TRIZ Development Framework for Malaysian SME

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Summary

Malaysia Productivity Corporation (MPC) and Malaysia TRIZ Association (MyTRIZ) are focusing on the initiative to expose the Malaysia TRIZ Practitioners with the latest TRIZ development to acquire a wider perspective of TRIZ practices around the world, encourage Malaysia TRIZ Community to share ideas and collaborate with TRIZ experts from other countries, and apply the knowledge acquired to develop various new products, processes, services or systems for international and local customers. In order to ignite the effort, a framework is developed to mobilize the initiative of adopting TRIZ for Malaysian industries focusing primarily on Small Medium Enterprise (SME). This research explores on the framework to expand the knowledge of TRIZ for the targeted industries. Most of the inputs are extracted from the experienced academicians and industrial experts who use TRIZ as a part of their core subject. The established framework which incorporated Problem-based, Outcome-based Learning and Business-Coaching is intended to suit the Malaysian environment and it is able to effectively increase innovation in the industries.

Keywords: Inventive Problem Solving, Systematic Innovation, Business Coaching, SME, MyTRIZ, MPC.

1. INTRODUCTION

The Round-Table Discussion (RTD) was best summarized by the Director General of the Malaysia Productivity Corporation (MPC). He said that best practices such as TRIZ must be enjoyed by as many people as possible, if not everyone. MPC which has 30 years of experience since its inception in 1983 in facilitating the productivity tools and encouraging the use of the innovation tools would play the role of a facilitator to encourage the adoption and application of TRIZ. It is imperative that Malaysians innovate to achieve greater value for the nation. Several RTDs were organized by MPC and well attended by MyTRIZ members, universities and industries. The objective of the RTD was to develop the best approach to expand new innovative culture through TRIZ in the Malaysia industries. Through the work sessions, various issues and challenges were surfaced and discussed in term of introducing TRIZ to the industries especially the SME [1]. The intervention focused on the SME as the needs were different from large Multinational companies and Government Linked Company (GLC). The SME required more exposure to new tools that could help them increase the level of innovation in their products, processes or services. With the limited SME's capabilities and resources, a comprehensive and innovative framework is established to effectively proliferate TRIZ as the main tool to increase their innovativeness and competitiveness. In addition there are relatively few empirical papers or reports emphasizing on the use of inventive problem solving techniques, in the journey to enhance their innovativeness in Malaysian SME. The framework then proposes a conceptual model that could be served as methodology to develop the SME capability, and become the foundation for future empirical based research.

2. MALAYSIAN SME

SMEs are quoted as constituting 80% of global enterprises, whereas SMEs in Malaysia constitute 99.2% of total business establishments which contribute 30.9% of total manufacturing output and account for 31.8% of total employment in 2008. Malaysian manufacturing SMEs are classified into micro, small and medium-sized enterprise with less than 150 full time

employees or less than RM25 million of annual sales turnover. Majority of them are micro enterprises with 79% of establishments, small enterprises constituted 18% of establishments, and medium enterprises represented 3% of establishments [2].

Broad-based SME promotion started to become one of the government's top priorities in 1990s and in 1996, the Small and Medium Industries Development Corporation (SMIDEC) was created under the auspices of Ministry of International Trade and Industry (MITI), tasked with coordinating the provision of infrastructure facilities, financial assistance, advisory services, market access and other support programmes to SMEs. The SME sector was further prioritized with the creation of the high-level National SME Development Council (NSDC) in 2004, and by its inclusion as a targeted growth area in Malaysia's Third Industrial Master Plan (2006-2020). In 2009, SMIDEC was officially transformed into Small and Medium Enterprise Corporation Malaysia (SME Corp) and continues its role as coordinator of SME programmes across all related ministries and agencies. A streamlined methodology called the SME Competitiveness Rating for Enhancement (SCORE) was developed and has helped increase the relative role of SMEs in the economy, although by most measures, Malaysia still has a long way to go. For example, Malaysia's SME sector made up only 31 per cent of GDP in 2009, compared to 49 per cent in Korea and Singapore (Figure 1) [3].

