

## Company Value Creation through Effective Innovation Process Management

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**Abstract.** Company value creation is considered a significant metric to measure corporate success. One possible method is the launch of innovative products that potentially attract new customers and capture a reasonable market share. This discussion highlights examples wherein heightening innovation activities through incremental increases in Research and Development spending, the number of innovative products in the sales funnel, as well as those innovative products in the marketplace impact company value. Yet, another company value driver, worthy of consideration, is the effective management of innovation processes. The Stage Gate Control Process embodies a recognized framework for effective innovation process management. Central to this manuscript is the case of PharmaComm, a pharmaceutical company that developed a customized version of the Stage Gate Control Process. By this way PharmaComm accelerated new products development and shortened time to launch. In adapting this methodology, it multiplied company value during the acquisition process.

**Keywords.** Stage Gate Process; innovation; company value; stock valuation.

### 1 Introduction

A basic strategic goal is to gain competitive advantage to surpass competitors and generate shareholder value. To do so, a company possesses key competencies as fundamental factors to generate competitive advantage. These competences are unique and difficult to imitate. One of the most significant is the ability to innovate. Investments in strategic innovation require a positive return on investment resources. In addition, management not only envisions innovation but also creates and once deployed, measures its effects. Strategic innovation is complex and combines four processes that comprise strategy, entrepreneur, change and investment processes (de Witt and Meyer, 2014). For innovation to generate customer value, it is essential to be properly designed and launched in a timely fashion. To meet these demands, the company establishes functional and effective innovation-related activity management. In this regard, the authors propose two research questions. The first being, if a formalized process is conducive to effective innovation management. The second, if the intensity of Research and Development (R&D) activities expressed in terms of the number of R&D projects impact the increase of company value. If the company

respects the aforementioned premises, it creates conditions to better attract future investors. Investors consider such firms less prone to risk and their interest in investment support increases company market value. Once such a process is operational, the company proceeds with the prescribed and defined steps that result in the delivery of the project respecting both time and budget (Stage Gate International, 2015). The terms innovation(s) and innovation(s) management are related with the concept of the innovative company and are addressed throughout this discussion.

## 2 Research Methodology

Recognizing that the examination of issues and circumstance is often based on qualitative research, a case study serves as foundation to this discussion. Case studies are frequently used as qualitative research methodologies (Yazan, 2015). The characterization of a case study has evolved over the past two decades with varying definitions. Yin (2014) defines case as “contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clear and the researcher has little control over the phenomenon and context!” Thus according to Yin, the case study is an empirical inquiry that investigates the case by means of addressing the “how” and “why” of the phenomenon of interest. Stake (1995) hesitates to provide an exact definition of a case study. He views case as a specific, complex and functioning thing, more specifically an integrated system that possesses boundary and working parts. He also mentions four definitive characteristics of qualitative research that are equally valid for qualitative case studies. These characteristics are holistic, empirical, interpretive and emphatic (Yazan, 2015). Merriam (1998) views the case as a thing, a single entity, and a unit around which there are boundaries. Accordingly, a qualitative case study is an intensive, holistic description and analysis of a bounded phenomenon such as a program, an institution, a person, a process, or a social unit. Qualitative methods concern meaning rather than frequency of phenomena. Emphasis is placed on case study design. It follows the basic logical sequence that connects the empirical data to the initial research questions and finally, to its conclusions (Yazan, 2015). Generally, the case study is a legitimate research strategy that resolves complex research problems. A case study becomes a foundation on which the theory is built. Such a process begins with the research question definition. The a priori identification of variables or constructs from the extant literature guides the research process. Tentative themes, which emerge from the fieldwork are compared and contrasted with the literature. The idea is to systematically compare and contrast theory and data, iterating towards a theory that accurately reflects the data. The comparison of the emergent themes and theories with the literature is crucial, given the limited number of cases that are studied (Eisenhardt, 1989). Theoretical development from case studies relies on non-statistical sampling. Given the limited number of cases to be studied and processed, it is essential to select critical, extreme and relevant cases in which the phenomenon is transparently observable (Eisenhardt, 1989). Furthermore, the non-random sampling incorporates a factor of subjectivity within the case study approach. For this reason, the multiple-case approach renders this methodology more reliable.

