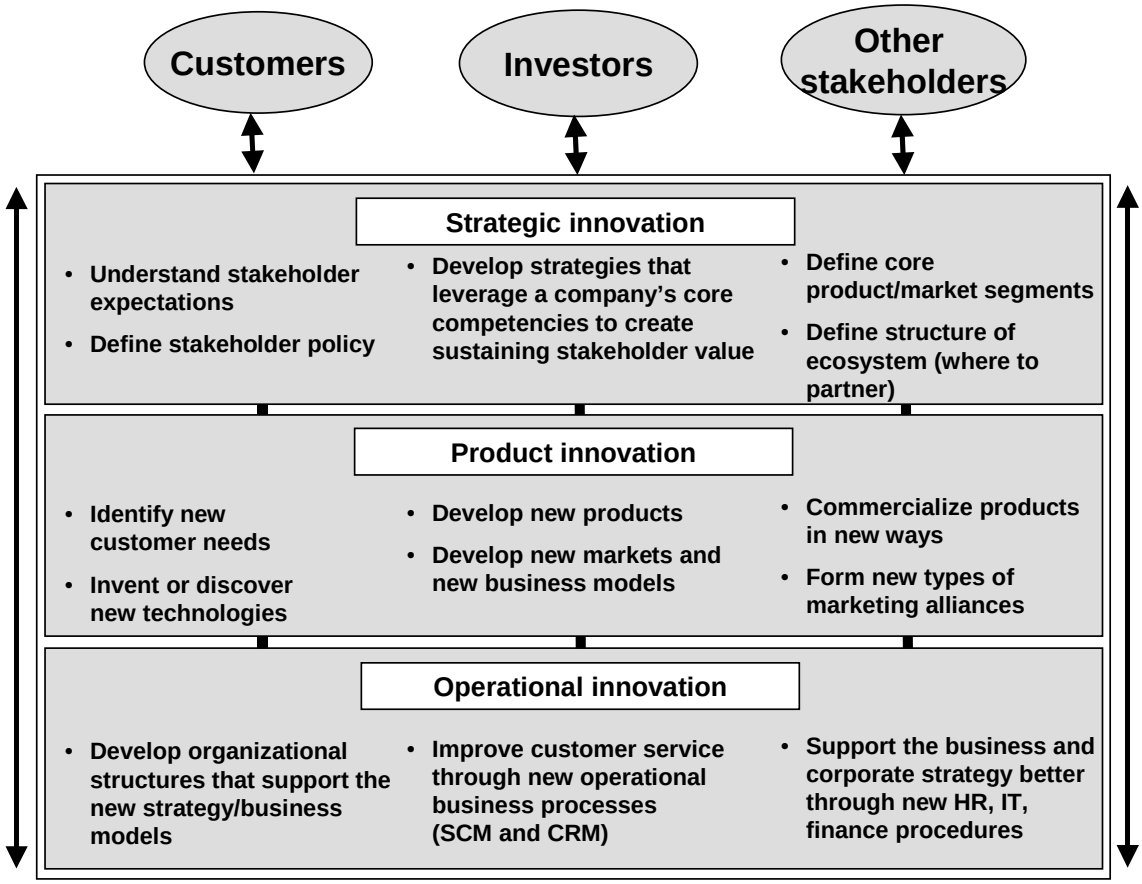

Figure 4: The company as an integrated, dynamic innovation system[50]

4. Innovation – Where Do Controllers Fit In?

As we have already seen, innovation management has become increasingly important to businesses in the past few decades, and even more so recently. This trend has also impacted on the practice of controlling, or in other words, on the organization's controlling requirements. For controlling is a management service, and when there is a change in management's focus or activities, controlling has to follow suit or go even further and itself become a proactive driver of innovation.

The topic of innovation and controlling can therefore be approached from two sides:

- On the one hand, there is the issue of how a state-of-the-art, best-practice innovation controlling model should be designed (as a service for innovation management) and in which direction next practice trends are heading.
- On the other hand, there is the question of how relevant innovation management is to the advancement of the discipline of controlling and how innovation management should be organized.

The first point will be discussed in the next two subsections, and the second will be covered in the last section.

[50] cf. *Daum* (2002), P. 230

4.1 Best Practice in Innovation Controlling

The International Group of Controlling (IGC) – an umbrella organization of institutes providing training, research and development in the field of controlling in German-speaking countries – defines the controller's role as follows: "Controllers design and accompany the management process of defining goals, planning and controlling and thus have a joint responsibility with the management to reach the objectives." [51]

Thus controllers are the company's "business conscience" and assist the management with business control. The business control process starts with the definition of clear objectives and planning, and in this respect, innovation management is no different from any other management task. Innovation controlling therefore also starts with the specification of clear business objectives and planning, usually in the shape of strategic and operational market targets and business plans that outline how these objectives are to be attained – or rather, by which measures. This allows companies to then build a business case to calculate the anticipated financial effects.

In innovation controlling, however, this process is particularly challenging because it is usually difficult to prepare a business case for innovation projects, or the effort cannot be justified because it is difficult to quantify prices and revenues, for these are not usually generated until much later and they entail risks.

