

CSR, Sustainability, Ethics & Governance

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Sustainable Entrepreneurship

Business Success through Sustainability

 Springer

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Corporate Capability Management: Collective Intelligence in Use for Improvement on a Company's Sustainability, Innovativeness and Competiveness

Daniel Velásquez Norrman, Martin Riester, and Wilfried Sihm

1 Introduction

Despite of proven immense impact on short-term profitability, short payback periods, serving as a multiplier for performance enhancements or by annual cost-savings and being recognized for its significance on the innovativeness and competiveness of a company, successful continuous improvement (CI) as defined in the paper is rare. An approach with prerequisites of a successful exception is the Fraunhofer Austria Corporate Capability Management (CCM) concept. CCM is defined as the systematic and holistic approach to ongoing improvements on organization's capabilities in order to efficiently enhance a company's **sustainability, innovativeness and competitiveness**. The concept comprehends discrepancies between research findings on critical success factors and contemporary industrial practices. The paper demonstrates that a gap between best practices and the actual implementation in companies is present. It concludes that the CCM concept addresses potentials for cost-savings, increased innovativeness and sustainability even left out by advanced CI practices.

2 Demand for Enhanced CI-Concepts

The significance of CI for a company's innovativeness and competitiveness has already been recognized (Bessant and Caffyn 1997; Shingo 1988; Caffyn 1999). In fact, CI of work processes was estimated second most important to short-term

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profitability at the same time as internal quality improvement groups were seen as the most important source of innovation in work processes and procedures (Soderquist and Chanaron 1997). Nevertheless, as our online study, industrial projects conducted by Fraunhofer Austria and former research point out – the context in which a **successful** CI process takes place still needs to be reformed. In addition to contemporary practices, three explicit aspects overlooked by organizations must be considered by efficient CI. Hence discrepancies between contemporary practices and demands on processes for ongoing improvements are herein elucidated and the Fraunhofer Austria Corporate Capability Management concept (CCM), a systematic and holistic approach to successful improvements on organization's capabilities, is explained.

2.1 Research Focus

The research and development of the CCM concept is based on results in the area of continuous improvement. Over the last decade, the importance of managing ongoing improvements has increased and spread to new fields. Many companies still lack appropriate approaches and methods to effectively address CI in their organization. The research aims on overcoming these gaps and providing a concept for successful CI.

In order to conduct the work different methodological approaches has been relevant for this paper. A state-of-the-art analysis, an online survey, and continuous improvement projects at industrial companies were conducted to obtain up-to-date information on relevant trends and challenges. Whereas the state-of-the-art analysis and the CCM-concept are presented, only a few results from the study has been chosen for presentation in this paper

2.2 Brief History Description on CI

CI as defined by Bessant et al. (1994) in “a company-wide process of enabling a continuing stream of focused incremental innovation” or as herein understood as “an approach that continuously seeks to identify, evaluate and implement sustainable enhancements targeting the elimination of waste in all systems and processes of an organization, products and services”, goes back to the eighteenth century during which initiatives such as management encouraged employee-driven improvements were undertaken (Schroeder and Robinson). Over the decades, the need to continuously improve on a larger scale within the organization became essential (Bhuiyan and Baghel 2005) and the approach stretched geographically. The scope of CI, initially used in the manufacturing process, evolved into a much broader term, constituting a management tool for ongoing improvement involving everyone in an organization (Bhuiyan and Baghel 2005; Kossoff 1994; Imai 1986).

CI has as of today established itself as one of the core strategies for manufacturing and an imperative as to meet challenges posed by the contemporary competitive environment. One of these challenges is the continuously changing environment which puts attention on companies to incorporate **flexibility** into its system if to be able to change and match market needs. Hence the most important thing stays the ability to change and to do it quickly enough (Yamashina 1995).

