

## NEW APPROACHES TO FOSTERING INNOVATION CAPACITIES IN LOW AND MEDIUM-TECH SMEs

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### Abstract

Small and medium enterprises in low and medium-tech sectors form economic backbone of developed countries – most of employment and gross domestic product is associated with SMEs. The innovation research, practitioners and SME policy measures tended to focus on high-tech, high absorptive capacity SMEs, however this group of SMEs constitutes only small proportion of total number of SMEs. Innovations in most SMEs and especially in low and medium-tech sectors, however, take place through ad hoc or project driven activities rather than formally organised activities. Enhancing innovation performance of the mainstream low and medium-tech SMEs is challenging yet promising opportunity.

SMEs are much focused on their missions and targets and they do not always pay sufficient attention to long-term research and innovation objectives. Usually companies assess new business opportunities in terms of investment and return on investment; quite naturally they transfer this thinking to R & D and innovation. But there is inherent complexity and uncertainty in dealing with long-term research, it is difficult to put hard figures or have fixed plans. And hence there is little trust in such endeavours and natural tendency towards short-sighted R & D and incremental innovation. Strategic R & D requires new competencies. Long duration is associated with risks and long-term commitments, complexity of ideas, relationships, projects, maintaining cross-functional cross-organizational teams. It is difficult for an SME to assess the value of future business and new knowledge.

The strengths of most SMEs are in their agility and customer knowledge. Understanding innovation activities, enhancing their ability to leverage these strengths in delivering new significant value are the key to sustainable growth of SMEs. Few SMEs can capture value from innovation alone; most have to rely on external sources for ideas, technologies and knowledge. In order to get a valuable input from outside, SMEs need to go through the difficult process of searching the environment, identifying a ‘matching’ competence and combining it with their internal capa-

bilities. Ability to make use of external knowledge to their advantage is referred to as absorptive capacity, capability to collaborate effectively depends on internal processes, structures and individual competencies.

From a practitioners’ point of view, here are two key questions: 1) How to know what innovation related competences should be strengthened? and 2) What learning path is the most effective?

The competence can be defined as the capability to perform the work activities in a given professional context in order to answer organisational requirements, thus, to be effective, the content of innovation training should take into account the context, current and future competence needs of a particular company. On the other hand, the delivery of innovation training should have a practical component.

**Keywords:** innovation, absorption capacity, competence, training.

### Introduction

SMEs’ strengths even in low and medium-tech sectors lie in their agility, imagination and customer interaction. However, many SMEs face significant barriers from inside and outside that prevent from using these potential strengths. Practitioners, academics and policy makers on the issues of technology and innovation traditionally have had a focus on cutting-edge, high-tech SMEs or SMEs of high absorptive capacity. However, in the best-case scenario, the SMEs in this group do not exceed 10% of the total population. To have significant impact, policy measures should reach large proportion of SMEs and be tailored to various types of SMEs and their particular needs.

Knowledge transfer in the context of SMEs is meaningful only when it is thoroughly connected to the innovation activities taking place within a smaller business. This requires a deep understanding of innovation activities within these organisations. Innovation is the development of a new product or a new process, all the way from the new idea to its realization and the commercial exploitation in the market. In effect the innovation activities within these organizations are a fusion of technology adoption, product and process

development and intensive marketing activity. Knowledge transfer should fit in this diverse puzzle in order to produce significant value for a small business. Moreover, policy intervention is complicated by the differences in the ability of SMEs to absorb external knowledge, as well as their development needs. This requires deep understanding of innovation activities.

From the practitioner's viewpoint, the above considerations have certain implications on how knowledge transfer or innovation competence programme targeted to SMEs should be structured and delivered. To be effective, it should at least take into account current absorptive capacity of a particular SME, its context and innovation needs.

This article covers the following questions:

- How to define competence related to innovation activities that should be improved? How to spot future competence needs?
- How to structure training programme to ensure effective delivery?
- How to define the content of SMEs training programme as their needs and abilities vary significantly?

Literature review shows that there is no clear-cut answer to these questions.

**The aim of the research** is to propose a scheme for innovation training programme development for low and medium-tech SMEs.