To complicate matters further, when they are building a business case, controllers are reliant on the assistance of the players and initiators who are responsible for the innovation, and the information from these people is often the controller's only source. As engineers, marketers, or even "internal entrepreneurs", it is only natural that the main players are more interested in the opportunities that can be exploited than the risks that the project entails. In practice, this means that projects or business cases look very promising at first, but gradually deteriorate as unforeseen events come into the equation. This raises the question of how controllers can prevent this situation and what they can do to fulfill the management's understandable desire to realize initial business cases for the innovation initiatives of researchers, developers, engineers, and marketers (see Figure 5).

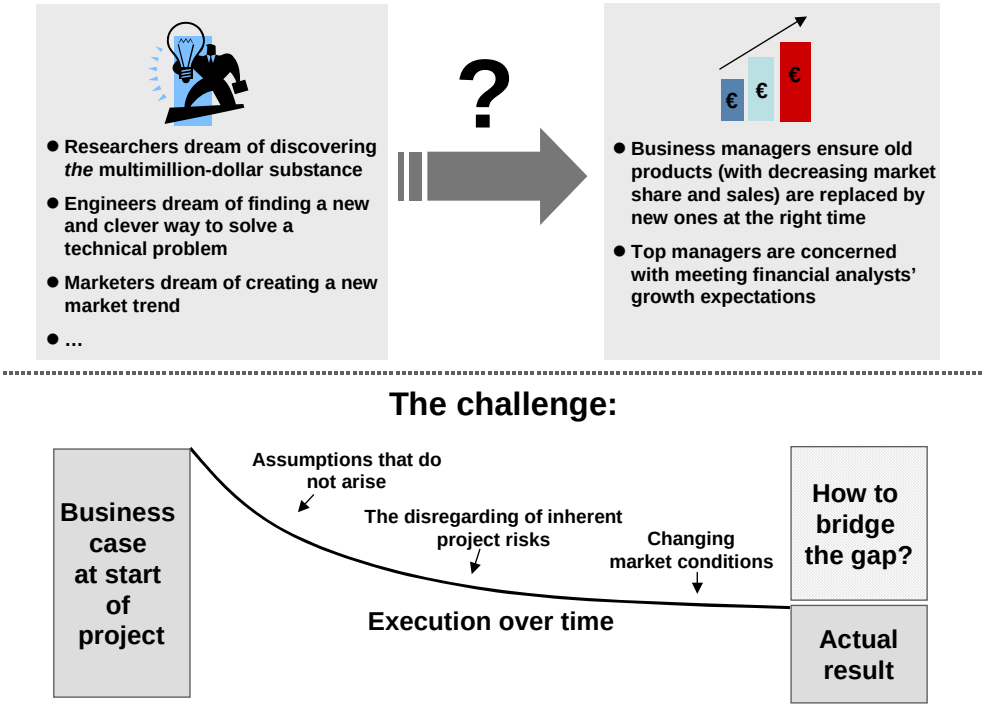

Figure 5: Managerial challenges during the innovation process - how to transform the initial idea or business case into commercial success

[51] cf. http://www.igc-controlling.org/engl/index_engl.html

The solution to this, which reflects current best practice in innovation controlling, consists of three elements (see Figure 6):

- Effective project controlling and an effective innovation process with well-defined responsibilities – that is focused on the innovation objectives and puts the company in a position to master the challenges posed by innovation management
- Efficient project portfolio controlling
- An optimized innovation structure (consisting of multidisciplinary project teams and a suitable structure for project portfolio management committees, which are tailored to the innovation process)