Generally the minimal costs and cost reduction motives involved in the implementation and maintenance of CI has been one of the main reasons to its expansion in Europe (Boer et al. 1999). During the boost CI has had, also in association with the introduction of the TQM movement or CI methodologies such as e.g. Lean Manufacturing, Six Sigma and Kaizen (Bhuiyan and Baghel 2005), the phrase has become increasingly popular. Even if CI is present, and to some seem to have the characteristics of another worn-out buzz-word, considerable **potentials** are left unexploited by even the early adopters of CI.

2.3 *Successful CI*

A web-based online study on CI and CCM carried out by Fraunhofer Austria in 2012 had the respondents divided into three categories dependent on their score with regard to the three criteria "employee participation rate", "idea for improvement implementation rate" as well as "target range of CI process". The top 15% of the respondents with the highest score were categorized as High-performers whereas the 15% of the respondents with the lowest score were labeled Low-performers. In matter of economic benefits the results were evident – the study showed on cost savings being up to **three times** higher per employee and year amongst the High-performers when compared to the Low-Performers.

The difference between basic forms of instituted programs in order to apply CI and successful CI, i.e. being efficient in taking advantage of available potential, can be immense. The Critical success factor for CI has amongst others been studied and identified by Gibb and Davies (1990) in research on Australian small to medium enterprises (SMEs), been described by Bessant and Francis (1999) as practices within the behavioral model describing the evolution of CI capability as well as listed by Caffyn (1999) as the core organizational abilities and key behaviors for CI. Even if the emphasis of the study on CI and CCM was not on the identification of critical success factors, the study results were used together with former research results and industrial project experiences in the derivation of **explicit aspects** that must be stressed and covered by the CCM concept.

Hence CCM has been developed in order to exploit the potentials for capability enhancements left unutilized. New **sources** of intelligence and new **fields** of improvement with **sustainability** being one in particular are addressed. Former flaws have been recognized due to the lack of a systematic approach and methods to implementation of processes for ongoing improvements regard to: (1) **corporate approach**, i.e. comprehension of external stakeholders, (2) **operation specific**,

i.e. transfer of CI methodologies to indirect and company specific operations, and (3) **empowered controlling**, i.e. the communication and monitoring for a sustainable CI.

2.4 Corporate Approach

The enforcement of CI as a management tool for ongoing improvement involving everyone in an organization does not consider the relation to external stakeholders. A similar inadvertence of external stakeholders is seen with the types of CI based on the organizational designs presented by Berger (1997). Focus is foremost on the benefits of multifunctional work groups whereas external stakeholders are left unmentioned.

Caffyn (1999) addresses the ability to move CI across organizational boundaries, i.e. effective working across internal and external boundaries at all levels is defined as one of the core organizational abilities for CI. The view of CI for continuous and incremental improvements or the one of intermittent and not incremental, i.e. **innovation** (Imai 1986), comes into play when the contribution of external stakeholders to CI are to discuss. Whereas CI is strongly linked with continuous incremental improvements, also understood under Kaizen, it does not exclude incremental innovation. In the ongoing process for improvements targeting the elimination of waste in all systems, innovations are important and must hence include external stakeholders as possible source for ideas. Close working relationship with key customer was seen as the second most important source of innovation in work processes and procedures in a study amongst French SMEs, close working relationship with key supplier qualified as the eighth most important source (Soderquist and Chanaron 1997). Singh and Singh (2011), comes to similar results in their investigation having customer relationship rated as most important in carrying out continuous improvement activities in the manufacturing organizations. The comprehension of **external stakeholders** considers the potential of these stakeholders in their feasible contribution to incremental improvements as well as innovation.

Results from the Fraunhofer Austria study on CI and CCM showed on an average participation rate, i.e. number of involved employees to total number of employees on-site, of around 30 % over the last 2 years amongst the respondents. The comparison between the best and the worst in class showed on a more than **eight times** higher participation rate amongst the High-performers than amongst the Low-performers. Integration of external stakeholders in the process of ongoing improvements increases the potential for a higher participation rate that then theoretically even may exceed 100%.

