Asia-Pacific
Economic Cooperation

Strategic Intellectual Asset Management for Emerging Enterprises

Capacity Building for Successful Entry to Global Supply Chain

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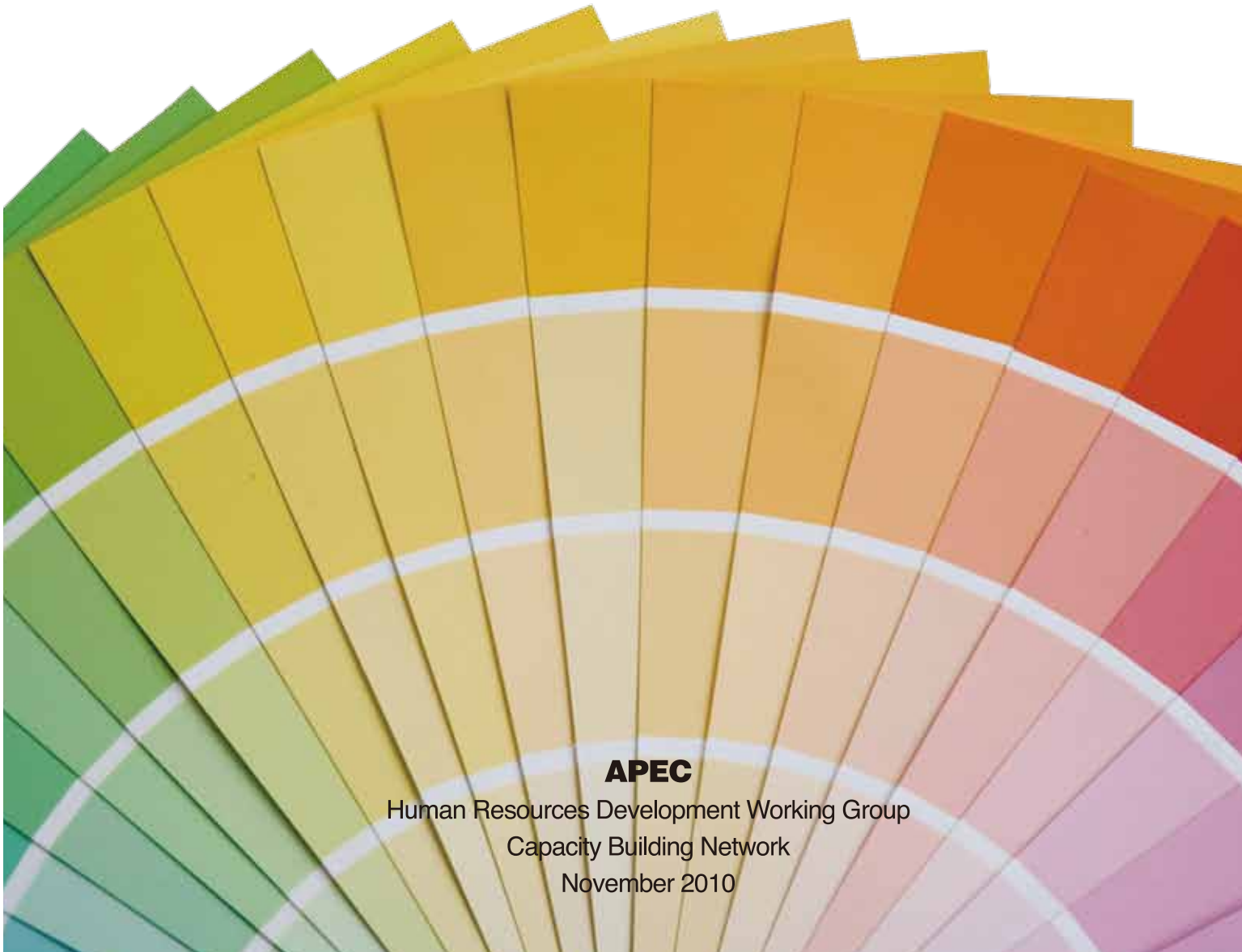
Case Book



APEC
Human Resources Development Working Group
Capacity Building Network
November 2010

Asia-Pacific
Economic Cooperation

STRATEGIC INTELLECTUAL ASSET MANAGEMENT FOR EMERGING ENTERPRISES

CAPACITY BUILDING FOR SUCCESSFUL ENTRY TO GLOBAL SUPPLY CHAIN

CASE BOOK

APEC
HUMAN RESOURCES DEVELOPMENT WORKING GROUP
CAPACITY BUILDING NETWORK

NOVEMBER 2010

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PREFACE

The year 2010 marked an important milestone for the Asia-Pacific Economic Cooperation (APEC). In the Bogor Declaration of 1994, APEC established a target for achieving effective liberalization of trade and investment among its developed member economies by 2010 and among its developing economies by 2020. A review of APEC's progress in this area reveals that a great advancement has been made in trade liberalization and facilitation efforts, but a number of issues still remain and new issues emerge as the region gets integrated into the global economy.