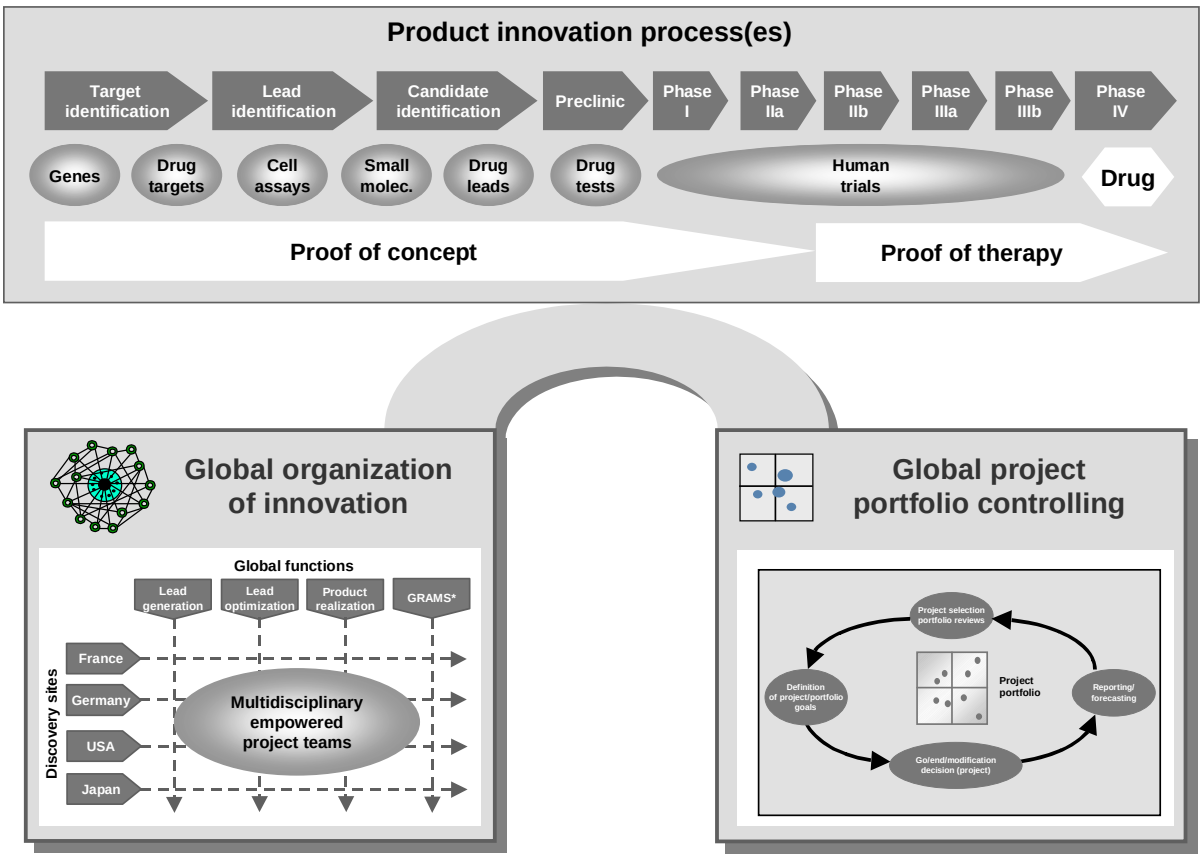

Figure 6: The three elements of best practice in innovation controlling (example of pharmaceutical manufacturer)

4.1.1 Effective Innovation and Project Controlling Processes

The IGC's definition of the controller's role, which was cited earlier, continues as follows: "Controllers ensure the **transparency** of business results, finance, **processes** and strategy and thus contribute to higher economic effectiveness."[52]

This means that the controller's function is not just to ensure the transparency of strategy, business results, and finances but also the transparency of business processes and their economics – which ultimately generate financial results and cash flows – and to control these to achieve strategic, business, and financial objectives.

[52] cf. http://www.igc-controlling.org/engl/index_engl.html (highlighted by author)

The organization starts the innovation process by forming a clear picture and understanding of each of the phases in the process – and controllers are instrumental in establishing this process and in contributing their business expertise and methodical project controlling know-how. Initially this involves defining in clear terms the main phases in the innovation process and determining how success will be measured (see Figure 7).

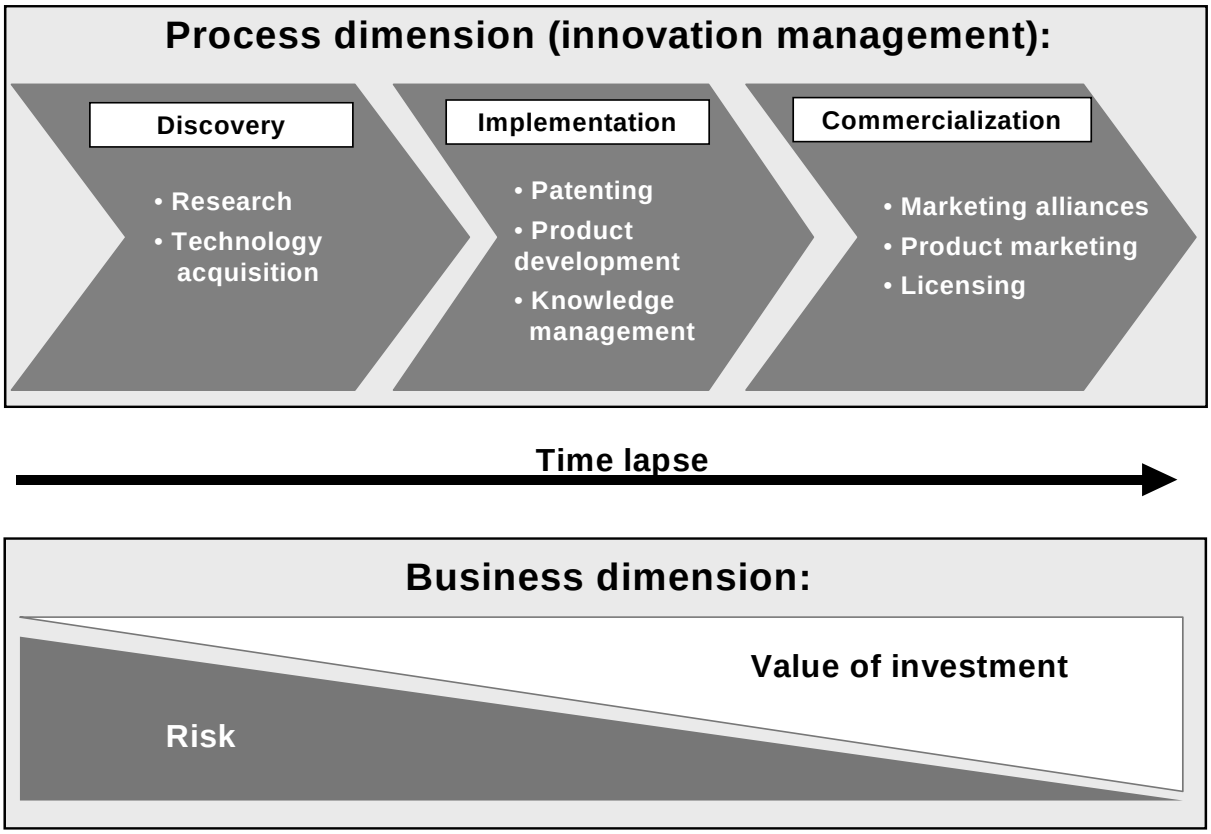

Figure 7: Generic model used to provide a basic business structure for the innovation process[53]