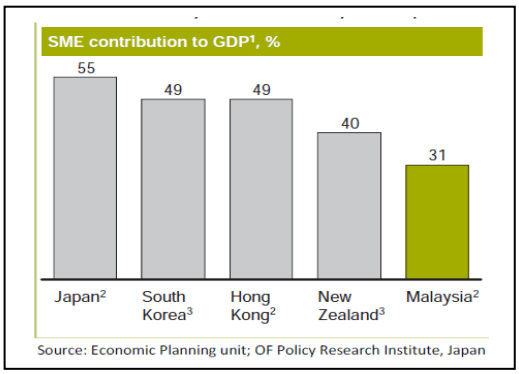


Figure 1: Malaysian SME Contribution to GDP is Relatively Low Compared to Other Countries. [4]

Thus the government will focus on unlocking the growth and innovation potential of SMEs, creating domestic, regional and global champions. Key measures that would be taken include reducing regulatory costs, building capacity and capabilities, supporting an entrepreneurial culture, enhancing financing and support systems for SMEs.

To accelerate the growth of SMEs, the next focus is on integrating SMEs into the economic mainstream to become an important engine of growth in the National New Economic Model. SMEs are surrounded by challenges such as uncertainty in the external environment and pressures from globalization and market liberalization. Policy focus would be to enhance the capacity and capability of SMEs towards building long-term resilience and competitiveness. To achieve these goals efforts should be garnered through more targeted and result-based approach to SME development [2].

It is imperative that Malaysian economy, especially the SMEs have to innovate to achieve greater value for the nation. This has been strategically planned by Malaysia, as highlighted in the 10th Malaysia Plan, in which the 4th Key Enabler to support economic growth is "Developing SMEs as an Engine of Growth and Innovation". [4]

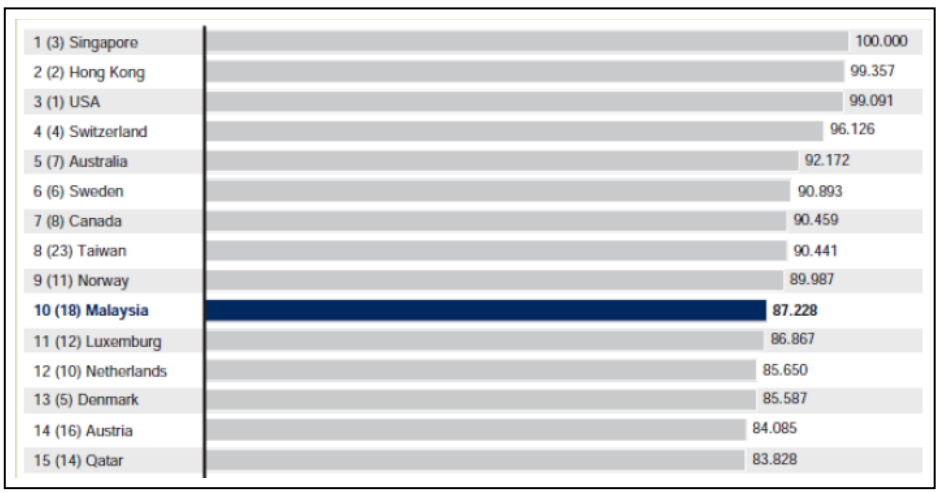


Figure 2: Malaysia Ranked 10th in the World Competitiveness Scoreboard 2010 [4].

Malaysia continuously enhancing its world competitiveness by engaging various strategic initiatives: creating private sector-led economy; supporting innovation-led growth; creating innovation opportunities; funding innovation; rationalizing role of government in business; developing SMEs as an engine of growth and innovation; establishing world class infrastructure to support growth and enhance productivity; and finally competing globally. These initiatives as stated in the 10th Malaysia Plan has help Malaysia leap-frog to the 10th position in the World Competitiveness Scoreboard 2010 (Figure 2).