In order to prepare the enterprise management and policy makers for the changing environment and to cope with new challenges, the APEC Human Resources Development Working Group (HRDWG) Capacity Building Network (CBN) has been implementing a number of projects addressing some of these emerging issues. The more recent attempts along this line produced case books such as *Corporate Social Responsibility in Global Supply Chain* and *Opportunities and Challenges of Foreign Investment in APEC*, among others. These projects were proposed by the Institute for International Studies and Training (IIST), a non-profit, non-government organization, under the supervision of the Ministry of Economy, Trade and Industry (METI), Japan, and implemented with the cooperation of APEC member economies.

This project entitled "IPR Strategies for Emerging Enterprises – Capacity Building for Successful Entry to Global Supply Chain" is another one of these efforts; it addresses the challenges in raising awareness of the importance of intellectual assets among the SME owners and managers. The approach we have taken is to make the SME owners and managers recognize and utilize the intellectual assets strategically, rather than police violations of the intellectual property rights of others.

The project was launched with an experts' workshop in Okinawa, Japan in September 2009, during which the experts shared the issues on intellectual asset management in the APEC economies.* Based on the discussion, capacity building needs were identified and a tentative program for SME owners and managers was designed, using a framework developed by the experts. Cases on their own respective economies were then written by the nominated experts. Each case was developed in line with the focus within the framework and as set forth in the program design. Some cases were modified to include a decision making component, while others represented best practices.

A pilot seminar was then organized from 01 September to 02 September 2010 at the Asian Institute of Management (AIM) in Manila, Philippines to evaluate the program design and case materials developed under the project. The feedback of the participants indicated that the program succeeded in motivating them to learn more about intellectual asset management. The experts who participated in the seminar also shared that the program would be very useful for their own economies. The abundant sharing of knowledge and expertise among the experts was one of the major benefits of doing this project under APEC.

This publication contains a compilation of 10 case studies involving eight APEC economies which were developed under this project, and a synthesis of all the lessons

learned throughout the implementation of this project. The full text is also available on the APEC website in downloadable form. We hope that the materials will be widely used by other institutions and trainers within the APEC community.

As the project overseer, I would like to express my sincere gratitude for the cooperation extended by the experts and their organizations in making this a successful project through their contributions at various stages. Their names appear on the following pages. We are particularly grateful to the case authors and reviewers for their considerable effort and patience in revising the cases to this final shape. Ms. Lorna Balina contributed with her professional editing expertise for the project.

The success of the pilot seminar in Manila owes a great deal to the professionalism of the AIM team headed by Ms. Marvee Bonoan in organizing the seminar and the expertise and valuable inputs of the AIM professors who led the case discussions. We are also grateful to the resource speakers and experts who interacted with the participants.

In closing, I would like to extend my sincere gratitude to several individuals who worked hard throughout the entire project. Professor Buenaventura Canto provided the direction and professional advice in program design, delivery and case development. Prof. Canto and Ms Etsu Inaba went through all the cases a number of times to provide detailed and valuable suggestions to each author and put together the report synthesis. I would also like to acknowledge the continued support of the officers and staff at APEC Secretariat. Last, but not the least, I would like to express my deep appreciation to my IIST team, led by Ms Etsu Inaba and Ms Aki Kawanishi for their tireless efforts in managing and finalizing this project successfully. Without the cooperation of all these individuals, the project could not have come this far.

November 2010

Koichiro AKATSU

Project Overseer
Vice-President and Managing Director
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(Please note that the term "economy" is used to indicate APEC members, instead of "country" or "nation," as an APEC-accepted nomenclature.)

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Asia-Pacific
Economic Cooperation

Synthesis

Strategic Intellectual Asset Management for Emerging Enterprises

Capacity Building for Successful Entry To the Global Supply Chain

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Background

Strong intellectual property rights (IPR) protection and enforcement are recognized as important conditions for trade and investment liberalization and economic growth. APEC has endorsed new Model Guidelines under the APEC Anti-Counterfeiting and Piracy Initiative to inform citizens of the importance of IPR protection and enforcement, and to secure supply chains against counterfeit and pirated goods. Most of these efforts so far have been concentrated on public sector enforcement, in addition to some awareness raising campaigns targeting the consumers. APEC leaders called on its members to continue addressing the IPR protection and enforcement challenges in the region in close consultation with the private sector.