In the next step, the company structures the innovation process in detail (see Figure 6). This involves project controlling, the assignment of distinct responsibilities, and task description. Amongst other things, this phase addresses the following:

- Who defines the objectives or the customer/application problems for which the team is to find a solution during the research or "discovery phase"?
- Who is responsible for identifying potential leads – in other words, possible solutions – that should be investigated further?
- What are the key milestones in the innovation process?
- What are the objectives for each of the project phases (typically a mix of resource/budget objectives, market targets, and target dates)
- How will target achievement be measured?
- What will happen if things do not go according to plan, and who has to take action?

[53] cf. Lev (2001), P. 111. Daum (2002), P. 275-279 explains the basic method used to develop a suitable measure system.

4.1.2 Efficient Project Portfolio Controlling

Businesses usually have to juggle multiple innovation projects at once. This raises the issue of how they can optimize their global portfolio of projects.

Every single project ties up resources that could be used in other new projects that may have better prospects, and market conditions, technologies, and the company's business strategy can all change over time. This changes priorities both for innovation projects that are already up and running and for future candidate projects. Companies therefore need an effective project portfolio controlling process to optimize the entire "innovation pipeline".

Project portfolio controlling consists of:

1. Assisting the management to prioritize and select candidate projects
2. Helping the management to "maintain" the pipeline and global portfolio of development projects and products that are already on the market. This involves assisting with decisions about whether projects are to be continued, deferred, or terminated (whether current products are to be discontinued) and with setting up and maintaining an optimum portfolio structure.

The first task requires an evaluation of prospective candidate projects based on precise criteria that incorporate opportunities, risks, availability of resources, business strategy, and the optimum structure for the global portfolio. A great deal depends on this task because:

- There are usually more ideas and suggestions for new innovation projects than there are available resources and capacity,
- Every new project that is added to the portfolio influences the opportunity and risk structure of the global portfolio and the makeup of the pipeline (best possible mix of new projects, projects ready for launch, and products already launched),
- The global strategy cannot be implemented until the individual projects are selected,
- This is the only way to ensure the optimum use of available resources and capacity to achieve value-added.

The purpose of the second task is to continually adapt the innovation or product portfolio to constantly changing conditions.

While in the past, it was common practice for companies to shepherd an innovation project to completion (or failure) once it had been released, today a project only remains active for as long as it meets the specified criteria. Thus each project is evaluated individually and as a whole on a regular basis, and not just once at the beginning of the project. In particular, companies review:

- Whether the project is still in keeping with the organization's business or innovation strategy
- The feasibility of the project being a technical success (or rather, whether there have been technological developments in the marketplace that are conducive to the project)
- The feasibility of the project being a business success (or rather, whether there are still market opportunities/the window of opportunity is still open)
- The status of the target/actual comparison for the defined target criteria (from the initial business case or evaluation)
- Whether the project still represents the best use of business resources
- Whether the project's priority level has changed relative to the other projects in the global portfolio

Based on the findings of this review, the organization can decide to make changes to a project, leave it unchanged, defer it, or terminate it. Within project portfolio controlling, both current projects and prospective candidate projects are evaluated on a regular basis, and new projects can be started and existing projects terminated. The objective of this process is to maximize value-added from investments in innovation and to optimize and balance the innovation pipeline or product portfolio (see Figure 8).