**The objective of the research** is to review relationship of absorptive capacity with innovation activities; competences and absorptive capacity; to analyze practical issues in developing and deployment of innovation programmes in low absorption capacity SMEs.

**The methods of the research** are systematic, logic and comparable analysis.

### **SMEs and innovation**

Business innovation within small and medium sized firms is a fusion of technology adoption, various internal activities and intensive marketing. In a highly cited article written by Sawhney et al. (2006), business innovation is defined as "the creation of substantial new value for customers and the firm by creatively changing one or more dimensions of the business system". They recognize four key innovation dimensions:

- offerings (products/services);
- processes;
- customers;
- points of presence in the market (distribution).

A company needs to perform in all four dimensions in order to survive in the long term. Small firms target niche markets rather than mass markets. In fact, established small firms (beyond the start-up phase) are usually very good in managing the market

side of their innovation activities, i.e. customers and points of presence. In simple terms, SMEs manage relatively well the interface with the market in the sense of understanding the needs, the requirements and the purchasing ability of their customers well. Where most of the SMEs are relatively weaker, is the other 'side' of innovation, namely the development of new products and processes. More specifically, although the smaller firms are good at generating new ideas (or 'sensing' new ideas from the market), they are facing significant barriers in realizing the development of new products or new processes.

Traditionally, SMEs have been treated quite equally. However, there is some evidence that different types of companies have different innovative behaviours (RIS Lithuania (2007), RIS Western Switzerland (2007):

- start-ups tend to focus their innovative activities on creating marketable products,
- micro companies concentrate on how to make their products reach customers effectively,
- small sized firms focused their innovative strategy on improving internal management,
- medium sized firms look primarily into managerial and manufacturing processes.

However there is also 'horizontal' dichotomy cutting across all four size groups of SMEs. This dichotomy is related to the absorptive capacity of all size groups of SMEs.

### **SMEs and absorptive capacity**

Collaboration is critical for SMEs innovation activity (Freeman, 1991). For the majority of SMEs the only way to develop new processes, services or products, new business models is through accessing external sources of expertise such as scientific, technical and professional experts (Tyson, 1993), university departments (Chrisman and Katrishen, 1995), consultants and other intermediary organizations (Bessant and Rush, 1995). They have to adopt technology or knowledge from outside and fuse it with their internal activities, a task that a lot of SMEs underperform. There are a number of reasons for this. In order to get a valuable input from outside, SMEs need to go through the difficult process of searching the environment, identifying a 'matching' competence and combine it with their internal capabilities. However most of the small companies tend to focus on a limited range of products and services (Hemer, 1995) making the process of 'matching' difficult. To complicate things further, innovations in small firms take place through ad hoc or project driven activities rather than through formally organised activities (Dodgson and Rothwell, 1990); as a result, SMEs do not always possess the capability to identify the right source of expertise and organize the transfer of its knowledge to the company.

It has become clear that different SMEs have different levels of capacity to identify, negotiate with and absorb knowledge from external sources of expertise.

In the enterprise context, absorptive capacity refers to a firm's ability to identify, assimilate and exploit knowledge from external sources (Cohen & Levinthal, 1990; Lane & Lubatkin, 1998; Van den Bosch et al., 1999; Zahra & George, 2000).

Four dimensions of absorptive capacity are identified:

- acquisition referring to "a firm's capability to identify and acquire externally generated knowledge that is critical to its operations"
- assimilation "the firm's routines and processes that allow it to analyze, process, interpret and understand the information obtained from external sources"
- transformation denoting the capability of the firm to combine "existing [internal] knowledge with newly acquired and assimilated knowledge"
- exploitation of "the firm's ability to harvest and incorporate knowledge into its operations".