In the past, intellectual property issues tended to focus on the protection of established brands and technologies mainly owned by large corporations in developed economies against counterfeit products from developing economies. In recent years, because of the fast economic development in the APEC region, companies in the emerging economies and "emerging" small and medium scale enterprises (SMEs) in developed and developing economies have effectively utilized indigenous technologies and innovative designs to enter the global market place. However, their own unique products or processes are often without full intellectual property (IP) protection.

The strengths of these enterprises are not limited to their technologies alone. Other intangible assets that entrepreneurs and managers of these companies are usually not fully aware of contribute to their companies' competitiveness. It is generally accepted that intellectual assets represent a huge untapped "invisible capital" for SMEs.

With this as background, the project entitled "IPR Strategies for Emerging Enterprises – Capacity Building for Successful Entry to Global Supply Chain," under the auspices of the Asia-Pacific Economic Cooperation (APEC) Human Resources Development Working Group – Capacity Building Network (HRDWG-CBN) was developed with the following objectives:

First, the project sought to identify the issues and challenges of emerging enterprises in recognizing and maintaining their intellectual assets, and

Second, the project aimed to develop a prototype capacity building program and relevant training materials for the program.

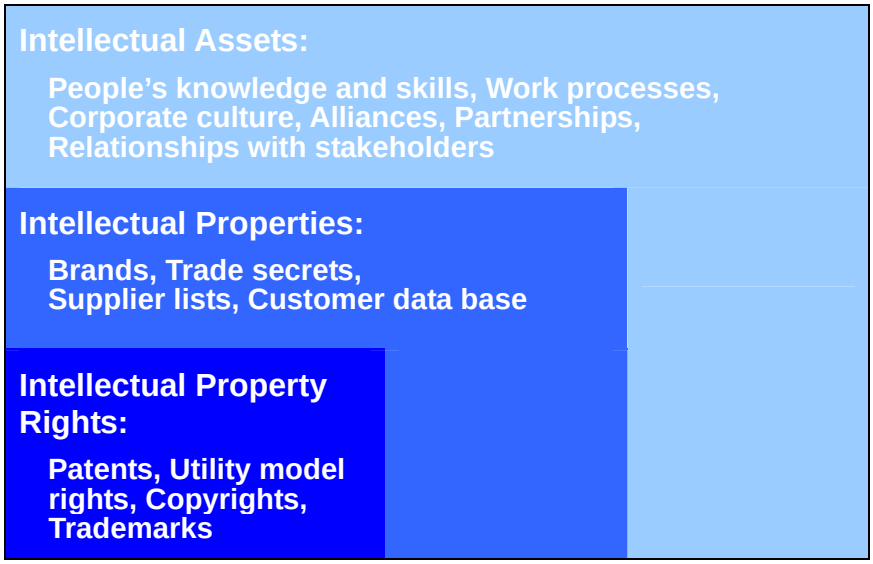
A total of 10 cases from eight APEC economies were developed. The issues highlighted in the cases varied, addressing the complexity of real-life challenges in intellectual asset management. Using the newly developed cases, a prototype capacity building program was designed and successfully tested in Manila, Philippines.

This paper synthesizes the lessons learned from the process of developing and teaching the cases, and the sharing of knowledge and experiences among the experts, trainers, owners and managers of SMEs and government officials throughout the implementation of this project.

Definition of Intellectual Assets for the Project

The project was originally conceived to address intellectual property rights (IPR) in emerging enterprises. However, at the initial experts' meeting it was decided that, given the interest of the target audience, it would be more appropriate to redefine the project scope to cover all kinds of intellectual assets, not just IPR.

The following diagram shows how intellectual assets, intellectual property, and intellectual property rights relate to one another.



(Adopted from *Keys to Intellectual Asset-Based Management Evaluation & Finance*, Ministry of Economy Trade and Industry, Japan 2009).

The project has thus defined a firm's "intellectual assets" or "intellectual capital" as all its "*resources without physical embodiment utilized to create future value*" (Vincent Leung**,** *Investing in Intellectual Capital*).

Intellectual assets can be classified into the following categories:

1) Human capital: the qualities of people's competencies, knowledge, experience, skills, commitment and resources. (Examples: Know-how, Education, Vocational Qualification, Work-related knowledge & competencies, Entrepreneurial Spirit, Innovativeness, Changeability, Proactive abilities – Guthrie, 2001, p.35).