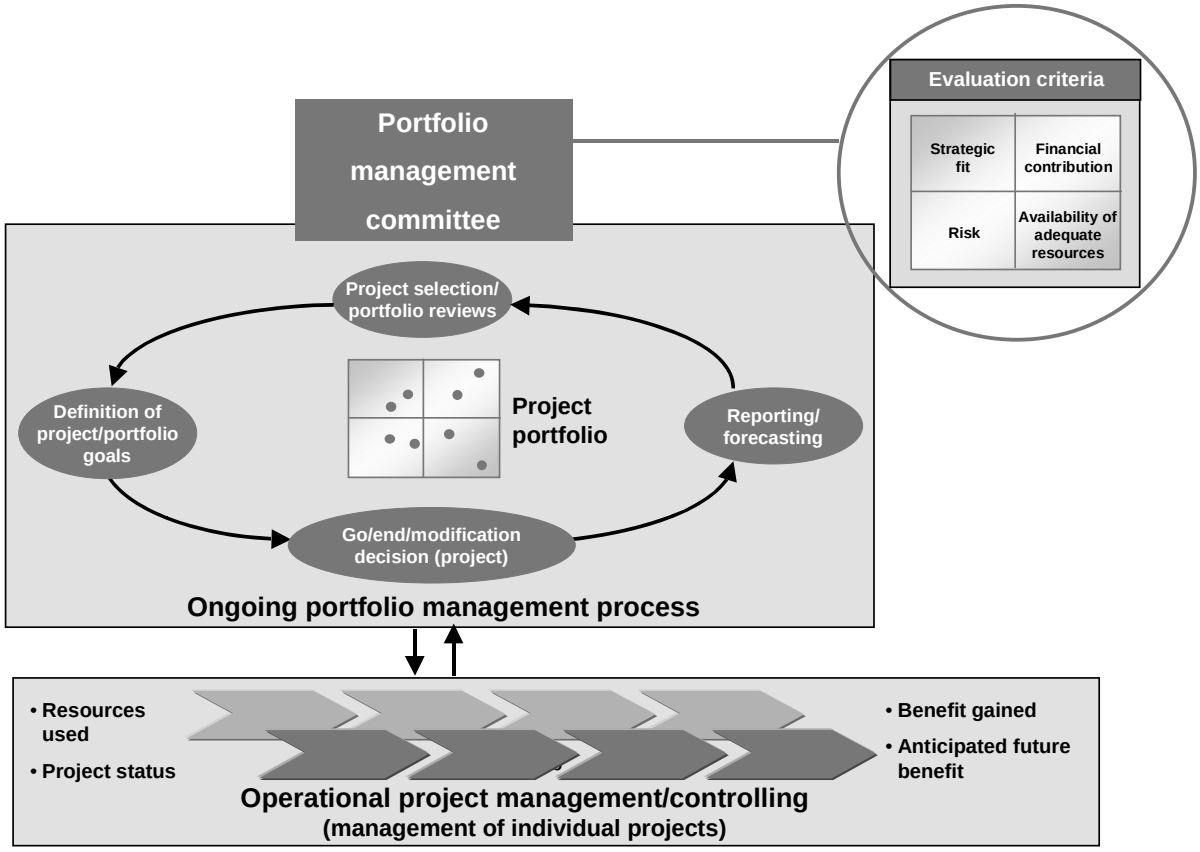

Figure 8: The role of project portfolio controlling is to help the management to maximize value-added from its investments in innovation and to optimize the innovation pipeline or product portfolio.

4.1.3 Optimized Innovation Structure

Project controlling and project portfolio controlling deliver information to help the project management teams or project portfolio management teams to make decisions. But how should these decision-making committees and teams be set up? The structure of decision-making bodies can be particularly critical to success in large organizations because, as discussed above, one of the main challenges and success factors in the innovation process lies in integrating the knowledge clusters of the various functional areas (research, development, marketing, sales, and so forth), which are usually quite isolated, while also assigning distinct areas of responsibility to R&D and production ("make it") and the marketing teams within the company ("sell it").

Multidisciplinary project teams constitute one element of best practice in the organization of innovation management within the company. These teams combine expertise from different areas and can therefore make better operational/tactical project decisions than, say, a team made up only of members from R&D. The project team's job is to oversee the project throughout its lifecycle in collaboration with the company's global innovation support teams and the regional and local marketing teams (see Figure 6, bottom left).

The second element of best practice is portfolio committees, which are responsible for releasing new projects and making decisions about the makeup of the global project portfolio. Today it is considered best practice to adopt a form of labor organization that fulfills the specific tasks and economics of the three main innovation phases (see above) rather than to deploy a single committee that oversees the portfolio throughout all the phases of the project's lifecycle. There is a separate committee for every phase (research, development, marketing) and they each report to and are coordinated by the operational management teams that oversee the innovation process – the research management

team, the development or product technology management team, and the business or field management team (see Figure 9). The central portfolio management group is responsible for coordinating the management teams and providing integrated project portfolio controlling services for the entire process.