With regard to absorption capacity, research made at University of Brighton (UK) distinguishes three groups of SMEs:

- Cutting-edge SMEs. These are the SMEs that perform cutting-edge innovative activities developing new technologies. This group involves, for instance, firms in high-technology or science-based sectors and in several cases they spin-off from the commercialization of university research. These companies have exceptionally high absorptive capacity engaging in intensive knowledge transfer activities. They have a sound understanding of the technological aspects underpinning their products and processes, but may lack understanding of markets and customers. They are very important for the economic development, but they are a very small minority of the total population of SMEs. The size of this group does not exceed 3% of total SME population.
- High absorptive capacity SMEs. This group leads the use or adoption of new technologies. These are the companies that innovate by developing, combining or actively adapting the existing technologies. They have a sound understanding of their markets and customers, but have a less clear understanding of the technological aspects underpinning their products and process. They have nurtured their absorptive capacity over years of practice and they have managed to place themselves in networks with good sources of expertise. The size of this group does not exceed 15% of all SMEs (taking into account the top 10% of leading technology users and the top 5% of the technology adopters).
- Low absorptive capacity SMEs. These SMEs can be defined as those that can engage in innovation only if they see clear value in doing so. They are

those companies that can exploit technologies through adaptation – but they do not always do it. They have a sound understanding of their markets and customers, but have very limited understanding of the technological aspects underpinning their products and processes and they clearly underperform in knowledge and technology transfer activities. Their share in the total population exceeds 80%.

This classification corresponds to that developed by Working Group EURAB (2004) 12 which sorts SMEs according to the degree to which they can develop, reconfigure or adapt new technologies – technology pioneers, leading technology users, technology adopters and basic SMEs with little or no R & D.

Since innovation is related to organizational learning, it is not surprising that absorptive capacity is critical for innovation. Papers on this topic suggest that absorptive capacity adds to the speed, frequency and magnitude of innovation and that innovation produces knowledge which becomes part of the firm's absorptive capacity (Kim & Kogut, 1996; Helfat, 1997; Van den Bosch et al, 1999). While exploratory innovation may make limited use of prior knowledge, it can also involve novel combinations of existing technologies and know-how (Van den Bosch et al., 1999; Kogut & Zander, 1992:14).

There is also a clear relationship between absorptive capacity and learning (Barkema & Vermeulen, 1998; Ahuja & Katila, 2001; 16, Simonin, 1999), and organizational learning factors that explain the development of absorptive capacity in particular knowledge domains (Barkema & Vermeulen, 1998; Rosenkopf & Nerkar, 2001). Underlying many of the papers on this subject is the assumption that learning and absorptive capacity co-evolve with each influencing the other. The feedback loop (absorptive capacity → learning → new absorptive capacity) is mediated by the environment in which the firm competes and its success in coping with it. Consequently, this strategically valuable capability is a path-dependent, firm-specific, and socially embedded means to use other firms' knowledge to create competitive advantage. It is also dependant on internal knowledge sharing and integration (Zahra and George, 2000).

#### Competences

Business success is increasingly dependent on intangible assets. This can be seen on valuation of publicly traded companies and increasing gap between the book and market value. Sveiby (1997) finds average rate of market to book values 4.5:1 to 5:1 in different industries. There is a number of factors that determine the value of the firm, including intellectual capital, which includes "individual competences" defined as skill, education, experience, values and social skills of the workforce. One of the reasons for incre-

ased attention to competences is that it may be difficult to imitate, thus it can be the source of sustained competitive advantage (Van der Berg, 1998). This has been discussed within organisational core competence approach (Parhalad & Hamel, 1990; Kochanski & Ruse, 1996). Individual competences here are seen as one element that makes organisational core competence, others being systems, technologies, location and infrastructure. Consequently, development of individual competencies may be part of strategic resource development.