The fundamental process by which firms gain the benefits of internal and external knowledge, create competitive advantage and develop capability can be summarized in the term Knowledge Integration (KI). The characteristic of KI, i.e. integration of knowledge, is a vital part of CI and an important driver for

innovation and productivity performance (OECD 2004). Comprehension of stakeholders in the concept of successful CI does not lead to differentiation but integrates knowledge indispensable for competitive survival and creates **firm-specific** innovation (Mohannak 2012). Innovation being firm-specific is also more valuable inside the organization than in the market, less subjected to imitation, and contributes to the ongoing improvements of a company's capabilities.

The contemporary practices of collaboration with stakeholders are mainly limited to explicit stakeholder such as customers within the new product development or suppliers for the supply chain management. Mohannak (2012) discusses current relevant frameworks and proposes an own conceptual framework for KI in R&D firms and with emphasis on the new product development. Described are e.g. critical success factors such as strategic communities (SC), company specific knowledge integration system dependent by the type of knowledge the company wishes to integrate (goals), team building capability and knowledge integration through communication networks within and outside the organization. The importance to integrate external stakeholders is hence evident but seldom addressed by concepts on capability improvements.

The process of ongoing improvements is neither limited to incremental improvements nor internal ideas for improvement, but improves on corporate capability when external stakeholders are comprehended with efficient processes for transfer and integration of knowledge in the work with continuous improvements.

2.5 Operation Specific

Whereas the enforcement of CI methodologies within non-manufacturing processes, has reached a certain stage of maturity in regards to implementation, it can still not be considered as mastered amongst others in matters of employee participation rate. The differences between CI maturity level between manufacturing and non-manufacturing operations are also seen in the previously described study on CI and CCM where the participation rate amongst manufacturing companies was almost **three times** higher than amongst trading companies.

Reasons to why CI has not reached the same status in non-manufacturing operations are foremost seen in the history of CI as previously described. The philosophy of incremental or continuous improvements was originally used for enhancing manufacturing processes and first more recently gained popularity in indirect operations (Yamashina 1995). Another eligible reason is that business processes in various senses differ from manufacturing processes. Wiegand and Nutz (2007) separate the operations of a company into direct and indirect operations, where direct operations work with goods and materials whereas the indirect operations are mainly concerned with information.

The classification of operations into direct and indirect operations has the operations of Manufacturing, Assembly, In- and Outbound Logistics and Maintenance arranged to direct operations and the operations of Accounting, Controlling, Purchasing, Sales, R&D, IT, Procurement and Human Resources to the indirect operations. Indirect operations are then characterized with task mostly not being well-defined, consolidated with a high degree of creativity and employee individual design as well as primarily made up of overhead costs. Hence the approaches and methods so successfully used on manufacturing processes must not necessary imply the same results when applied on indirect business processes. The difference in characteristics between manufacturing and business processes is in fact seen as such major ones that methods must be adapted (Laqua 2012). The differentiation of Lean Production and Lean Administration, both with the target of sustainable elimination of waste through continuous improvements programs but for direct respectively indirect operations, is just one example. The evolution of criteria of manufacturing paradigms from cost over quality, variety, responsiveness and to sustainability (Koren 2010) as new area for improvements is a second example on how successful CI has to be operation specific.

Methods and approaches that have successfully been used in the direct operations cannot directly be transferred onto indirect operations, but must first be adapted in regards to their characteristics before they can be applied in the process of ongoing improvements.

2.6 *Empowered Controlling*

Controlling of CI is distinguished as a critical success factor in the Fraunhofer Austria study on CI and CCM. The share of companies measuring the number of submitted ideas was twice as high amongst High- to Low-performers. When the controlling of savings through continuous improvements is considered, the share is almost **three times** as high amongst the High-performers. Monitoring and measurement of CI is also described as a practice in the higher levels of CI evolution (Bessant and Francis 1999) at the same time as Singh and Singh (2012) stress that efforts in e.g. measuring and reporting CI productivity and costs as long overdue.