2) Relational capital: the firm's external relationships with stakeholders – customers, partners, allies, suppliers, government contacts, banks, etc. (Examples: Brands, Customer Loyalty, Company Name, Distribution Channels, Business Collaborations, Licensing and Franchising Agreements, Favorable Contracts)

3) Structural capital: elements that harness and convert tacit knowledge into explicit knowledge, including intellectual property, organizational knowledge and processes, control and information systems, etc. (Examples:

Patents, Copyrights, Trademarks, Corporate Philosophy & Culture, Business Processes, Management & Information Systems, Networking Systems, Financial Relations)

The following table further describes and lists specific examples in each category:

Table 1. Categories of Intellectual Assets

Categories	Meaning	Specific Examples
Human Capital	**Valuable knowledge assets held in the heads of the enterprise's staff and available for use to create wealth for the enterprise**	• **Professional competencies** • **Work experience** • **Motivation and behavior** • **Expertise arising from academic and pre-employment study and work experience** • **Effective teamwork within small groups, enhanced by regular team-building efforts** • **Good staff communication skills**
Relational Capital	**Value-creating relationships**	• **Relationship with shareholders** • **Relationship with suppliers** • **Convenience of retail outlet** • **Relationship with professional and regulatory organizations** • **Government relations** • **Customer support group** • **Cooperative management and worker relations**
Structural Capital	**Systems and practices of the enterprise that add value and create wealth for the enterprise**	• **Quality control system** • **Financial control system** • **Registered trademarks and designs** • **Training programs** • **Work manual** • **Rule-based incentive scheme system** • **Registered IP rights** • **Customer database** • **Software management system**

(Diagram adapted and modified from *Put Your Enterprise Knowledge To Work: A Guide to Intellectual Capital Management:* Intellectual Capital Management Consultancy Programme, March 2009 Hong Kong, China.)

Framework for Strategic Intellectual Assets Management: Key Challenges, Tasks, and Core Competencies

A Framework for Strategic Intellectual Asset Management (SIAM) was developed based on discussions at the initial meeting of the experts, analysis of the issues, challenges and practices of companies in the cases written for the project, as well as ideas drawn from the SIAM Seminar held on 1 - 2 September 2010 in Manila. The purpose of the SIAM Framework is to guide SMEs, especially those entering the global supply chain, in leveraging their intellectual assets for long-term growth and profits.

The SIAM framework covers: 1) the major issues and challenges SMEs need to address; 2) the "cycle of tasks they need to perform well; and 3) the core capabilities they need to build in order to manage their IAs strategically and derive maximum value and competitive advantage from such assets.

1. The Foundation – A Clear Business Strategy

SIAM is based on a clear definition and understanding of the firm's business strategy, especially the firm's primary customers and its unique selling or value proposition. The value of intellectual or intangible assets is a function of how much the IA contributes to the creation or delivery of the firm's unique selling proposition. The more the firm's unique selling proposition depends on an intellectual asset, the more strategically valuable that asset is.

2. Identify, Analyze and Report Intellectual Assets

This requires an understanding of intangible, intellectual assets and its various types (beyond intellectual property rights) so the firm can list, classify, assign weights or ratings (based on the IA's importance as a driver of the firm's strategy), and keep a record or inventory of the intellectual assets for reporting to creditors, investors and other stakeholders.

3. Value Intellectual Assets

This involves identifying and evaluating the firm's options for obtaining or creating economic or financial value from its intellectual asset/s. It also requires an understanding and application of the various methods or approaches for valuing a firm's intellectual asset/s.

4. Protect Intellectual Assets

SMEs must also be able to identify, analyze and manage the risk/s their intellectual assets are exposed to. They must also know how best to protect these intellectual assets legally (e.g., through patents, copyrights, trade marks, etc.) and through other means.

5. Leverage Intellectual Assets for Strategic Advantage

Probably the most important management challenge for SMEs is aligning IA with the firm's business strategy and leveraging a specific intellectual asset or mix of assets to establish and sustain a unique competitive position for long-term

growth and profits.

Just as important are the tasks of measuring the firm's performance in leveraging its IAs for strategic advantage as well as continuously investing in innovation and the development of intellectual assets to ensure sustainability.

SIAM Issues and Challenges Highlighted in the Cases

Ten cases were developed under this project. The cases present real-life intellectual asset management situations and the various strategic issues and challenges faced by the entrepreneurs and managers. They were written to serve as teaching materials for discussion in a capacity building program for SMEs on Strategic Management of Intellectual Assets.

Presented below are brief abstracts of the cases developed under the project.

Magna International, Inc (Canada)

This case is on Magna International Inc., a leading auto parts and assembly company in Canada with manufacturing facilities in 25 economies. Magna became a leader in the design of automotive parts and manufacturing processes. Innovation was a core corporate strategy and intellectual property protection was an important part of its management strategy. Its unique relationship with the large automobile manufacturers required Magna to extend licenses to its competitors. Magna however enjoyed an advantage in tacit knowledge of the production techniques involved.

