INTRODUCTION

Entering globalization and free market era, which is full with complexity, competition, diversity and dynamic, entrepreneur in general and small-medium scale enterprises (SME) in particular as one of the economic poles in Indonesia, it ought to be able to hold an optimal role in absorbing labor, community development, technology absorption, export capacity and competition. SME found in developing and developed countries is still facing classical handicap such as technology, finance, managerial and market accessibility, in spite of its high flexibility, responsiveness, dynamic and resistance. Therefore, designing and management of SME in context of technology dissemination needs to understand business dimension as enterprise description, product/service, market, enterprise location, competition, management, personnel, budget, research and development. Beside general technology, both SME in general and specific are closely related to: (1) Technology choice covering technology complexities, capital intensity, and human resource (HR) quality; (2) Technology learning strategy based on learned technology position combination, both process and products with faced competition, through existing learned technology, technology integration, technology development and basic research; (3) Enterprise unit covering enterprise scale, HR, organization, location, product type, enterprise unit, experiences, competition level and business network; (4) Performance indication of business unit and business man, and technology diffusion institutions; (5) Linkages of business with characteristics of authority, functional, normative and diffusion. Dissemination pattern of integrated and sustainable technology is expected to establish network among development subjects intensively and dynamically, to compile agenda of transfer technology, implement technology that is appropriate and develop learning organization for technology dissemination activities.

METHODS

Understanding the birth of technology (Figure 1) is indispensable in technology transfer (technology
and science development implementation) in training and development of SME through support from agencies such as research centres, science parks, technology parks, incubator centers (business or technology), business and innovation centres, industrial and business areas in the production of strong and utilizable economic activity for every one (Hubeis, 1999).

**Figure 1. Technology birth chain (Hubeis, 1991)**

Description: initiation/product/service; prototype product development (technical and economic); product specification; price and market potential; phase 1-3 integration (starting fabrication realization); full fabrication and marketing strategy (product, price, promotion, brand and distribution); total commercialization of product/service, both already exist or new.

Technology dissemination as an effort to learn technology includes knowledge, understanding, application, analysis and synthesis for specific agents (UPT BPPTG LIPI, 1999). Therefore, technology development mastering should be capable of making efficient allocation of existing technology resource (methods, techniques and procedures) (Harvard Business Review, 1999), both high employment or medium employment or high financial or medium financial to produce high added value products having competitiveness and export orientation. From those points, designing and management of SME in the context of technology dissemination needs to understand business dimension (Hubeis, 1997; 2001) as follows:

**Enterprise description.** This description contains enterprise type (trade, manufacturer and service; product and service, consumers), enterprise status (initiation, enlargement, acquisition and division), enterprise form (single owner, united and company), enterprise condition (profitable and developing) and enterprise operation (starting time, operation time/hr and seasonal/fixed).

**Product/service.** This shows desired things (sold, usefulness, difference, new invention and location) to the consumers according to the production capacity.

**Market.** Market is the goal of marketing including consumer characteristic (personal and institutional segmentation), product/profile usefulness (wanted, prospect and cycle), selling and distribution (easiness found) competition (competitor, suppliers, and information), position determination, publicity and promotion (market space, image and message) price determination (product + service + image + load + profit formula, aim and flexibility), goal and budget (enterprise goal) and strategy (communication, motto and collaboration).

**Enterprise location.** Location shows different needs (access, rent/buy, enterprise centering and performance) in supporting the business.

**Competition.** This occurs if the enterprises operating has found a market (profit and expansion), so that an information analysis is needed (number of direct/indirect competitors, competitor condition, similarity and difference, chosen marketing strategy).

**Management.** Management consists of items such as owner history, related job experience, right and responsibility, salary and resource for enterprise share.

**Personnel.** Personnel or human resource (HR) represent strength (skill, expertise and competence) of an enterprise. Hence, appropriate personnel is needed (number competency and availability, employment condition and salary including incentive and training).