Slightly more than the half of over 200 companies questioned in a study on Management Tools reported that they have established a standardized CI-Process in their organization. The share is reduced to almost a third when it comes to taking advantage of the CI-process as to achieve ongoing operational process improvement (Stegner 2010). Bessant (2000) comes to similar results in a survey conducted by CI research advantage (CIRCA) at UK firms, around 50% have instituted some form of systematic program to apply CI and 19% claims to have a wide spread and sustained process of CI in operation.

More widespread knowledge and enthusiastic ideas, demand organizations to be able to integrate them through mechanisms such as directions and organizational routines (Grant 1996). Task of the management is to support this process and

anchor it in the management system. The lack of support from management level is second to the unwillingness to change amongst employees the biggest reason to why increase in productivity projects are stalled (Schneider et al. 2011) and the presence of support as a core ability for continuous improvements accordingly to Caffyn (1999). The management role is highlighted in CI systems using control charts suggested by MacKay (1988), requiring a management team to decide which processes to attack, to establish teams to work on the project, to allocate resources and to review progress.

Goals and results must continuously be measured and when necessary adapt actions or goals as to secure the sustainability of the ongoing improvement process. In this manner two major obstacles within controlling and CI arises, defining and measuring CI goals as well as coordination individual employee motivation with e.g. target agreement to maximize in terms of incentive structure (Maras 2009). Complementary to the explicit aspects addressed by a concept for successful CCM, added value of a monitored and measured CI process is further seen in **market valuation** of a company. Measuring intellectual capital is becoming more important for companies in matters of stock market valuation, as to attract venture capital or build a partnership.

The sustainability and hence the success of the process of ongoing improvements is dependent on the incorporation of management support and employee motivation. Management support and employee motivation is in turn empowered with controlling of incentive structures coupled to CI targets.

2.7 Requirements on Successful CI-Concept: CCM

Substantial unexploited potentials arise as a result from contemporary practices not being:

- **Corporate**, i.e. comprehend external stakeholder and new source for improvement (i.e. collective intelligence) through efficient processes for transfer and integration of knowledge
- **Specific**, i.e. adapted to company and process specific characteristics, as well as novel areas for improvement, and
- **Sustainable**, i.e. implemented mechanism for individual motivation and link to CI targets

These potentials must be addressed by concepts aiming at a systematic and holistic approach to ongoing improvements on organization's capabilities in order to efficiently improve on company's sustainability, innovativeness and competitiveness. Hence the Fraunhofer Austria CCM concept has been developed and practiced.

3 Concept of Corporate Capability Management (CCM)

Fraunhofer Austria's CCM concept focuses on afore mentioned and described requirements, necessary for a successful implementation of a CI-concept, means: (1) corporate, (2) specific and (3) sustainable.

3.1 CCM Main Idea

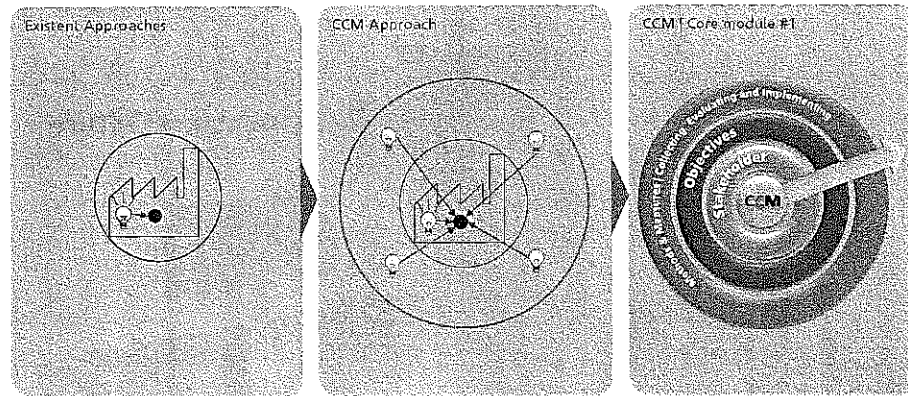
CCM considers not only current employees as potential **sources** for ideas and not only direct operations as **fields** to improve a company's performance. CCM represents an enhanced concept which includes several CCM-stakeholder groups and novel fields such as **sustainability** and **indirect operations**. Furthermore, the improvement of a company's performance is not the only objective the CCM is taking into account. CCM explicitly considers the improvement of an organizational culture as a major additional objective. For realizing these objectives, the CCM-concept pursuits two ways of gaining ideas, (1) individually initialized by stakeholder groups (bottom-up) and (2) specifically set activities by responsible persons within a company (top-down). Additionally, the CCM-concept includes an approach for a sustainable controlling, adaptable to a company's specific structure and processes as well as applicable by each company, regardless of its industry classification. Besides this, the CCM-concept provides two adaptable generic core modules as support for setting up a specific CCM, aligned to a company's needs, as well as a generic roadmap for a stepwise and sustainable implementation of CCM within a company. Therefore the CCM-concept represents a holistic and sustainable approach for accessing and utilizing a company's corporate capabilities (Picture 1).