The case highlights an equally important form of intellectual property which is trade secrets, a broad range of knowledge within the corporation which has a degree of value, however small. Managing trade secrets involves maintaining confidentiality and imposing obligations on employees who may transfer to a competitor. The case describes some of the practices Magna utilizes for protecting its intellectual assets, particularly in doing business outside of its own culture and society where the legal process and attitudes toward enforcement are different. The case can generate discussion on a company's option to exercise its legal rights in view of costs and benefits.

Nanhainan Co. Ltd (China)

The case on Nanhainan Co. Ltd, an emerging Chinese private enterprise, illustrates how the company entered the international supply chain by creating and managing intellectual assets, and how it had developed its core competencies and pursued sustainable development in the past two decades. Nanhainan's growth was closely related to the economic environment in China while its international operations were largely influenced by conditions in the international market. Nanhainan's intellectual assets management became the main source of its core competencies in the midst of various business environments.

This case focuses on the intellectual assets management (IAM) capacity building of Nanhainan. It highlights the company's experience in managing its

intellectual assets and describes the various elements of its IAM system. The case also illustrates how IAM becomes the basis of an effective enterprise development strategy and enhances the business prospects of an enterprise.

Hong Kong Institute of High Performance Computing (Hong Kong, China)

The Government of Hong Kong Special Administrative Region, in collaboration with the business community, launched an "Intellectual Capital Management (ICM) Consultancy Programme" in March 2009. The programme offered free consultancy services to enterprises, especially small and medium enterprises (SMEs), to help them cultivate and manage their intangible assets for the long-term economic benefits of Hong Kong.

This case highlights how ICM had successfully inspired The Hong Kong Institute of High Performance Computing (HKHPC) to discover and commercialize its intellectual capital into a profit-making business, thus transforming HKHPC from a purely research oriented enterprise to a commercially viable one.

Previously, awareness of ICM was low in the Hong Kong business community. Like other entrepreneurs, Dr LAM Wai-kin, the founder of HKHPC, did not expect much from this free government consultancy programme. However, following several rounds of dialogue, self-assessment and hours of discussion with the two ICM consultants, Dr Lam Wai-kin was able to do a mapping of the intellectual capital and hidden value of HKHPC. This shifted his mindset on how to run HKHPC in a more efficient and sustainable manner.

Because the programme was a government initiative, the consultants were allowed to provide only strategic options but not strategic or legal advice. HKHPC showed a great deal of entrepreneurial spirit in searching for ways to reach its business goal as it uncovered the hidden intangibles of the enterprise. The founder, however, had foreseen the difficulty and the bumpy road ahead for a small enterprise like HKHPC as it pursued its aim to play a significant role in the arena of supercomputing.

PT Apora Indusma (Indonesia)

As a leading provider of space-frame products that had delivered projects to more than 24 economies around the world in the past two decades, it can be said that APORA was already good at identifying or creating intellectual properties (IP). The fact that it had registered patents in China, Chinese Taipei and Indonesia indicated that the entrepreneur knew how to protect its intellectual properties.

Like many other companies, however, APORA had not fully realized that intellectual assets (IA) went beyond IP. The entrepreneur was not aware of the sources and the most strategic use of the company's intellectual assets as well as what could be done to mitigate any potential risks of the current system and make the business more sustainable. APORA's immediate challenge was how to leverage its IP rights to win more business. By securing patents for the invention, APORA expected to attract more customers, command price premium, drive sales volumes, enable clear product differentiation and positioning and hopefully reduce marketing

cost. But things did not automatically turn out that way. The case enables the reader to identify the reasons for the lackluster growth of the enterprise and to generate ideas for mitigating potential risks that it faces.

Tanikei Manufacturing Ltd (Japan)

In the case, Mr Taniuchi, the president of Tanikei Manufacturing Ltd in Japan and the inventor of a safe can top, considered the best way to maximize the value of his intellectual properties and to ensure that his technology would be widely used globally.

Mr Taniuchi had to determine the terms with which to negotiate with Heinz, a US giant food processing company that was very interested in his can top technology. He obtained an IP professional's advice on different valuation methods to evaluate his IPs. While he tried to use the three valuation methods (the cost approach, the market approach and the income approach), he also had to consider other elements before he could sit at the negotiation table. The case can be used to generate other issues and considerations for negotiation and various ways to ensure that the interests of the inventor are protected.

Malaysia Plastic Sdn Bhd (Malaysia)

Malaysia Plastic, a well-established and privately owned polypropylene woven bag and fabric manufacturer in Malaysia, was facing a challenging time when its profits deteriorated due to the fierce competition from local as well as regional manufacturers brought about by the liberalization of the regional trade. The new Managing Director called on his middle managers to formulate a plan to turn around the company and to build up its capability for future growth and sustainability.