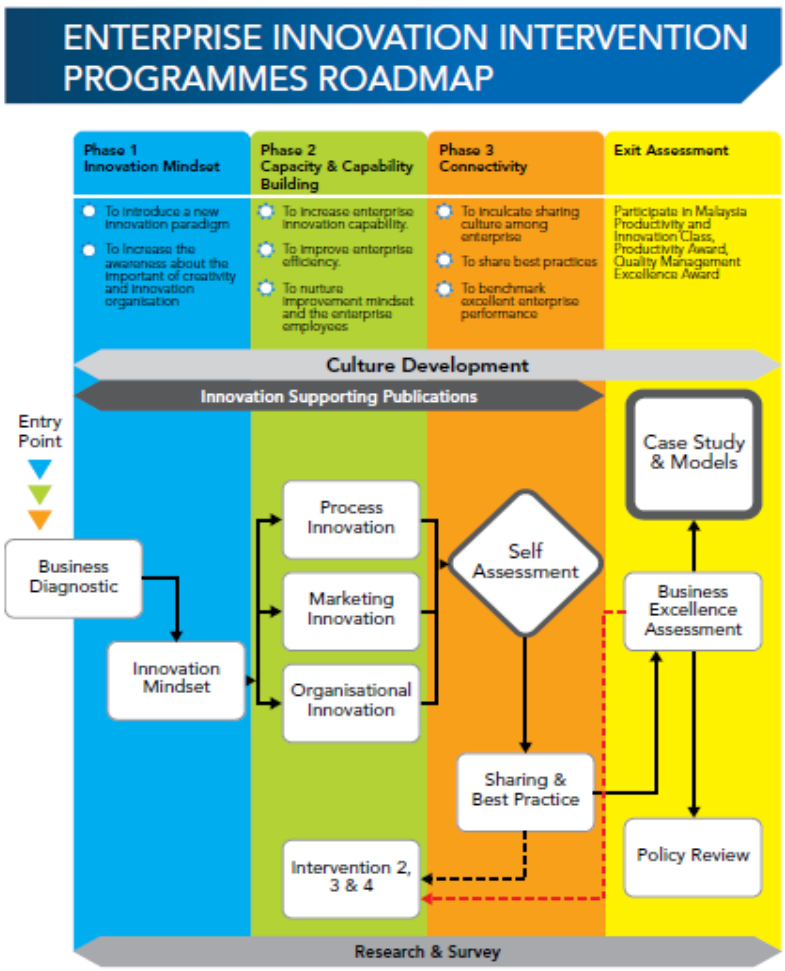


Figure 3: Innovation Intervention Roadmap [5]

In the effort to facilitate Malaysian SMEs to enhance their innovativeness, the government established Institutional Structure Supporting Innovation and R&D and this include SME Corp and Malaysian Productivity Council (MPC). MPC major roles, among others are (i) undertake productivity enhancement research and activities and (ii) advisory and training to enable enterprise innovation. MPC which has 30 years of experience since its inception in 1983 in facilitating the productivity tools and encouraging the use of the innovation tools would play the role of a facilitator to encourage the adoption and application of TRIZ in SMEs. MPC has developed the Enterprise Innovation Intervention Programs Roadmap, in which TRIZ is to be embedded in the 3 Phases Culture Development: Innovation Mindset; Capacity & Capability Building; Connectivity [5].

3. TRIZ EXPERIENCE IN PROMOTING INNOVATION IN SMEs

Challenges in Introducing TRIZ:

Previous researchers found that SME lacks of expertise, and always experience monetary constraints. The biggest hurdles and barriers was unfamiliarity with the methodology that led to disbelieve on TRIZ [6]. Other issues faced by SMEs in learning and implementing problem solving techniques in Malaysia are: lack of knowledge, time consuming, increased workload, and increase cost [7]. TRIZ as one of the problem solving technique does not have rich parents, big corporate

sponsors and cool advertising in comparison with Six Sigma, for instance. Indeed, the best way to overcome these obstacles was to get excellent results in real projects using TRIZ.