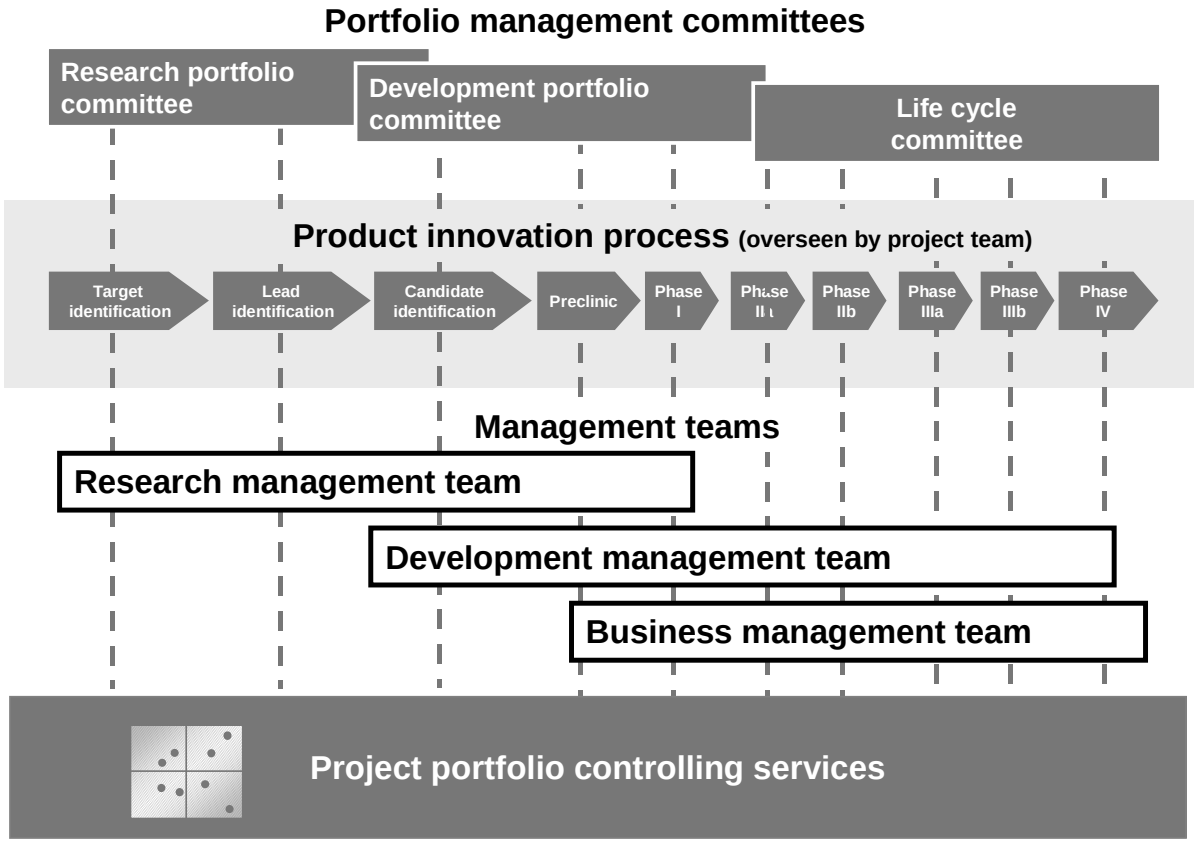

Figure 9: Responsibility of the portfolio committees; coordination provided by the management teams through project portfolio controlling services (example from the pharmaceuticals industry)

4.2 Next Practice Trends in Innovation Controlling

The next section presents some of the next practice trends in innovation controlling that the author has encountered in his experience. It begins by discussing the controller's main instrument: the performance measurement system. It then goes on to the issue of how the controlling service can be proactive in adapting to new demands that will arise from evolving business models. Finally, it suggests that controlling will increasingly look beyond the company and broaden its focus to the extended ecosystem, which includes partner companies.

4.2.1 Performance Measurement: From Cost Controlling to "Attraction" Controlling

One of the main problems or challenges in innovation controlling is that controllers typically only ever deal with the cost or input side of the innovation process and hardly, if at all, with the output side; that is, with the outcome that the customers or market expect. The following is an example:

The controller of a large R&D division within a corporate group has invested a lot of time and expert knowledge in setting up a reporting function to provide the management team with a comprehensive business overview of every one of the company's development projects and of the invested resources. This is the first time that the management team has ever had a transparent overview of all the R&D

areas and their projects and invested resources (predominantly the number of employees involved in each project). However, this did not lead to better decisions.

The reason for this is that the management team was made up of the head of the R&D division, managers from the R&D subsections, the product manager, and the controller. There had always been competition for resources (or rather, employees) among the managers of the R&D departments. But up until this point the managers of each R&D department only knew how many employees the other R&D departments had and not how many people were working on each project in each of the areas. Due to the increased transparency provided by the new function, the managers of the R&D departments now know how many projects each of the other departments has running, their status, and the number of employees allocated to them. This has intensified the conflict and tussle for resources in the management team and led to a situation where decision-making is worse than before due to political horse-trading.

What the company needed was "objective" information, a commonly acceptable point of reference in the shape of market intelligence to inform the management of the customer and market-relevance of development projects. Not only would this have eased the conflict surrounding resources, it would also have provided a common basis for decision-making for the first time, and the R&D department managers would no longer have been able to argue that so-called facts put forward by colleagues were selected with the sole intention of pushing their own projects.

The availability of financial information on the manufacturing process (including the resources involved), which is the controller's traditional domain, must be **combined** with information on "effect" or attainable "effect" from the perspective of potential customers (that is, the attractiveness of the product or service). In an environment where companies are competing more and more on attraction (buyer's market) than on low manufacturing costs (seller's market), this type of qualitative information is not just required for effective innovation controlling but also for enterprise management as a whole.

Given that there is harsh competition to win customer favor in today's buyers' markets, it may be useful to look at the left side of Figure 11, which is shown above, and use the information to optimize value-added from the customer's perspective. For after cost optimization, customer value-added provides the most leverage in maximizing internal value-added – the margin (right-hand side of Figure 10, above). If a company can optimize the subjective value of a product for a potential customer, the customer will be willing to buy and may even pay a higher price. This would increase the value of the company's investment in innovation and its top line, the sales revenues that it generates.

To achieve value-added, controlling systems must systematically incorporate subjective customer ratings alongside internal information on revenues and costs. This involves analyzing the value components of the customer ratings, and to maximize the overall rating from the customer's perspective, companies must harmonize the relevant value creation processes (for example, in product development or sales and marketing) and resources. This requires optimized costs and well-designed, distinct value creation processes that are improved on an ongoing basis. To this end, companies must include both perspectives in an analysis of the overall result for the entire company and for its various divisions: that is, traditional information on costs and profitability and customers' subjective ratings of the finished product.

The vector-based concept of performance measurement[54] is a design that combines these two types of information. Vectors visualize and improve the logic between subjective customer value and effect for the organization (costs, result) and thus help companies to optimize these (see Figure 10). This allows them to generate the ideas they need to further develop the resources and competencies that will be essential to the generation of "customer attraction" or competitiveness in the future.