The case illustrates the business environment, competition and technologies in the domestic and regional markets. In formulating the business strategies, various intellectual assets of the company have to be taken into consideration.

Icebreaker Limited (New Zealand)

This case presents the experience of Icebreaker Ltd, a New Zealand-based merino wool outdoor garment manufacturer. With design offices in Portland, Oregon, USA and factories both in Shanghai, China and North Carolina, USA, Icebreaker had successfully integrated its supply chain from the sheep farms in the New Zealand Southern Alps to their distributors in over 30 economies.

The process of Icebreaker's intellectual assets identification could be categorized into two distinct phases. First was the company's adoption of an innovative approach and second was the careful selection of its business partners throughout the supply chain by means of the so-called "narrow and deep philosophy," which effectively helped amplify its innovative approach.

Besides providing an analytical description of the two phases, the case describes how Icebreaker's explicit ethical commitments have been incorporated into its processes throughout the supply chain. It also analyses the challenges that Icebreaker's growth had brought to the company. The case can be used to illustrate

the strategic decision-making process of a global enterprise.

Pictor Limited – Taking Diagnostics to the World (A) (New Zealand)

Drs Sarita and Anand Kumble established Pictor Ltd to commercialize the technology they discovered, which miniaturizes and multiplexes the commonly used enzyme-linked immunosorbent assay (ELISA) technology for laboratory tests. The technology would enable the use of diagnostic tools even in remote areas or in the developing economies at much reduced costs.

Dr Sarita Kumble had to make some key decisions on three major aspects: making current product development a priority; raising sufficient funds to take Pictor to a new level of manufacturing; and recognizing that the company would depend largely on forthcoming contracts and the IA valuation to raise those funds

The case describes the point of differentiation of Pictor technology, which allows identification of the intellectual property rights to be protected legally. It further discusses the course of action taken in the context of international intellectual property protection and the associated processes and costs. Lastly, the case discusses the reasons for attempting to assess the value of the IA from both a commercialization perspective and the eventual sale of the company.

The case deals with one discrete aspect of biotech company development. It is suitable for use in asset protection, commercialization of technology and preparing the technology for sale.

Pictor Limited – Taking Diagnostics to the World (B) (New Zealand)

This is the sequel to case (A), where the management had decided to do their own manufacturing of the products. The assessment of the amount required to pursue their strategy and their evaluation of different funding sources are presented in the case. The case can be used for assessing the funding sources and the potential benefits and constraints of the funding decision.

Universal eXchange, Inc (Chinese Taipei)

This case addresses the intellectual assets (IA) management of a company that established financing services on the Internet. It emphasizes the measurement of IA from a strategic perspective to cope with the development of an emerging enterprise.

Financing usually occurred with business transactions, and credits and loans among the business enterprises and financial institutions had to be managed. UXB2B launched its unique business model in the first decade and intended to grow its business to the next level.

A review of the IA of the company was conducted in which the financial, customer, human, process and innovation aspects were included. It appears that the UXB2B successfully emerged as a financing platform during its first phase. However, applying such a model for a new set of customers required a leading player as the center of trading activities. It was apparent that large corporations eligible to be

the center preferred to have their own system and associated intranet for trading purposes, and might be less likely to participate in an independent platform to serve such needs. The IA evaluation of UXB2B took place while the company was considering leaping to the next business scope. How to sustain the company's development with an IA strategy is the main consideration of the top management in planning its next move.

The particular issues, knowledge and skills in the SIAM Framework covered by the cases are indicated in Table 2 below.

Table 2. SIAM CASES – ISSUES, KNOWLEDGE & SKILLS FOCUS

Economy	Case Titles	The Foundation -Formulating/ Clarifying Business Strategy	Identifying, Analyzing & Reporting Intellectual Assets	Valuing Intellectual Assets	Protecting Intellectual Assets	Leveraging Intellectual Assets for Strategic Advantage
Canada	**Magna International, Inc.**	x			x	x
China	**Nanhainan Co. Ltd**	x	x			x
Hong Kong, China	**Hong Kong Institute of HPC**	x	x			x
Indonesia	**PT Apora Indusma**	x	x		x	x
Japan	**Tanikei Manufacturing Ltd**			x	x	x
Malaysia	**Malaysia Plastic Sdn Bhd**	x	x			x
New Zealand	**Icebreaker Limited**	x	x		x	x
New Zealand	**Pictor Limited – Taking Diagnostics to the World (A)**	x	x	x	x	
New Zealand	**Pictor Limited – Taking Diagnostics to the World (B)**	x		x		
Chinese Taipei	**Universal eXchange, Inc.**	x	x		x	x

Observations and Insights on Strategic Management of Intellectual Assets by SMEs

The following observations and insights on strategic IA management by SMEs were drawn from analyses, presentations and discussions of the cases by participants and experts during the seminar on SIAM held at AIM, Manila. These observations and insights are presented following the SIAM Framework described earlier.