The success in large corporations has been achieved with participation of experienced TRIZ specialists from Russia, including their coaching approach. The trained Samsung employees, for example, did not have the practical TRIZ experience to deal with real projects. Even though they knew the process and could memorize the theory, they still **needed coaching** to get them over the speed bumps of problem solving [6]. It is extremely important to develop and to use the same (TRIZ) language and approach for clear communication, discussion and solving real problems between different specialists from different divisions. As all know, TRIZ uses own specific language: mini-problem, su-field, engineering contradiction, physical contradiction, ideal final solution, resource analysis, product evolution, patent circumvention, etc. With a coaching base of TRIZ training and TRIZ language, people are facilitated effectively during problem solving process.

There is an increasing concern that training and education fail to prepare trainees to properly address complex, ill-structured problems in the context of multi-disciplinary teams in order to produce innovative solutions and designs. Instructional solutions such as coaching, active learning, helping coachees develop metacognitive skills, and the direct teaching of creative problem solving skills have been proposed and will be discussed [8]. The common objectives of applying TRIZ in enterprises are: cost reduction of manufacturing, product or process improvement, inexpensive engineering (without additional researches) problem solving, cost reduction by avoiding competitor patents and development new patents ("umbrella patenting"), forecasting and development of new concepts for existing product design, and development future brand new core technologies. The common application areas of TRIZ are: existing product improvement, new product development, manufacturing technology improvement, patent overcoming and new patent development, short and long-term forecasting, scientific and research engineering [6].

4. TRIZ DEVELOMENT FRAMEWORK FOR SME

There is a dire that SME need a simple, feasible, collaborative implementation framework and actively supported by the government agencies. Recognizing that a key factor in many SME environments is the lack of time to learn new skills, to develop education and training methodology that enables individuals to derive real benefit from TRIZ with the smallest possible learning curve is imperative [9].

The RTD developed a suitable framework to bring TRIZ to SMEs (Figure 4). The preparation stage includes the cooperation between MyTRIZ and MPC to identify potential sectors among the SMEs to initiate activities. Then MPC will start to engage the SMEs by inviting them into the program. The SMEs that are interested to join the program will be trained by certified trainers from MyTRIZ and later start a real project in their operation level. Problem-based learning, Outcome-based approach and Business Coaching technique are incorporated in the framework. Planned activities, workshops with elements of coaching for enterprises will be organized, solving the problem (capstone project) of enterprises by TRIZ method, which particularly refers to the technological processes, and also concern the problem solving or improvement in other areas of activities, such as organizational issues, customer service, advertising processes, etc.

A new approach to learning is required for companies, focusing on their immediate needs while building competitive advantage. Problem based learning (PBL) is a highly contextualized approach to learning and can use staff development to target real problems the companies face. PBL requires collaboration from mentors (coach) and peers (coaches), thus there is an element of social learning that takes place. An added approach is Outcome-based Learning (OBL) focused not on what the teacher (coach) intends to teach but rather the emphasis is on what is the outcome from the learner (coachee) of that teaching is intended to be. The basic premise of OBL is that the teaching and learning activities and assessment methods are constructively aligned with the intended learning outcomes for the course. In other words, the outcomes determine the curriculum content, the teaching methods and strategies, and the assessment process [10]. These approaches are embedded in Business Coaching technique incorporated in learning and implementing TRIZ.

Business Coaching in Training and Education:

Coaching human performance has a long history. For the most part, coaching interventions have focused on sports to improve physical behaviors. In 1974, Tim Gallwey signaled an extension of coaching to the mental mindset of the athlete in his book "The Inner Game of Tennis". About the same time, the life coach, business coach and executive coach industries began to grow. Thirty-five years later, coaching has become the chosen profession of thousands of people worldwide. Coaching as an instructional technique has now migrated to engineering education [8]. With this rapid expansion of the coaching function the concept of "coach" and the function of "coaching" have come to mean many things, In sports, the coach is the one that brings out the best of players both in their physical and mental game. The intent of coaching interventions that target psychological functioning is not well defined.