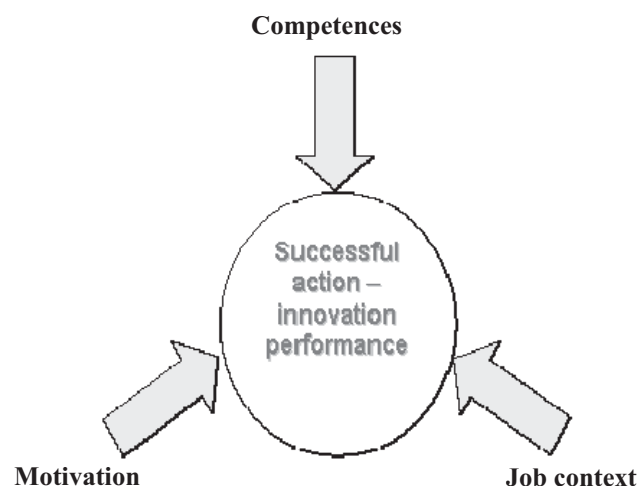
There are a number of competences definitions and approaches to competence development. One approach is represented by Lucia and Lepsinger (1999). Following Parry (1996), they define competence as a cluster of related knowledge, skills and attitudes that affects a major part of one's job (or role responsibility), that correlates with the performance on the job. They do not focus on connection with the strategy or organisational level. Alternative approaches have been introduced which chart member competencies used in the performance of tasks. Lawler and Ledford (1992) introduced such an approach, as they believed that organizations should concentrate on promoting the competencies employed in accomplishing tasks. Instead of limiting one's thinking to members holding specific jobs, the human resource needs of an innovative organization are better served if emphasis is placed on regarding the member as a valuable knowledge resource at the organization's disposal. Green (1999) derives competencies from activities and individual tasks of a particular job. Erpenbeck and colleagues (Erpenbeck, 2003) have introduced a competency diagnostics and development method that is based on

competency model (Erpenbeck & Heyse, 1999; Erpenbeck & Rosenstiel, 2003a) that includes competence taxonomy consisting of 64 competencies. Further, Lawler & Ledford (1992) note important feature of models that organisational members contribute to beyond present position. They relate competences to performance of tasks. Lindgren et al (2001) contend that "competences should be associated with processes of change and should be seen as dynamic, emergent and situated in constantly evolving practice."

We follow the definition coined by Sandra Bellier and Michel Ledru (Bellier, 2002): "The competence is the capability to perform the jobs activities in a given professional context, in order to answer organisational requirements". In other words, it is linked to action, linked to performance, contextualized and linked to the goal.

### **Innovation training programme development process for low absorption capacity SMEs**

A group of SMEs volunteered to participate in piloting new approach to innovation training. The participant companies represent low and low-medium tech companies, including service providers, those covering wood and furniture, electronics and IT, materials and construction sectors. One uniting feature is awareness of the need to develop strategic resources – competences that will meet current and future development and innovation needs. Initial assessment showed that companies face challenges in different areas – resources, organisation and strategy. Important aspect for many companies is the access to networks.



**Figure 1.** Performance determinants

There are several challenges in the process of training programme development:

- The context as well as strategies and organisation of companies vary. Organisational readiness involves enterprise-wide understanding of what

the company is trying to achieve and the reasons why, as well as relevant resources. The learning objectives should reflect that.

- On the resource side, innovation capacity depends on individual performance resulting in competen-

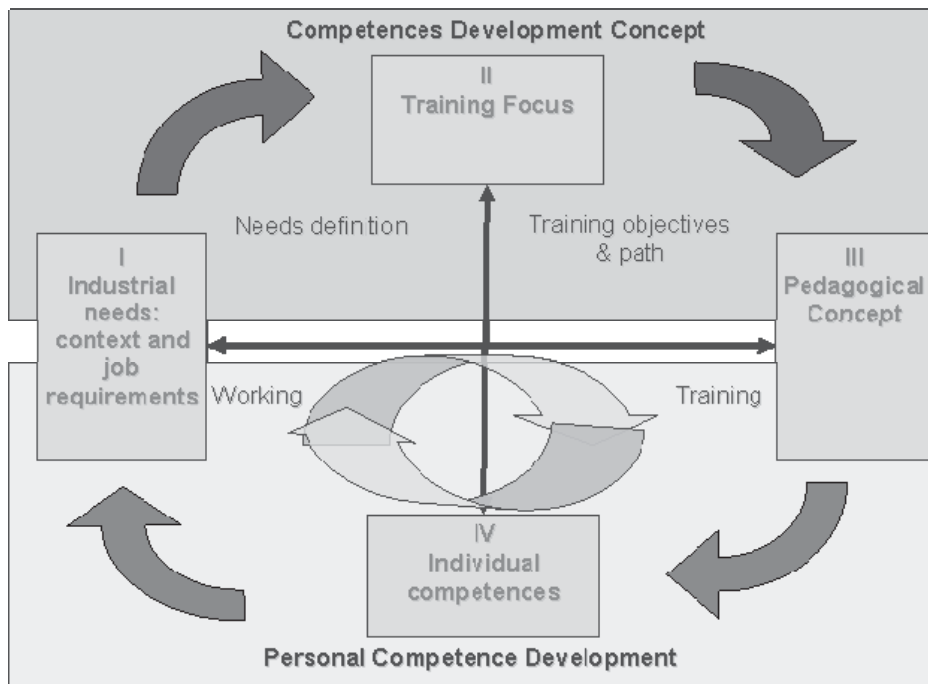


cies, job context and motivation. Thus, a learning path should be individually designed for each organisation.