[54] cf. *Daum*/*Bretscher* (2004)

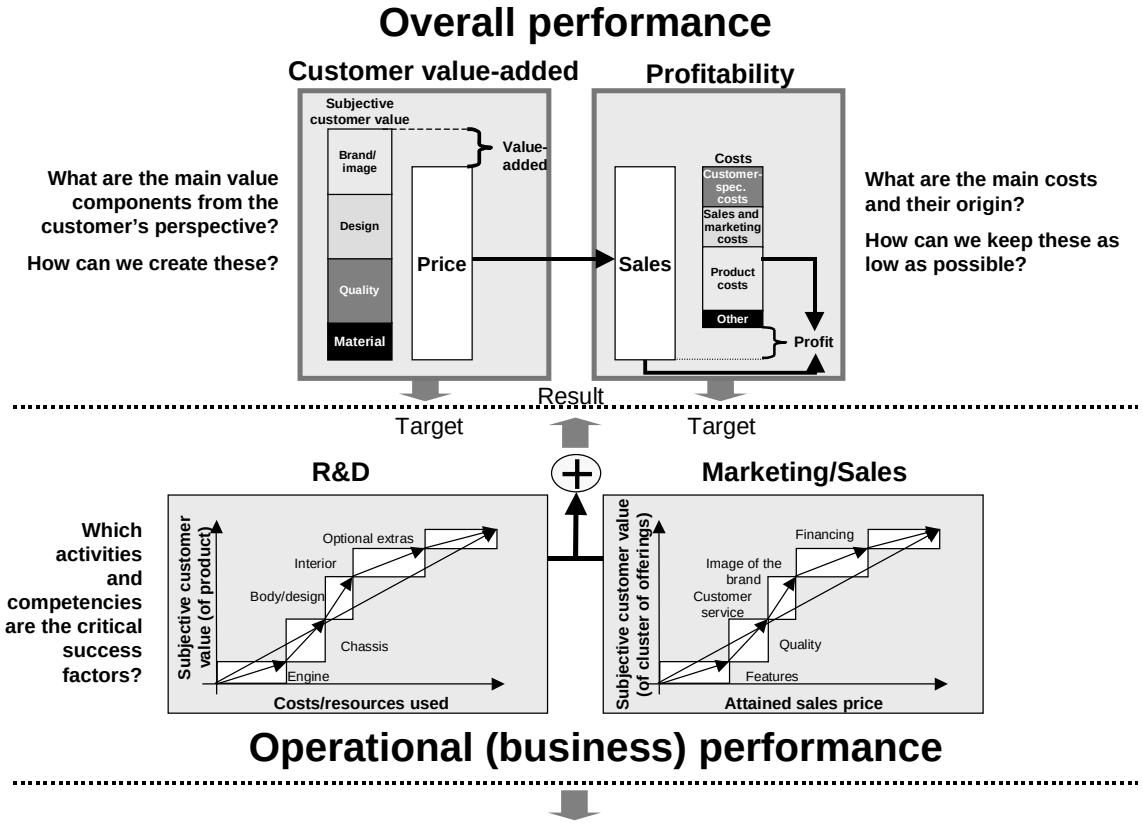

Figure 10: Example of the use of a vector-based measurement concept for combined performance (customer value/result for the company) in an automotive manufacturer (Daum, J.H., 2004, P. 148)

4.2.2 Organization: From a Static Controlling Service to a Dynamic Innovation Service

Up to now, controlling has been tailored to the organization's given value creation system and processes, and it is continually optimizing the controlling instruments that it applies. However, as a consequence of the higher innovation dynamics, these value creation systems will themselves be subject to constant innovation and change. As mentioned previously, it is not just product innovation that will become increasingly important – strategic innovation will too. This will lead to constantly evolving business models, which is the only way to gain true competitive advantage in today's open markets and dynamic business environment.

For controlling, this means that it will no longer be sufficient to simply maintain the instruments and processes that it uses for the existing value creation model. Instead, it must be prepared to continually review the entire controlling system, instruments, and processes and realign them or adapt them to new demands. This also means that controlling will increasingly be involved in providing business consulting and in developing new methods – for before deciding on a new business model or value creation system, the management will need advice from controlling so that it can take into account the business implications of the new design.

These developments will have the following impact on how controlling is organized:

- Due to tasks becoming more extensive and complex, controlling will have to focus more on its actual core activities and automate other tasks.

- There will be a greater distinction between routine tasks (handling controlling for the existing business model – planning, reporting, variance analysis) and consulting and innovation services for new methods. The first tasks will increasingly be pooled in shared service centers or even outsourced to external service providers.
- Controllers will become an integral part of multidisciplinary strategy teams. These project teams will oversee the innovation procedure for business processes, prepare information for decision-making, and take responsibility for the first phases of the implementation of the new processes.
- Alongside experts from other areas (for example, R&D, marketing, sales, and HR), controllers will work in multidisciplinary performance management competence centers that provide integrated, multidisciplinary business consulting services for operational management.

4.2.3 Focus of Controlling: From Internal Productive Factors to the Entire Ecosystem

The more dynamic the environment and the more intense the internal innovation dynamics, the more organizations as a whole will have to concentrate on what they do best or on what will create the most value-added for customers. There is a very good reason for the upsurge in partnering and outsourcing over the past decades. As explained before, partnering is particularly crucial in innovation management.