3.2 CCM Core Module #1

The core module #1 basically consists of three circles which are named "**stakeholder**", "**objectives**" and "**methods** (for collecting, evaluating and implementing ideas)". Forming those three generic circles, starting with the inner one, according to a company's specific structure and processes, is the first step for the implementation of a sustainable CCM-concept.

3.2.1 Stakeholder

Contrary to classical approaches of CI, the CCM-concept does not see ideas for improving a company's performance just in mind of a company's current staff. Ideas for small or significant improvements of a company's performance are also



Picture 1 CCM approach and core module #1

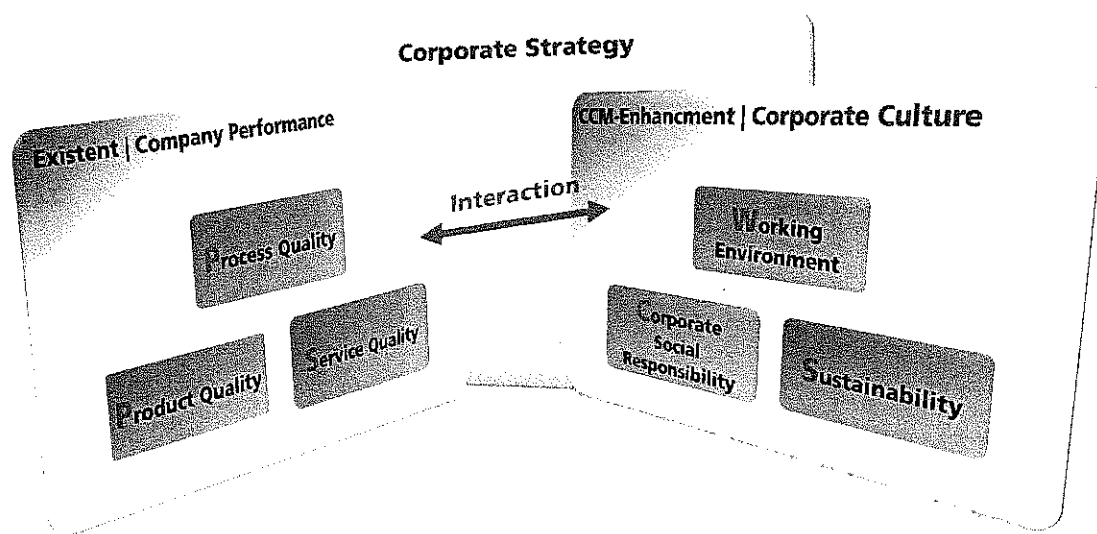
seen in mind of several **external people**, who are or were directly or indirectly in contact with a company. These people are all considered by the CCM-concept as possible sources for ideas and are defined as “CCM-stakeholders”. Examples for such stakeholder groups can be: employees, customers, suppliers, research organizations, retired persons (former employees), inter-trade organizations, etc.