- Knowledge transfer in SMEs is meaningful only when it is thoroughly connected to the innovation

activities taking place within a smaller business. It is more about “learning” than “teaching”.

- Training should be related to business development.



**Figure 2.** Innovation training programme development and deployment

Innovation activities in SMEs may have many forms – they may be technology related, include product and process development and marketing. It is the activity which delivers new value to customers and the firm by changing one or more dimensions of the business system, namely offerings, processes, customers, and points of presence in the market. Non-technological aspects of innovation in this context are at least as important as new technology.

It means that training programme should be customised to each participant company’s needs. On the other hand, it should follow clear logical frame in the process of adaptation.

We propose a methodology for adaptation of innovation training programmes targeted at SMEs summarised in the Figure 2 above.

The approach to training and coaching covers definition phase, where the “big picture” of business innovation is introduced and specific situation of the participant company is related to the framework concepts of business innovation dimensions and current and future business needs are captured; competences required to meet those needs are assessed.

Then there is case identification and design phase that addresses particularly important innovation issue or competence gap.

Another is implementation phase when acquired competences, designed approaches or processes

are embedded into company structures. Further competencies are enhanced through work practice.

Thus we can deliver a demand-pulled and context-specific training/coaching. To really empower the SMEs for long-term success, the cases are transformed to a reference case, which can be reused, transferred to other personnel or modified according to the needs.

It might look like a tedious task, however there are no shortcuts to efforts to build systems that develop the full potential of existing employees and cultures which provide the collaboration, mentoring, and learning opportunities that help everyone do better. It may initially seem surprising, that is only because we have succumbed to the idea that how people perform depends on some stable individual characteristics like talent or innate ability rather than on where they work, the technology and systems available to them, the quality of their colleagues, and the ability of their leaders.

The covered training and coaching themes follow key innovation areas: creativity, strategy, organisation, innovation life cycle management, and innovation culture. Important success factors include involvement of key decision makers within the companies and ability to define training/coaching results that have a meaning to the company.

## Conclusions

Reaching out to majority of SMEs rather than focusing on high-tech, cutting edge SMEs is a challenging task from innovation policy perspective and for a practitioner who stands up to “upgrade” innovation capacity of a low absorption capacity SME. The challenge is in that every SME has unique innovation competency needs, skills and knowledge that define the organisation’s competitive edge.

Definition of competency needs, especially if they are oriented towards the future, requires alignment with the company’s strategy. Innovation training programme developing process should take into account the following:

- flexibility to accommodate different needs through modular or “tool-box” approach;
- company participation in clarifying and focusing training needs;
- alignment of company development and training needs;
- focusing on innovation-in-practice rather than discipline of innovation

Proposed innovation training programme development model includes four stages: needs definition, training concept, training and application stages.

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## Mažos ir vidutinės įmonės inovacinių gebėjimų vystymas žemų ir vidutinių technologijų sektoriuose: nauji požūriai