**Budget.** Budget includes resources (private or loan) and budget utilization (capital and work investment) capital inventorization (engines and furniture, shop equipment, engines for product and service, transportation vehicle) and analysis (balance, break even point, profit and loss projection, cash flow projection, budget distortion and history).

**Research and development (R&D).** R&D includes technology transfer, product innovation and process holding important role to resist and compete in competitive market.

The issue in point 1-9 shows the importance of understanding interactive relationship of collaboration of multi parties supporting by budget, technical packages, human competency, information and institutional packages, in product technology development and process in SME level. Several points need consideration in order to achieve a dissemination technology that is effective and sustainable (Hubeis 2001; 2003): (1) System approach (input, process and output) of production factors at the down stream related to materials, process and equipments, capital, employment and involvement of economic, management and marketing operators; (2) Understanding of industry tree, namely primary product (raw materials),
secondary products (intermediate processed products, finished products and primary products) and tertiary products (derivative products from advanced treated main product and by product from secondary products). These are closely related to development and application of science, engineering and technology which has became more global as a result of the information technology (IT) application; (3) Understanding of product processing scheme including materials (raw materials, supporting/additive materials), handling/processing and treatment of intermediate products, finish products, shrinkage and waste; (4) Local and global market information proficiency related to product trend and consumers preference, and competitor enterprise scale and supplier support; (5) Business network learning related to conducive enterprise growth (budget, competition, information facility, collaboration, enterprise license and protection/siding), training and development (production and processing, marketing, HR and technology), financial and warrant, and collaboration, coordination and monitoring (target, patterns, written agreement, opportunity, stakeholders, enterprise operation, lean system, coordinator, establishment and its scope).

In order to accomplished effective technology dissemination condition (time, location, expertise and quality), both software, hardware and their combination for SME in a specific field, need support by this pattern of thought: what is needed ?, who needs it ?, when can be accessed ?, what form of dissemination is needed ?, where is it found ? when and where the dissemination can be used as a reference (Hubeis, 2002) ? In other word, it is necessary to focus on the line of thought, models and system approach that has been is being and will be operated, to reduce investment risk, reduce communication gap among actors, to aid production development and service through technology utilization, learning and development needed, and speed up dissemination of information technology to other parties in need (Harvard Business review, 1999; UPT BPTTG LIPI, 1999; Hubeis, 2001).

Beside general technology, both SME in general and specific (Hubeis, 1993, 1997, 2002) are closely related to: (1) Technology choice (Table 1) covering technology complexities, capital intensity, and HR quality. This needs innovation type that will be realized for new product development and new market expansion that are not independent of the 3F principal (flexibility, fashion, and feedback) and 3 S (specialty, software application, and systematization); (2) Technology learning strategy based on learned technology position combination, both process and products with faced competition, through existing learned technology (i.e. technology transfer and production license, technology integration (i.e. better design and function), technology development (i.e. product development) and basic research (i.e. science and technology collaboration). In this context technology is considered as an investment covering knowledge mobilization, technique, commercialization and management (3) Enterprise unit covering enterprise scale, HR, organization, location, product type, enterprise unit, experiences, competition level and business network. These are useful for production unit development based on appropriate technology, target and environmental friendly technology; (4) Performance indication of business unit (i.e. increase sale volume/year, business diversification etc) and business man (i.e. creativity in production, appropriateness in supplying demand, etc) and technology diffusion institutions (i.e. network formation, center of references, increase service income, etc). These could be obtained through periodic monitoring and evaluation; (5) Linkages of business with characteristics of authority, functional, normative and diffusion. These can support strategic empowerment pattern that are independent, holistic and achieve aims to get excess from various effective resources, in order to achieve economic capability (business choice, strategy formulation, system development, organization structure design and HR finding) in condition full with uncertainty and risky.