Identifying, Analyzing, and Reporting Intellectual Assets

- Many entrepreneurs and SME owner-managers are not aware of intellectual assets and do not appreciate their value to the business. As a result, they do not manage their IA strategically or protect them properly.
- The value of intellectual or hidden assets typically 100% to 600% of the value of visible or tangible assets. There needs to be greater awareness of how much more economic value can be created if companies (and even economies) harnessed the power of their intellectual assets more fully and managed these for strategic advantage.
- Ideas need to be transformed into IAs before they can be used to create value.
- Intellectual assets go beyond IPR (i.e., patents, trademarks, and copyrights) and other "structural" IAs; intellectual assets also include "human" and "relational" assets (e.g., organization's tacit knowledge, work processes, and partnerships and alliances).
- Reporting various types of intellectual assets (to supplement financial assets) has enabled SMEs in Hong Kong to gain more access to financing and better, cheaper terms from banks and investors. (CK So)
- Generating information on the firm's intellectual assets and sharing this with stakeholders often result in a higher valuation of the business.

Valuing IAs

- The various valuation methods result in different numbers. For methods that involve estimating future cash flows, the value of the estimate depends on the reasonableness of the assumptions and soundness of the manager's judgment.
- In the absence of a widely known market price, the price or value of an intellectual asset will ultimately depend on the circumstances and alternatives of the buyer and seller.
- It was observed that buyers (particularly Chinese) will readily pay for physical or tangible products, but not for intangible/intellectual assets. (SJ Liu)
- The challenge may be how to transform intangible intellectual asses into physical or tangible products to increase or better realize their value (e.g., PT Apora's design software, packaged knowledge products, etc.)
- The discussion on methods for valuing of intellectual assets (Tanikei case) was of great interest to participants. Valuation of IA was deemed to be important and challenging. More sessions should be devoted to this topic in future training programs.

Protecting IAs

- Most emerging, small and medium enterprises lack the experience, know-how and resources to protect their intellectual assets.
- Identifying what risks their IAs are exposed to, what IAs to protect and how to do so legally and when to take legal action require a good understanding of the various costs involved.

- Professional advice is critical in determining the best way to protect intellectual assets.
- Continuous innovation is the best and perhaps the only way to protect IA in the long run. IAs tend to become obsolete with time as well as with technological and environmental change and competition. IPR protection is not good enough by itself.
- Innovation often involves building on simple technologies that are well known.
- IPR fundamentally means the "right to exclude others from access or use of the asset" and the "right to go to court."
- Only a few people make money from IPR lawsuits (except for the lawyers). Some 90% of all lawsuits involving IPR get resolved out of court. (Charles M. Gastle)
- Tacit knowledge or "learning by doing" is an intellectual asset that can be protected as a "trade secret." The reason Magna International agreed to develop the Ford electric car even if they would lose money on it was the expectation of getting the future contracts. Non-compete agreements (for x years) are a good idea. (Charles M. Gastle)

Leveraging IAs for Strategic Advantage

- Intellectual assets are important, not only because of their commercial or market value (which is often much bigger than physical or financial assets), but more importantly, because of their strategic value. IAs drive the company's growth and profits by enabling it to create a superior competitive position and deliver unique value to its target customers.
- Different types and mixes of IAs are needed at various stages of the company's life cycle. For example, different kinds of human capital are needed for the organizational change processes that occur in the transition between the various stages. (This could be gleaned from the Icebreaker, UXB2B, and Malaysia Plastic cases).
- SMEs should also evaluate their performance in managing intellectual assets. Measures of IA management performance include: 1) input or "lead" measures, e.g., investments in R&D, skills training, brands, patents, etc. (HKHPC case) and 2) output or "lag" measures, e.g., revenues earned, contracts booked. (UXB2B case)
- Changes in strategy may require the firm to build on, acquire, or rely on a different type or mix of intellectual asset/s. For example, the decision of Malaysia Plastic company to shift from one type of product line to another or to change from selling products to selling solutions, required the company to rely more on its "relational" capital than its "human" capital.

Pilot Training Program on SIAM

The basic topics and tentative design of a training program for SMEs were developed at the initial meeting of experts held prior to the case writing activity. The initial design was based on the training situation in the APEC economies represented at the meeting and considered the resources of the target audience. Unlike large corporations, SMEs and emerging enterprises had limited financial and human resources.