### Santrauka

Globalizacija, žinių ekonomika, informacinė visuomenė – tai pagrindiniai žodžiai, apibūdinantys šiuolaikinę verslo aplinką ir iššūkius, su kuriais tenka susidurti įmonėms kasdienėje veikloje. Vis stiprėjanti tarptautinė konkurencija verčia įmones būti produktyvesnėmis, efektyvesnėmis, lankstesnėmis ir pan., o tai galima pasiekti tik neatsilikant nuo sparčios technologijų kaitos, ieškant naujų vadybos ir veiklos organizavimo būdų, t. y. diegiant produkto, proceso, organizacines ir kitų rūšių inovacijas. Inovacijos – vienas svarbiausių šalies ekonomikos ar įmonės sėkmingos plėtros veiksnių. Inovacinės veiklos plėtojimas ir aktyvinimas suteikia galimybę įvairiapusiškai modernizuoti gamybos ir paslaugų teikimo struktūras, kurti naujus ir tobulinti gaminamus produktus, naudojamas technologijas ir drauge didinti jų tarptautinį konkurencingumą, kuris yra vienas svarbiausių šalies ekonomikos plėtros veiksnių. Inovatyvios, į pokyčius ir naujausių žinių pritaikymą orientuotos įmonės yra šalies ūkio ir ekonomikos augimo pagrindas, produktyvumo šaltinis.

Ypatingą reikšmę inovacijos versle įgauna esant globaliems ir galimai negiamiems ekonomikos ir finansų rinkų pokyčiams, nes, kaip rodo pasaulinė praktika, strateginės (ilgalaikės) inovacijos nepraranda pagrindinio potencialo ir esant ryškiems krizių padariniams, bei sukuria tvirtą pagrindą galimam kilimui ateityje.

Šiandien akivaizdu, kad inovacijų diegimas nėra paprastas linijinis procesas, kurio metu mokslinių tyrimų ir technologinės (eksperimentinės) plėtros rezultatai virsta naujais produktais ar procesais. Inovacijos versle – tai kompleksinis procesas, sąlygojamas įvairių veiksnių ir subjektų, vykdančių tikslingai susietus mokslinius, technologinius, organizacinius, finansinius ir komercinius veiksmus, kurie veda inovacijos įdiegimo link. Tai suvokia daugelis įmonių, tačiau neretai jos susiduria su inovacinių gebėjimų stygiumi ir kitais, inovacinę veiklą ribojančiais veiksniais.

Mažos ir vidutinės įmonės yra ekonominis išsivysčiusių šalių pagrindas – jose sukuriama daugiausia darbo vietų ir nemaža bendrojo vidinio produkto dalis. Tiek inovacijų tyrėjai, tiek praktikai ir MVĮ politika turi tendenciją koncentruoti dėmesį į aukštų technologijų ar turinčias didelį absorbcinį pajėgumą įmones. Tačiau ši įmonių grupė sudaro tik mažą visų įmonių dalį. Inovacijos daugelyje MVĮ vyksta nereguliariai ar vykdamas projektinę veiklą, o nesivadovaujant formaliai organizuota veikla. Siekis pagerinti inovacinę veiklą paprastose MVĮ yra susijęs su iššūkiiais, tačiau atveria naujas galimybes.

Daugumos MVĮ stiprybė yra jų judrumas ir savo kliento poreikių žinojimas. Inovacinės veiklos pobūdžio supratimas tokiose įmonėse, gebėjimas pasinaudoti savo stipriosiomis pusėmis kuriant naują vertę gali užtikrinti tvarų MVĮ augimą.

Tik nedaugelis MVĮ gali pasinaudoti inovacijų nauda veikdami vieni; daugelis turi pasikliauti išoriniais šaltiniais ieškodami naujų idėjų, technologijų ar žinių. Siekdamas gauti vertingą pagalbą, jos turi ieškoti savo aplinkoje, identifikuoti tinkančias kompetencijas ir derinti jas su vidiniais gebėjimais. Gebėjimą panaudoti išorines žinias savo naudai, dar vadinamas absorbciniu gebėjimu, gebėjimą efektyviai bendradarbiauti lemia vidiniai procesai, struktūros ir individualios kompetencijos.

Praktikoje svarbūs du klausimai: 1) kokias su inovacijomis susijusias kompetencijas reikia plėtoti? 2) koks mokymosi kelias yra veiksmingiausias?

Kompetenciją galima apibrėžti kaip gebėjimą atlikti darbo užduotis tam tikrame profesiniame kontekste, kurios atitinka organizacinius poreikius. Todėl siekiant veiksmingo inovacijų mokymo(-si), mokymo veikla turi turėti tam tikrus praktinius komponentus

**Pagrindiniai žodžiai:** inovacijos, absorbcijos geba, kompetencija, profesinis mokymas