In the business world, coaching appears to be attractive to executives who use it to learn new skills, improve their performance on the job, or to find purpose in their lives. Individuals outside of the world of management and business also seek coaches to help them reach their life goals. The common thread is the development of a personal trusting relationship between a coachee and a coach, mainly for therapeutic reasons. The disciplines behind business and executive, and personal and life coaching are organizational development (OD) and human resource development (HRD). However, the quest to build a unique coaching profession, on par with OD and HRD, continues [11].

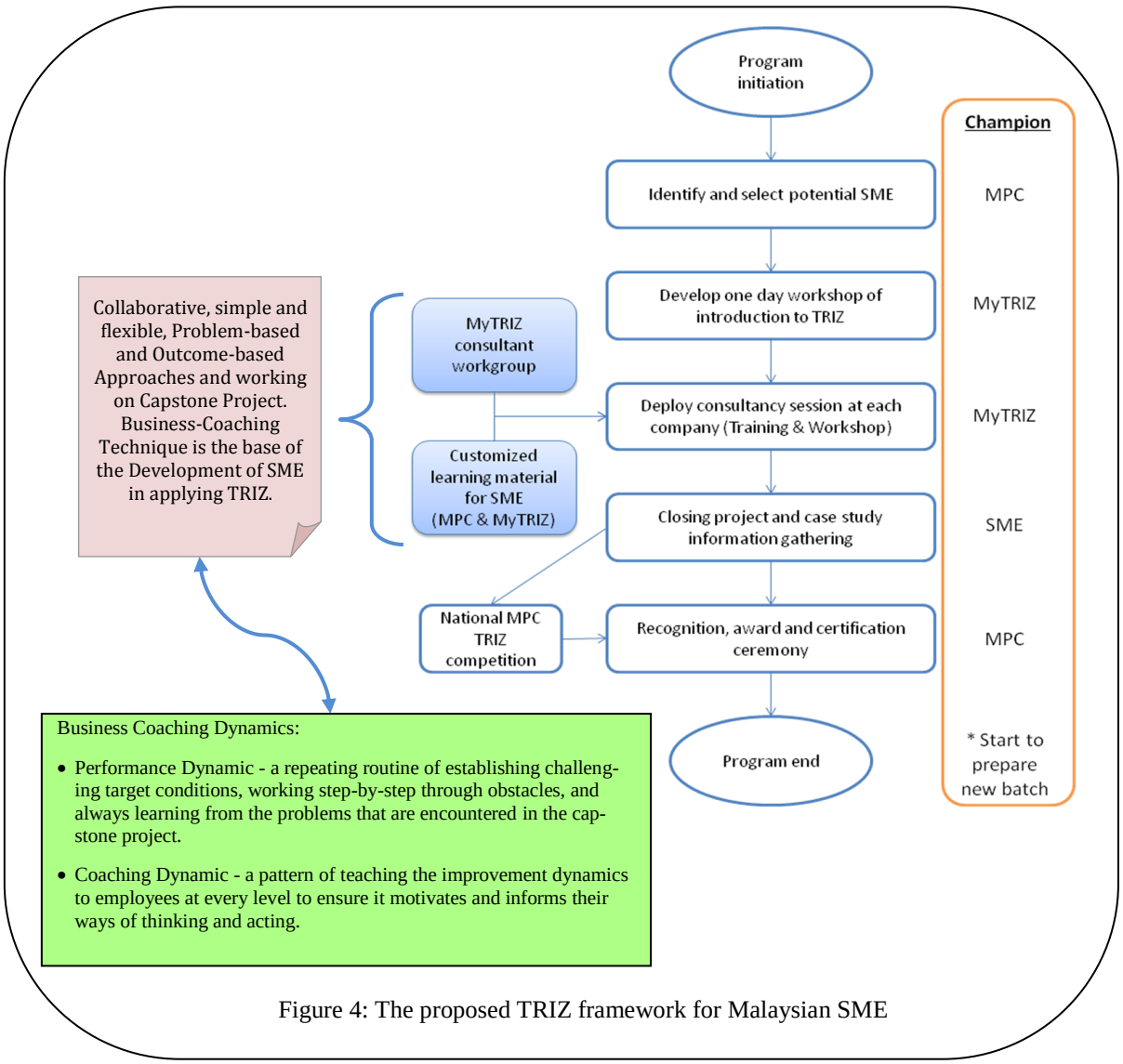


Figure 4: The proposed TRIZ framework for Malaysian SME

In general, the coach's role in this framework is to supply some content (usually in the form of pointing the coachee to the content) and to encourage coachee to construct their own knowledge. Coaching involves asking the right questions and to structure the discourse in such a way that the student use and construct knowledge towards solving problems and designing solutions. Coaches provide the connectivity between teaching process and learning process so coachees can produce their own knowledge. The coach asks questions like "what's going on here?" and "what do we know more about?" and in this way encourages coachees to explore and discover, bridging the gap between teaching and learning [8].