### 3 Innovations as value drivers

According to Drucker (2008), a company has two sources for growth, marketing and innovation. Moreover, Pitman (2003) proves that enduring company value growth remains the best indicator of the quality of corporate performance. The impact of innovation on company growth remains significant to many researchers. Mañez et al. (2013) as well as Rochina-Barrachina et al. (2010) examine the effect of process innovation on productivity growth with the emphasis on company size. They conclude that innovation augments company productivity no matter the size of the organization. On the other hand, the duration of company growth was different for small and large firms. While for the former, productivity growth was contemporaneous whereas, for large firms, long-lasting. The reason for which, process innovations in small firms is incremental and easy to imitate while process innovations in large firms are of a radical character and therefore unique. Similarly, large companies introduce more complex process-dedicated innovations that become common knowledge subject to a longer delay. Rosenbusch et al. (2011) observe relationships between innovation and company performance and determine that this association is ambiguous and context dependent. Factors such as the age of the firm, the type of innovation and the cultural context affect the impact of innovation on performance to a significantly larger degree.

Additionally, there is the opinion that both time and resources are required to learn how to apply innovative technologies effectively. Based on this perspective, productivity growth is often slower than expected as companies employ more resources to determine how to use and to reorganize to benefit from the new technology. This phenomenon is recognized as the Solow Paradox (Baily, 2004).

Strategic innovation requires resources and within this context, considered an investment to the company's future potential. Morris (2003) proposes that there exists a proven correlation between R&D expenditures and chemical companies share price increase during the period 1998–2002. Figure 1 indicates the causality between European chemical companies' relative expenditure expressed as R&D/sales and share price in the chemical industry. It confirms that the higher proportion of R&D to sales, the higher the share price. Further research demonstrates that the dependency between R&D expenditures and share price need not be linear as with the case of larger chemical companies. Kwon (2014) examines a similar type of dependency in SMEs and determines that this dependency is non-linear. Moreover, the character of this dependency is associated with the firm's characteristics and market structure. It is also reported that even non-profit SMEs generate tangible and intangible value (Huang and Yu, 2011).

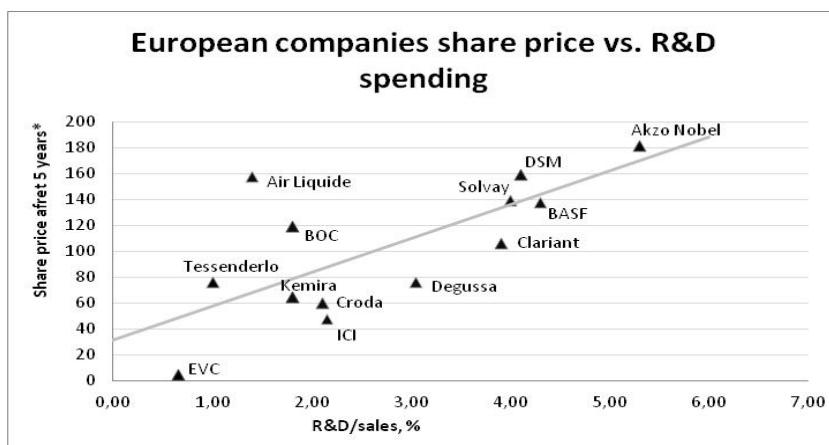


Fig. 1. Dependence between share prices and R&D spending in chemical companies (Morris, 2003)

Between the increase of market capitalization and the implementation of innovative solutions, exist many almost exclusively stochastic dependencies. Demonstrated by the pharmaceutical industry, such dependencies are exhibited with the periodical disclosure of pharmaceutical research results, not mentioned if positive or negative, significantly influences the fluctuation of share indices. There are no exceptions given that refusal to approve a new drug by the respective regulatory authority, such as the US-based Food and Drug Administration (FDA), immediately infers a significant decrease in the share price index. A recent example, the American pharmaceutical company Genta Inc. lost significant market capitalization upon FDA refusal to commercialize the skin-cancer drug Genasense. Consequently, the NASDAQ registered a significant slump in share price from 15 USD to below 2 USD (Feurstein, 2010).