In practice, out of these stakeholder groups, relevant ones have to be defined by a company. Generally, just two or three are selected in a first step and the company’s specific CCM-concept is designed for this selection first. Additional stakeholder can be added later at any time. It’s not necessary to include all possible stakeholders from beginning on.

3.2.2 Objectives

As already mentioned, improving a **company performance**, i.e. process quality, service quality and product quality, represents just a part of the objectives the CCM-concept focuses on. Another objective, the CCM-concept is targeting, is the **organizations culture**. Organizations culture is considered as a combination of the factors “working environment”, “corporate social responsibility” as well as “sustainability”. The reason behind this setting of these two major objectives is based on the assumption that there are interdependencies between an organizations culture and its performance as described above. The possibility to place ideas regarding the improvement of an organizations culture and see those ideas being realized influences the stakeholder groups and their willingness to generate and share ideas for a company’s performance in a positive way. The same assumption is applicable vice versa, means a good company performance influences the loyalty of stakeholder groups and their willingness to generate and share ideas to improve respectively to support an organizations culture in a positive way.

Depending on the company and its corporate strategy the relevance of particular components of the two major objectives are different respectively needs to be individually adapted. E.g. “product quality” is not necessarily relevant for the service industry. However, important is that the basic structure of the official



Picture 2 Enhanced objectives of CCM

targeted objectives always consist of a company's performance as well as of its organizational culture (Picture 2).

After setting the basic structure of objectives, they have to be matched with the selected stakeholder groups, i.e. the following question needs to be answered: Are there stakeholder groups, who just should deal with certain objectives? Does a company want to treat all set objectives with all stakeholder groups? E.g. the stakeholder group "suppliers" could be matched with the objectives "process quality" and "sustainability" but not with "working environment" because there is no meaningful link. Basically, defined stakeholder groups and objectives can be matched with each without any restrictions as long as it makes sense.

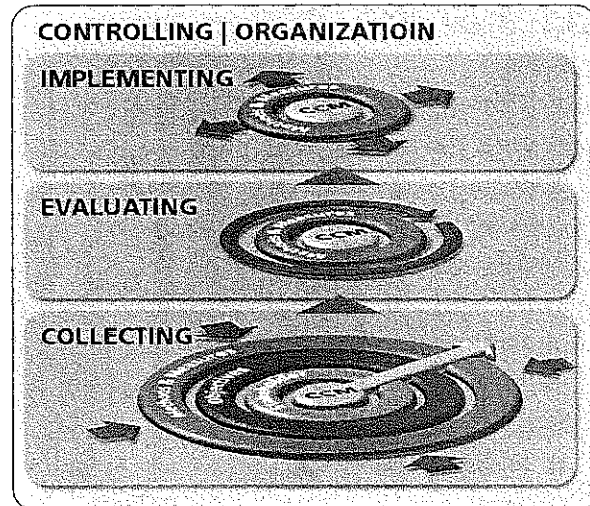
All defined pairs are basis for designing the third circle (methods and measures) of the core module #1.

3.2.3 Methods and Measures

For gaining a maximum output (max. number of ideas/improvement potential), it is mandatory to **define a suitable set of methods and measures** individually aligned to the stakeholder groups a company is dealing with and the objectives the company is focusing on with each stakeholder group. E.g. for gaining ideas of employees for production process optimization a company can organize a weekly meeting (measure) and apply "value stream mapping" as method. For gaining ideas of customers for new products likely it is more productive to organize a quarterly meeting (measure) and apply the method "brain-storming".

However, considering and matching possible methods and measures only on the level of "gaining" respectively "collecting" ideas is not sufficient enough for ensuring a holistic and sustainable approach of CCM. Further methods and measures for "evaluating" and "implementing" ideas are mandatory. Therefore

Picture 3 Core module #2



the CCM-concept provides a second core module which is explained in the following.

3.3 Core Module #2

The illustration of core module #2 points out the necessity of applying methods and measures on the level of “collecting”, “evaluating” and “implementing” ideas (Picture 3).