Another effort expands the coach's role along the knowledge-transfer continuum, from teaching to coaching. Coaches play three roles: mentor - provide support by guiding, being there, aware and helpful; mediator - a buffer between external reviewers and customers, and manager (facilitator): guiding the team's collaboration and design process. Industrial advisors (certified TRIZ trainers) are used as coaches in **capstone projects**. These coaches communicate with coachees face-to-face and via email, faxes and telephone/video conferences [8].

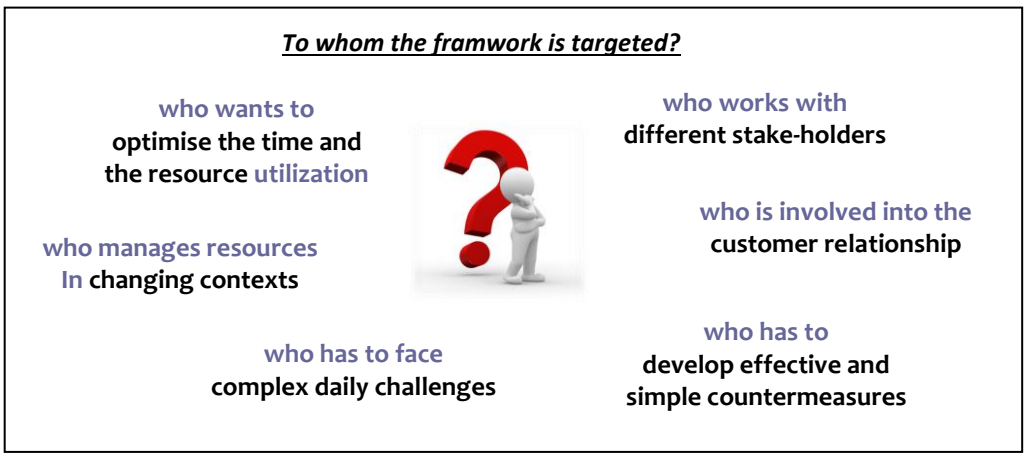
A third way that coaching is used to support capstone projects involves coach guiding and coaching coachees instead of teaching them. In this capstone course, the coachee's real life professional problem solving experience is accomplished primarily by the coach's guiding and coaching the students rather than directing them in solving the problem. Coaching as an instructional intervention is being used in capstone projects mainly as a way to facilitate communication and group process. Helping coachees work in teams is an important educational goal. Another major learning outcome for capstone projects is to provide coachees an opportunity to apply their knowledge and skills to solve real world problems and to design practical solutions.

The coaches are experienced and certified trainers on TRIZ method, in problem solving and innovation in general. Engaging these coaches means gaining a partner in enterprise innovation challenge. Through this partnership, coachee (person being coached) will:

- Gain clarity and guidance in executing his action plan toward achieving long-term goals and aspirations.
- Develop innovation skills and knowledge more effectively and efficiently.
- Improve performance in both professional and personal lives.