Table 1. Technology typology (Hubeis, 1993; 2003)

<table>
<thead>
<tr>
<th>Type 1 Technology: standard</th>
<th>Type 4 Technology: recent/sophisticated</th>
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<tbody>
<tr>
<td>• Standard production system</td>
<td>• Complex production system</td>
</tr>
<tr>
<td>• Standard/semi high capacity</td>
<td>• Complex/high investment equipment</td>
</tr>
<tr>
<td>• High quality HR</td>
<td>• High quality HR</td>
</tr>
<tr>
<td>• Local and international market, and high added value</td>
<td>• Global market and high added value</td>
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</table>
RESULTS AND DISCUSSION

Based on the above suggestions, it is possible to compile a focused technology dissemination pattern according to exploration steps, integration and development (Figure 2) which is influenced by research results (potential and risk), research and development time and product development (Hubeis 2003). This is valid for those having strong motivation to run a business (beginners, operating and experienced) and who knows the market; and potential enterprise motivated to grow further (start-up, growth, expansion and going overseas) (Hubeis, 1997). In concrete, steps such as introspection auditing of the dissemination, operational capacity evaluation, portfolio product analysis, diagnosis report, definition of process technology and developing product, and dissemination action planning (organization, direction, selection and following up) (EEC, 1998).

Dissemination pattern of integrated and sustainable technology is expected to establish network among development subjects intensively and dynamically, to compile agenda of transfer technology, implement technology that is appropriate and develop learning organization for technology dissemination activities (Hubeis, 2003). In other words, the integrated and sustainable technology dissemination pattern presented in Figure 2, carries expectation that evaluation results dissemination and collaboration in technology development in general, and SME in particular, can utilize all dissemination model available, i.e. information in the forms of leaflet/brochure, poster, booklet, CD-ROM and Web/homepage, and other forms such as training in combination with product display, collaboration meeting, seminar, exhibition and product testing, field trip and technology package tutorial, and video/slide program containing image of successful business based on technology, consultation and advocation (Hubeis, 2002). These could in return support primary competency development and determination of critical factors of SME success as results of adoption and adaptation and anticipation from dissemination activities or utilization of technology used in expansion of market (Figure 3).
CONCLUSION

Technology dissemination which is effective for SME in general, and in particular that is through a technology integration line (i.e., internship, adaptation and optimization) considering technology life cycle and product life cycle that is capable of creating product with high added value, having competitiveness and global orientation, and supported by sender-message-channel-receiver-effect (SMCRE) communication model (Hubeis, 2003). In this case, real activity from leading institutions is required (center for the promotion of entrepreneurship, small business development centers, the aid center for high-tech entrepreneurs, business and technology development center, small and medium industry development organization, fund for the promotion and use of technology, regional technology centers, etc) and annual competitive reward for SME (the small firms merit award for research and technology) success in developing products having business prospect (ECC, 1998; Harvard Business Review, 1999). The success of technology dissemination in transfer of technology process to accelerate SME growth (product, process and organization) is influenced by technology competition impact (competitors and success factors) and technology control level (protection), and asset consolidation (capacity to market and develop). To achieve those factors, development of SME operation needs to consider market potential (local and international market, type and volume of products), regional potency (large, sufficient, less) and present condition (program, business type, manager/owner, technology, potential and main competitor, problems and solution, etc) especially against impacts (competitors, success key factor and competitor analysis) and control (product, process, organization and technology analysis) level of technology used, and business classification (ideal, speculative, mature and problematic) (Hubeis, 1997, 2001). Hence, experience identification step, pattern innovation, planning and implementation, and result expectation are required (Hubeis, 2003).

SME prospect in Indonesia in the future as one of national income generators will be based on strategies based on local raw material with high added value (product price and variety), located in the village, local and global market learning, appropriate technology in production and information proficiency supported by basic sciences (mathematics, chemistry, physics and biology) and applied sciences (management, process equipment and technology, IT, economy, etc), product benchmarking (world quality), collaboration and business networking, educated and skilled HR (Hubeis, 2001). In this case, government policy becomes very important, especially relating to priority commodities and its processing industry, industrialization factors and research and development support, and formation of independent training institution proportional to the business scale of SME (Hubeis, 2003).

REFERENCES


Harvard Business Review, 1999. Managing High-