3.3.1 Levels of Methods and Measures

As explained, for **collecting** ideas each stakeholder group needs a special set of methods and measures.

Also for **evaluating** the ideas which the stakeholder groups generated, transparent measures and methods need to be developed and applied. E.g. reviewing all submitted ideas in a weekly session (measure) by applying standardized evaluation forms and independent evaluators (method).

In a similar way, methods and measures for **implementing** the collected and positively evaluated ideas need to be defined. These measures and methods are essential for realizing a measurable benefit for a company. E.g. realizing employee ideas categorized as “easy realizable” within the next 2 weeks after evaluation (measure) under participation of the employee who submitted the idea (method).

Like already indicated within the description of the methods and measures in core module #1, it is mandatory to link all defined methods on each level either to a continuous or a periodic recurring cycle to ensure an ongoing utilization. E.g. weekly employee meetings, quarterly meetings with suppliers or monthly reviews of achieved CCM results.

3.3.2 Controlling and Organization

After “levels of methods and measures”, the part “controlling and organization” represents the second major part of the core module #2.

This part is essential for ensuring the long-term success of the CCM-concept. According to a company's structure an appropriate CCM **organization** needs to be designed and set up. This includes three major points: (1) designing processes, e.g. how will collected ideas be forwarded to the evaluators? (2) Naming of other responsible persons, e.g. who is responsible for coordinating CCM in total or evaluating ideas? (3) Design communication processes. E.g. how are results communicated to participating stakeholder groups?

In addition, based on afore mentioned points, infrastructural requirements will be derived, i.e. info boards on shop-floor level, IT exchange platforms or the like.

Besides setting-up appropriate organization structures, the implementation of a suitable **controlling** is needed for ensuring an enduring transparency of ongoing activities and their performance. This includes basically two essential points. (1) The definition of key figures which are used for expressing the success of the concept. Depending on a company and the branch it's assigned to, determined figures can be different. But independent of these, the CCM-concept intends to **measure the output** (quantitatively and qualitatively) and the **input** (quantitatively and qualitatively) which is caused by all defined measures and methods. Means e.g., cost savings, increasing motivation of employees or number of collected ideas on the one hand, as well as invested time (personnel costs) and material costs on the other hand.

The second point intends to (2) anchorage (formal or informal) CCM-objectives within objective agreements of departments or responsible persons.

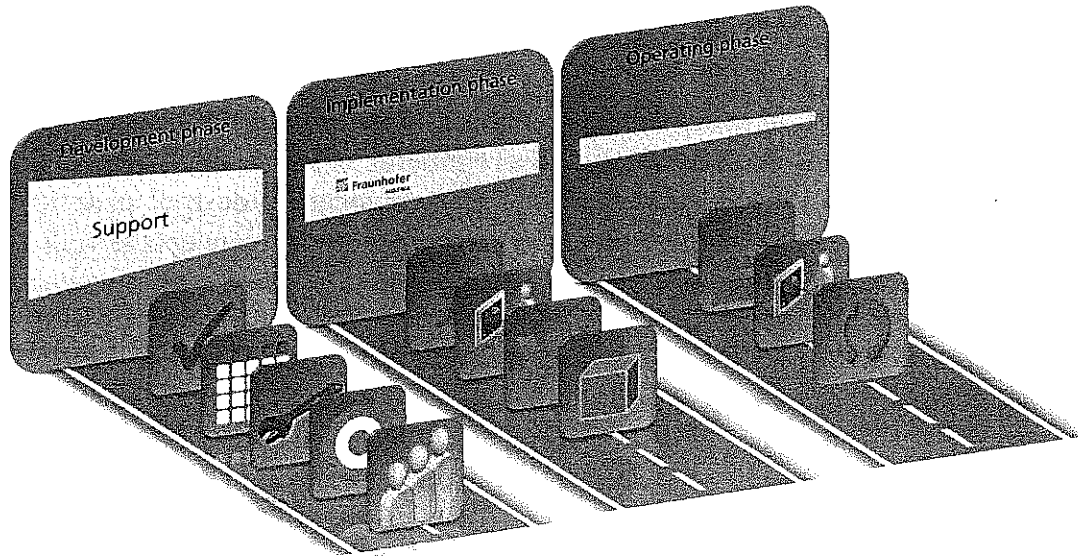
A further point could be the definition of a bonus system. In contrast to the points mentioned before, this third point is considered as optional, depending on the philosophy a company is pursuing.