In addition, company stock assessment is influenced by rival R&D activities. The latter effects company stock valuation both positively and negatively and is termed as positive and knowledge and negative spillover respectively. Asdemir (2013) examines the impact of a rival's R&D expenditures with the conclusion that positive spillover is usually prevalent. He further reveals that the impact of industry R&D on stock valuation is higher where R&D is concentrated among a few firms. In contrast to these conclusions, Koku (2010) questions positive spillover between R&D expenditure and company profitability within American pharmaceutical companies. He argues that not all innovations that are produced as the result of R&D are commercialized. The innovation-related spillover effect in the pharmaceutical industry does not permit firms to capture all the benefits that result from their innovation. The issue becomes whether the announcements of innovative projects impact company stock valuation. Kelm et al. (1995) conclude that the stage of the R&D process moderates the relationship between the wealth effects and technology, and market variables. The former are more important than market variables during the innovation stages and both are important during commercialization. Similarly, Korean research suggests that the impact of company innovativeness on brand value reinforcement implies customer value increase (Kim et al., 2015).

#### **4 Stage Gate Control Process (SGCP) as a formalized approach to management of innovations**

Stage Gate Control Process (SGCP) is a conceptual and operational road map that enables the transition of a new product from conception to final launch (Cooper, 2008). Originated in the 1980s, Cooper (1986, 1990) gathered corporate best practices that had a proven track record in innovation. He subsequently developed a formalized process that includes, an idea capture and handling system; doing voice of customer research work that includes "camping out" with customers and working with innovative users; generating scenarios, and holding major revenue-generating events (Cooper et al., 2002; Cooper, 2008). Reasoning behind the process is to systematically and prudently evaluate the merits of a product or service concept before, rather than after it is launched (Cooper, 1990). He postulates that the SGCP assists firms to minimize the risk of new product failure and managers develop differentiated products or services with superior value (Barringer and Gresock, 2008).

SGCP consolidates and bundles tasks and decisions into activities known as a stage. The innovation effort is then divided into distinct stages to render project supervision more effective. The transition of the innovation from one stage to another is contingent upon criteria achievement and the approval of management gates termed as gate keeping (Barringer and Gresock, 2008).

In practice, project teams complete predefined cross-functional activities in each stage prior to gatekeeper approval to proceed to the next stage of product development. The gatekeeper is usually a cross-functional team of managers and experts. This formalized process facilitates the innovation process through the stages, establishes milestones and recognizes critical success factors. Once the stage is completed, the project is critically reviewed against the metrics that specify the level of readiness, known as gate control, for the next stage. The level of rigidity of the gate control is based on the type of innovation. Radical innovations require a more relaxed stage assessment as compared with incremental innovations (Schmidt, 2009). Roberts (2007) concentrated on SGCP principles and developed a "generic" model. This model includes opportunity recognition, idea formation, problem solving, prototype solution, and solution utilization and commercial development. With the occurrence of special circumstances, some stages are merged. There is no recommendation as to the exact number of stages but rather is derived from the typology of innovation. A simple rule applicable to real processes, is that the higher investment into the innovation and the lower project risk acceptance is assumed, then the higher number of stages are involved. On the other hand, the more radical the innovation project, the lower number of stages is required. For radical innovation projects, three stages are recommended (Chiesa et al., 2009). It is reported that almost half of the companies that undertake new product development applied a form of SGCP (s2m™, 2015). However, reservations towards SGCP do exist. SGCP supports a sequential development process and underrates various parallel activities that are often essential for the timely completion of the project (Verworn and Herstatt, 2002). Another shortcoming is that SGCP inherently forces fundamental project decisions to be made earlier than necessary. Thereby, it restricts flexibility to respond to change and raises costs (s2m™, 2015). The lack of idea generation and creativity are considered

deficiencies. In view of these perceived weaknesses, Cooper (2014) developed the next generation model known as the Triple a System: adaptive and flexible, agile and accelerated. The reliability of which has been endorsed by companies such as 3M, Procter & Gamble and other European firms (Cooper, 2015). Moreover, the SGCP concept expanded outside the constraints of the classical innovation scheme and produced a new open innovation model (Grönlund et al., 2010). Current research suggests that SGCP has not fully exploited its potential and that future developments are foreseen (Cooper, 2014).

## **5 Management of innovation activities - generic drug business insight**

It is both the opinion and experience of the authors that the generic pharmaceutical industry focuses on product commercialization, for which patent protection has expired. Such a protection ensures the patent holder to enjoy product usage or process for the next 20 years and secures long-term competitive advantage. No sooner are other companies permitted to market the same product under its brand, the patent expires. If the basic managerial paradigm in commodities is to be the cheapest and through a low cost strategy out-performs competitors, then rapidity may be regarded as the basic paradigm. This, in turn, combined with a high speed of innovation enables the company to shorten the innovation cycle and become the first applicant to patent. Such being the case, the company protects its intellectual property by patents and dominates the market. Conversely, if the company produces generic drugs as with the PharmaComm case study, then it drives the generic product into the market immediately after the expiration of the existing patent. In both cases, if the company hastens its innovation activity, there emerges a flatter market penetration.