The coach will guide the coachee through an action plan using the framework, but the services will be highly customized to enterprise needs and stage of challenge.

The outcomes of the project focus on the impact to business bottom-line such as Return on Investment (ROI) or creating high value to the company such as developing new patents. This helps to identify the level of understanding of TRIZ knowledge and evaluate the level of application relevant to their business [12]. All achievements from the project create success stories to be share to others. Furthermore, MPC is very active in organizing activities such as conferences, workshops and competition events and providing rewards to the SME that are successfully in improving their business through innovation at national level. All these activities have been incorporated into the proposed implementation framework as show above.



5. RESULTS AND DISCUSSION

The SMEs need to see the potential of TRIZ knowledge in order to use it as catalyst in their business performance. Therefore, the critical step in introducing TRIZ to SME is by portraying the values and opportunities which lie within the knowledge of TRIZ [9]. With effective introduction of TRIZ, proposed here by integrating business coaching in TRIZ implementation process, the SME will be enlightened and strive at their own will to learn more about TRIZ and how they can improve their business performance through innovation. Later, the SME will be equipped with the knowledge and competency to use TRIZ and start their small-win projects to build up their level of practitioners. This condition will be the key process towards systematic innovation with continuous improvement. The best concept of TRIZ for the SME is achieving Ideality in their business performance. The Ideality concept becomes the key driver for ultimate business goals. In detail, the Ideality concept can be applied at all levels of supply chain, including improving productivity, waste management in lean concept, logistic and supply, developing business case, improving customer satisfaction, packaging, marketing, etc. This concept highlights the focus to increase the value of their business (profit, capital, volume, quality, productivity) and also focus to eliminate harmful effect to the business (losses, waste, defect, bad perception and image, incompetent). The SME which have similar understanding in managing problems in their business will develop their interest and spark the needs to know more about the concept and how to perform better.

REFERENCES

[1] Filippi, S., Motyl, B. & Ciappina, F.M., 2011. Classifying TRIZ methods to speed up their adoption and the ROI for SMEs. , 9, pp.172–182.

[2] Section II: SME Development Policies and Programmes. SME ANNUAL REPORT 2010/11.

[3] United Nations Conference on Trade and Development. BEST PRACTICES IN INVESTMENT FOR DEVELOPMENT CASE STUDIES IN FDI. How to Create and Benefit from FDI-SME Linkages - Lessons from Malaysia and Singapore. 2011.

[4] RSM Strategic Business Advisor. A summary of The 10th Malaysia Plan. 2010.

[5] Malaysia Productivity Corporation. Enterprise Innovation Background. Updated on : 2013-06-03.

[6] Krasnoslobodtsev V., Langevin R. APPLIED TRIZ IN HIGH-TECH INDUSTRY. TRIZCON2006, Milwaukee, WI USA, April 2006.

[7] Quan L.R. & Baharudin A. S. Jurnal Teknologi (Social Sciences). 63:4 (2013), 121–126.

[8] Rousseau P.R., and Nikolai Khomenko N. Improving Problem Solving and Solution Design Skills Using Problem Flow Coaches in Capstone Projects. PCEEA, 2011.

[9] Innotool, T. & Liaison, I., innotool – Innovation Toolbox For SMEs. www.triz-journal.com/archives/2004/07/06.

[10] O'Brien E., Hamburg I. Organisational Problem Based Learning and Social Communities for SMEs. European Journal of Distance, Open and e-Learning. Date of publication: 07.10.2013

[11] Robert G. Hamlin, Andrea D. Ellinger, Rona S. Beattie. Toward a Profession of Coaching? A Definitional Examination of 'Coaching,' 'Organization Development,' and 'Human Resource Development'. International Journal of Evidence Based Coaching and Mentoring Vol. 7, No.1, February 2009 Page 13.

[12] Lepot, X. & Neveux, A., 2011. 2A2CI : a systematic approach to implement TRIZ innovation in SME. , pp.1–11.