3.4 CCM-Roadmap

The design of the core modules #1 and #2 as well as further steps for setting up and utilizing CCM in a company are summarized in the CCM-roadmap. It represents a guideline regarding the major steps for designing, implementing and operating CCM (Picture 4).

3.4.1 Development Phase

The development is structured into the five steps already described above. (1) Define relevant stakeholder groups, (2) set objectives for each stakeholder group



Picture 4 CCM-Roadmap

(3) define methods for collecting, evaluating and implementing ideas, (4) define a periodic or ongoing cycle for the utilization of each method, (5) define a appropriate organization as well as a formal controlling for the CCM in total.

3.4.2 Implementation Phase

The implementation phase is divided into four major steps. (1) Implement required infrastructure, means e.g. the built-up boards on shop-floor level for communicating CCM-objectives and offering the possibility to turn in ideas. (2) Implement essential processes and organizational measures like defined in step 5 within the development phase. (3) Instruct stakeholder groups and train CCM responsible people e.g. head of departments. (4) Operational start of CCM in a determined pilot sector of a company.

3.4.3 Operating Phase

The operating phase is built up of the three major steps. (1) Real time operation i.e. extending the CCM-concept to other areas within a company and applying the defined methods and measures according to the agreed periodic or ongoing cycles. (2) Instruction and training of additional stakeholder groups respectively people and CCM responsible people. (3) Ongoing adaption, improvements and enhancements of methods to new or changed circumstances.

3.5 Findings

Based on a state-of-the-art analysis, the Fraunhofer Austria study on CI & CCM as well as industrial project experiences, **discrepancies** between **critical success factors** for a company's innovativeness and **contemporary industrial practices** were identified. A gap between best practices and contemporary concepts as well as actual implementation in companies is present. In particular three explicit aspects in relation to CI were discussed as overdue.

The result was that existing CI concepts leave out on critical potentials in unutilized sources and fields. Findings further showed that the difference between best practices and under-performers in the sense of High- and Low-performers is striking. High-performers showed cost savings being more than three times higher per employee and year when compared to the Low-performers.

Subsequent the term **successful CI** was defined as the concept exploiting these identified potentials. Three explicit aspects discussed had to be transformed into requirements on a successful CI concept:

- **Corporate**, i.e. comprehend external stakeholder and new source for improvement through efficient processes for transfer and integration of knowledge
- **Specific**, i.e. adapted to company and process specific characteristics, as well as novel areas for improvement, and
- **Sustainable**, i.e. implemented mechanism for individual motivation and link to CI targets

Based on these findings the concept of Corporate Capability Management (CCM), defined as the systematic and holistic approach to ongoing improvements on organization's capabilities in order to efficiently enhance a company's **sustainability, innovativeness and competitiveness**, was developed.

The explanations given in this paper, point out the holistic approach of the CCM-concept. CCM enables companies to (1) access a broader field of possible idea sources, (2) be innovative in novel fields and (3) generate measureable benefits out of them. Furthermore it provides a proceeding for a stepwise designing, implementing and operating process of the system for continuously improvements on capabilities. The CCM concept was built up in two modules and a roadmap. Module #1 shows objectives, method and measurements whereas Module #2 provides a detailed view on methods and measures relating to the three levels of "collecting", "evaluating" and "implementing" ideas. The CCM-roadmap was designed with regards to the different phases when establishing a CI-system.

Finally, the CCM-concept, in a long term perspective, tends to institutionalize CCM as a function within an organization.

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