The development of unique unknown products or procedures or incidentally known products with significantly different utility value is enormously demanding and costly. Needless to mention that only three out of ten drugs that reach the market generate revenues that meet or exceed average R&D costs (Gassman, O. and Reepmeyer, G., 2005). Only large global multinational companies can embark on the development of innovative pharmaceutical products while others proceed with generic drugs development. The development of generic drugs does not signify that the company is not innovative. The company may develop its own unique route to a generic drug that may be entirely or partly protected by patents. As a consequence, competitors then seek alternative technologies that are not in conflict with existing patents. The competitor inevitably incurs additional costs and worsens its competitive position. It illustrates the importance of the innovation effort within the generic pharmaceutical industry, which affords an opportunity to capture at least a part of the generic drugs market. Notwithstanding the lower development costs, the development of these products is correspondingly demanding and time consuming. The trigger for this development is patent protection expiration usually supported by customer demand for distribution. The results of basic research may also act as another impetus for development. Such conditions necessitate the company to cope with the technology that guarantees the generic copy to be identical with the original. Due to complexity and demands of innovation within this industry, new generic product

innovation combined with their product launch are regarded as breakthrough or radical innovation. This challenge is ranked among the key competences that create the basis to win the competitive edge over market rivals.

Challenging conditions occur wherein the nature of the innovation is relatively inexpensive and simple but the industry regulator imposes complex governing restrictions on the execution of change. It is not uncommon that these impositions prevent the company from implementing the incremental innovation process. Over the past decades, management of radical and incremental innovations in the pharmaceutical industry has been subjected to various principles. However, Cardinal (2001) proposes that the management within the pharmaceutical sector are more consistent than previously suggested. However despite decades of intensive research experts in pharmaceutical management are still a long way from solid guidelines for the manageability of pharmaceutical innovation costs (Gassman and Reepmeyer, 2005).

## **6 Case Study: PharmaComm as an example of innovative company**

The case study typifies a mid-size Czech pharmaceutical. The actual name of the company has been modified due to privacy considerations. The company which employs more than 90 employees is focused on the production of hormone-based Active Pharmaceutical Ingredients (API). Thanks to its specialization in hormone-based API development and production the company plays a unique role in Czech API business. From the European perspective the company represents a respected competitor in the branch.

The case study describes how the adoption of formal strategic management within the product portfolio enabled market value growth and the rise of investor interest to support this trend. The SGCP approach is used once modified to accommodate its specific environment. The Roberts' Model of SGCP corresponds to the innovation process of this mid-sized pharmaceutical. One of the more significant reasons to opt for the Roberts' model rather than the Cooper is that the former reinforces the idea generation phase (Roberts, 2007). The basic requirement for the case study elaboration was the knowledge of internal sensitive data to compare calculated market value with actual investor proposals.

PharmaComm focuses on the development, production and sales of active pharmaceutical ingredients. The company is engaged in hormonal products development. Both development and final launch are intensive activities. New product development requires the exploration of multistep technology, its optimization and validation. To minimize failures, the company established a formalized innovations management process, which bears resemblance to SGCP.

Stage 0 - discovery: Activities are oriented on opportunities discovery and new ideas generation about the product. The innovation process is initiated by ideas collected both from internal and external sources. Ideas generators are typically R&D or marketing personnel. The output of this stage is the critical assessment of ideas from various perspectives such as, the environmental impact of technology, accessibility of

key sources, preliminary technical feasibility, and others. If the results substantiate a further analyses of the idea, then the topic is moved to the next stage subject to preliminary laboratory examination. The gatekeeper in this stage is an expert panel composed of R&D managers and specialists, Quality Assurance and Technical Managers.

Stage 1 – scoping and laboratory exploration: A comprehensive assessment of technical and financial benefits and market prospects is performed. This stage operates with variant and scenario approaches. This critical stage must prove that the technology projected is technically feasible. In addition to an irrevocable confirmation that the company is capable to accomplish the technological aspect, it is necessary to examine if the technology provides an actual generic form of the original drug. To avoid potential intellectual property infringements, preliminary laboratory development considers only those technologies apparently patent free. The output of this stage is the Opportunity Study approved by the gatekeeper executive management team and the Managing Director.