The trend for business model innovation will further accelerate this development. It will also give rise to partnerships being forged more rapidly and frequently, and being dissolved again. Acquisitions and the full integration of former partners will be another aspect of this trend.

However, the more companies integrate vertically and outsource activities to partners or perform them in collaboration with partners, the more they will have to find ways and methods of jointly managing these processes or establish “collaborative” controlling. This means that controlling will broaden its focus from the company’s own (internal) productive factors to the productive factors and value-creating processes of the whole ecosystem of companies, suppliers, and marketing partners.

As a consequence, organizations will have to define which controlling activities can be carried out by each partner alone and which can be carried out jointly, which then raises the question of how joint activities can be managed organizationally. This function would also lend itself to the pooling of routine tasks – and some specialized ones – in jointly-run shared service centers or centers of excellence, or to the use of an external service provider for specific activities.

5. Do We Need an Innovation Management Process in Controlling?

The next practice areas outlined in the last three sections are still new to most companies, and this applies to the last three points in particular. Nevertheless, this author is of the conviction that the trends we are already seeing will accelerate even further in the next few years. And this raises the issue of how controlling will handle the subject of innovation management.

If the focus of controlling is going to be subject to increasing change (enterprise business model or ecosystem), then instead of just following the trend, controlling will have to be proactive so that it does not just provide a controlling service but also future-proofs the quality of this service.

Therefore the response to the question “do we need an innovation management process in controlling?” must be affirmative. So the real issue here is the institutionalization of innovation management in controlling.

This underlines the fact that the aforementioned challenges presented by innovation management will also become an issue in controlling, and the described best practice requirements in innovation management and innovation controlling will also be applicable to this area.

Furthermore, controlling will have to give consideration to the topic of business model innovation. This will involve the assignment of distinct tasks and the definition of objectives to enable the organization to drive ahead and coordinate product innovation (product innovation process for the development of new controlling products/services), the structure of innovation teams, innovation control, and the development of key "enablers" (see Figure 11).

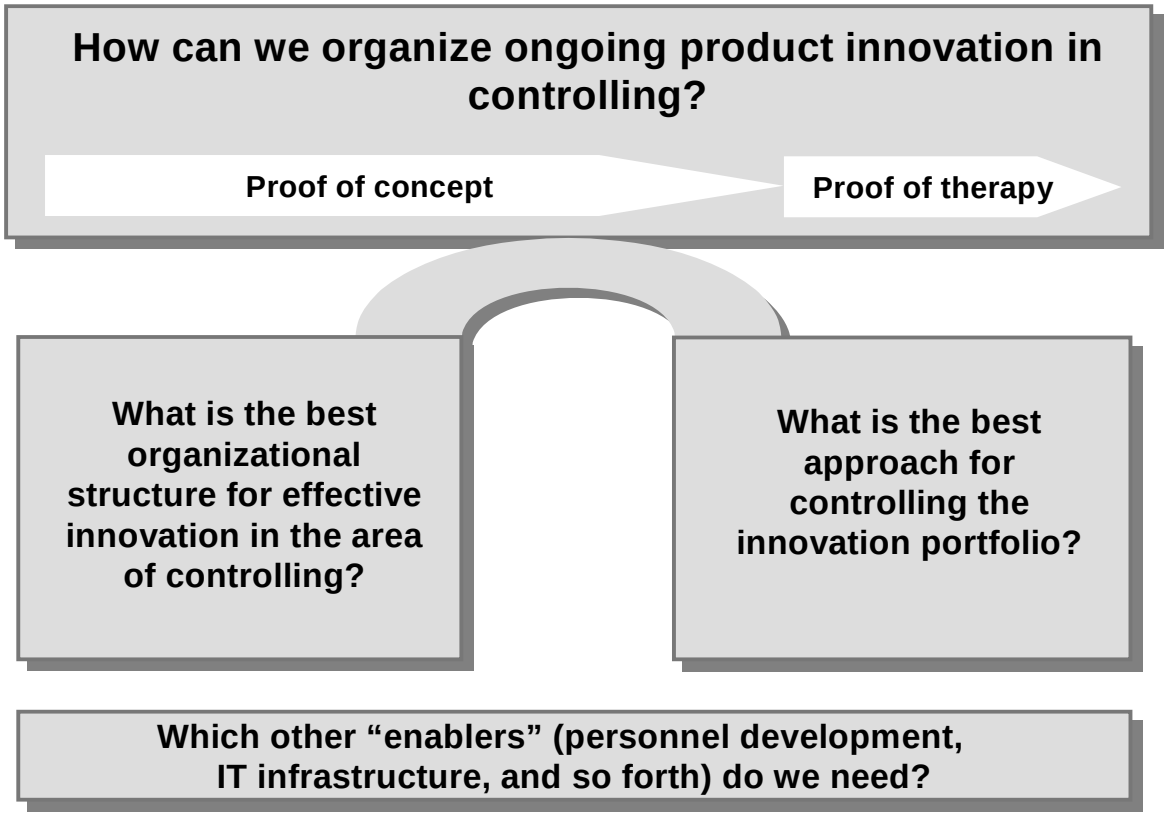

Figure 11: The three areas for effective innovation management in controlling

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