Stage 2 - development: Development plans are transformed into concrete deliverables. Plans are divided into several phases, each substantiated by a comparison with the predefined milestones. Technological development and engineering are performed to their full capacity and include scale-up, technology placement, ancillary operation assurance and pilot production tests. In addition to technological development, marketing, logistic, quality assurance, operating and above all, financial plans are elaborated. Finally, the test plans for the next stage are defined. The output of this stage is the Feasibility Study approved by the gatekeeper Board of Directors.

Stage 3 - testing and validation: Process(es) testing and validation are activities ranked among the most important. The purpose of this stage is to perform validation of the entire project and includes process validation and testing methodology validation. Both types of validation are prerequisites to obtain final approval from the regulatory authorities. In addition, customer acceptance of the product and the economics of the project are subject to final verification. R&D and Quality Assurance Directors must be cognizant of project parameters with regulatory standards. These standards are addressed in the regulatory authority guidelines, typically the State Institute for Drug Control in the Czech Republic (SUKL); the Food and Drug Administration in the United States (FDA), and various other Pharmacopoeias (European, US, Japanese Pharmacopoeia). The output of this stage is a validation report. Gatekeepers are R&D and Quality Assurance Directors.

Stage 4 - final process audits: Final process audits are critical milestones, which qualify the process for commercialization. Successful completion of these audits is a precondition for product commercialization; otherwise, the company is not authorized to market the product. The audits focus on several key topics:

Health and Safety – audit is performed by Regional Hygienic Station to confirm that the new technology is safe.

Environmental Compliance – technology complies with 2008/01/ES or its Czech equivalent 76/2002 Sb. When implementing new technology, companies submit updated versions of the Integrated Prevention and Pollution Control (IPPC). Approval is granted by a Regional Office which judges whether the Best Available Technology (BAT) was actually used and environmental pollution is within the prescribed limits.



Compliance with Quality Assurance Standards –the most challenging of the approval process. Auditors examine whether compliancy exists between the company's Quality Assurance System with the codified standards as well as the principles of Good Manufacturing Practice (GMP) on new technology at full scope. If the company fails to meet the GMP standards, the company is prevented from pharmaceuticals production. Gatekeepers are both internal and external auditing bodies: internal auditors, SUKL, FDA, Regional Hygienic Station or Regional Office. Internal managers are responsible for preparedness for final audit while the external regulator auditors have the integral authority to grant final approval to market the product.

Stage 5 –Innovative product launch: Any pharmaceutical product has to be registered by customers who eventually register the product with the respective national health authorities. Therefore, it is necessary to provide customers with intensive support. To expedite the registration process, it is necessary to provide all available data to avoid customer redundant work. The registration process, dependent on the demands of the registration authorities, is often protracted. Unfortunately, unless the registration process has been successfully completed, the commercial production cannot commence. Therefore, it is the intention of the producer to be conducive to the customer in that both parties work together to commercialize the product in the shortest time. From the legal perspective, it is necessary to execute all sales contracts, arrange for logistics as well as other tasks. Gatekeepers are internal company managers responsible for an effective cooperation with the customer and implementation of the necessary procedures.

## 7 Case Study Implications

The empirical correlation between the level of innovativeness expressed by the number of products under development and company value is exemplified within the PharmaComm case. Over the past decade, the company did not have a strategic plan to support innovations as no new product was envisioned. Given these circumstances, external investors were reluctant to bid more than 1M Euro for PharmaComm. This despite the owner's expectation of approximately 4.8 M Euros. To resolve this dilemma, it was necessary to seek appropriate tools that would over a three-year period increase company value to the anticipated level. In this context, the company judged innovation as the most efficient leverage. As the company is not listed on a stock exchange, only one way was available to measure, monitor and communicate company value to the owners. The adopted approach was based on the comparison of the bids indicative of the potential investors' 'willingness to pay' for the company. Although there was a lack of innovative projects that feasibly could be completed over the three-year span, it was surprising to observe how even unfinished innovations without any tangible economic result, increase the company market price. Table 1 illustrates the dependency between the number of innovative products as sales opportunities and the company market price expressed as actual bids submitted by investors.

**Table 1.** Dependence between number of products under development and company value (own research)

Year	2005	2006	2007	2008
Number of new products in the pipeline	0	1	3	4
Actual bids for the company offered by investors (M Euro)	1.8	3.4	5	5.4

Due to its research strategic goals, PharmaComm accomplished the reengineering of its product portfolio thus permitting the product's life-cycle to be observed and managed. During that period, the company had ten products in its portfolio. Four products serve as cash cows and provide the greatest turnover. Potential sales opportunities of innovative projects include research associated with three additional products. Over 90 % of the entire production is identified for export to global markets such as, Russia, USA, India, Australia and several South American countries, where the demand to fulfil requires testing conditions for market penetration. Sales growth has a potential of 3 – 7 %, due to the successful introduction of newly developed products.

In 2012, the firm's market value substantiated by investors, represented 21 M Euros, determined by the DCF and MVA methodologies. Within five years, PharmaComm, through the implementation of its version of SGCP became one of leading companies in the industry (Klicperová, 2012). The company reinforced its competitive position to capture a larger market share for its new products and to approach new customers interested in an innovative product. Due to effective management the company expanded its product portfolio and thus to diversify company business. Almost immediately, customers considered the company to be more stable and reliable as a business venture. Even prior to profit identification sourced from the new products, potential investors increased their bids.

The correlation between the number of new products as potential sales opportunities and company market price is observed through the investor initiatives. Similarly, the ability of the company to innovate is an inherent part of company goodwill manifested by the investor interests to acquire the company. This conclusion is in consonance with the findings of Gassman, that the drug development pipeline is a key value driver for pharmaceutical companies. Moreover market valuations of pharmaceutical companies are usually based on prospected new drugs approvals and expected new drug revenues costs (Gassman and Reepmeyer, 2005). The company was finally sold to a new investor who recognized the hidden potential of effective innovation management. The final bid and execution price more than quadrupled the company book value. This example demonstrates how effective innovation management process impacts company value through reinforcing its competitive position.

## 8 Results

Research and innovation activities management becomes a part of its strategic management. The rate of future success and competitiveness depend on the effectiveness of its internal innovation processes. This explains why data are connected with value analysis and factors to create value derived from innovation activities. Information of this nature is corporate sensitive and is not readily available to the public to formulate analysis or comparisons. Typically, it is related to company sale proposals. The methodology deployed for this research is based on the analysis of a case study. In turn, the case study involves an actual entity, which enabled the authors to analyze sensitive data. Barriers to research of topics of this nature are the volume of statistical data available, the number of companies concerned, the fact that a part of data remain soft based on qualitative parameters, forecasts and investor's behavior. This decreases the applicability to statistically process.

The data and information used for this discussion were obtained through personal research with data usage within the actual company. The case study proves that implementation of a formalized access to strategic management of innovation and research processes does have a positive impact to value creation, which reflects investor interest to grow and support such projects and companies. At the same time, investors view such investments as investments of relevant risk, which effectively decrease operating capital costs (Klicperová, 2012).

Additional in-depth research dedicated to the assessment of the impact of selected types of innovation such as, product, marketing, process and organizational innovation, on company performance or value creation is recommended. There is of course, the limitation to execute a large scale research project in view of the confidential character of the data and the low comparability levels.

## 9 Conclusion

The authors demonstrate how efficient innovation contributes to company value generation. The company ability to innovate is considered as one of the most powerful value drivers.

Companies strive to exceed competitors and therefore, seek tools to accelerate the innovation process and generate higher customer value. Companies improve their competitive position through the capture of larger market share for innovative products, the acquisition of new businesses with innovative products and diversification of company's product portfolio.

A formalized structured innovation process methodology also permits to gain competitive advantage and the subsequent company value growth. The Stage Gate Control Process and its customized adaptation to particular business environments is proved as a flexible and usable methodology. Despite the prevalent use of SGCP by established companies focused on large-scope innovation projects, even mid-size and small companies can use a formalized innovation management methodology. These companies may address all internal particularities so that the process operates at optimum level. Using a formalized innovation process derived from SGCP is

exemplified by PharmaComm case study. Not only did the company benefit but also attracted investors who recognized its potential, sophisticated innovation management and in turn, bid for the company four times the book value. The company succeeded to obtain and maintain a competitive edge over its rivals. The findings explored in this manuscript are consistent with previously published results.

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