The program had to be interesting and worthwhile enough to convince entrepreneurs and SME owner-managers to attend.

Special emphasis was also placed on the value of the program for APEC. The program would not only raise awareness of key IAM issues and problems, but also cultivate essential skills, provide alternative tools and techniques, and inculcate the right values and attitudes toward intellectual assets, particularly with regard to intellectual property and intellectual property rights.

After the cases and accompanying teaching notes had been written, the initial design of the SIAM training program was modified and transformed into a 2-day pilot training program for SMEs, named "Seminar on Strategic Intellectual Asset Management: Discover, Protect and Profit from your Firm's Invisible Assets."

The pilot seminar was also to be used to test and improve the new cases on SIAM written for the project.

The pilot seminar was conducted on 1 - 2 Sept. 2010 at the Asian Institute of Management in Manila, Philippines with 32 participants including 14 females: 15 from SMEs, 13 from government agencies, 3 from the academe, and 1 from an NGO.

The purpose, process and benefits of the pilot seminar were as follows:

LEARNING GOALS & OBJECTIVES

In line with the APEC's goal of building the capacity of SMEs in "emerging" economies to successfully enter the global supply chain, the pilot seminar aimed to develop leaders among entrepreneurs, owners and managers of SMEs who could better appreciate the importance of intellectual assets and create, protect and manage these intangible assets for strategic advantage. This would enable them to ensure a fair return on their intellectual asset investments and collateralize intellectual assets effectively.

In line with APEC's goals, the pilot seminar was designed to provide the following competencies or learning outcomes among the participants. At the close of the seminar, it was expected that the participants would be able to:

1. Identify intellectual assets and understand their strategic importance
2. Estimate the value of these intellectual assets
3. Learn how to protect the firm's intellectual assets
4. Generate superior growth, profits and competitive advantage with their intellectual assets.

SEMINAR PROGRAM & ROAD MAP

The pilot seminar was designed around the "cycle" of management tasks described in the SIAM Framework: 1) Identify, Analyze & Report, 2) Value, 3) Protect, and 4) Leverage Intellectual Assets for Strategic Advantage. The seminar took the participants on a journey through the various areas of knowledge and skills in intellectual asset management in "building block" fashion, albeit very rapidly, given the time constraints the group had to work with (See Exhibit 1).

Eight of the 10 cases on SIAM were presented and discussed during the pilot seminar. The wide variety of intellectual asset management issues, settings, and challenges presented by the cases contributed greatly to the high level of interest and learning experienced and expressed by the participants and facilitators.

FEEDBACK FROM PARTICIPANTS

- The participants said that they gained a clearer understanding and awareness of the various types of intellectual assets and their importance. Many said they were eager to use this knowledge to make an inventory of the intellectual assets in their firms as soon as possible.
- They also gained a greater awareness of how intellectual assets could be valued. However, most of them also wanted more exercises and specific training on valuation; they said more time should be allocated to IA measurement and evaluation.
- Case discussions were rated most effective in making the lessons clear and relevant to the participants' own concerns. Most of the participants asked for more time to prepare and digest the cases however.
- They liked the mix of "excellent" experts and facilitators.
- They recommended that the seminar be offered again soon and more frequently. They also said that follow-up seminars/training programs should be considered.
- Participants were also interested in the potential use of documentation and reporting of intellectual assets for financial evaluation.
- Participating experts were keen on replicating the pilot seminar design in their own economies or regions.

LESSONS LEARNED

- The APEC experts, with their different areas of expertise and geographic origins, contributed much to the rich variety of perspectives and ideas in the seminar discussions.
- The case discussion methodology made learning in the pilot seminar richer and more interesting as it encouraged participation and sharing of ideas among the participants.
- Cases presented real-life issues and challenges in IA management, making the learning relevant and more exciting.
- Skilful handling of discussions was an important element in the program.
- The 2-day format of the seminar was adequate for an introduction to the topic - to elicit the interest and appreciation of entrepreneurs and SME owner-managers in IA management.
- More in-depth, follow-up programs should be offered to enable the participants to actually apply what they learned in the 2-day introductory course and produce real value-added for their businesses and economies.

The Way Forward

Based on the experience of implementing the IAM project, which drew on the resources, knowledge base and diversity within APEC, the experts involved recommend

the following future actions for consideration by APEC and its members:

Replication of the Pilot Seminar

The pilot seminar and case teaching materials should be replicated and disseminated to other members of the APEC community as an introductory course or training program on IAM. Feedback on the pilot seminar has indicated that the program design, methodology, contents, case materials and duration were effective in raising the awareness and interest of the entrepreneur-managers on SIAM. The SIAM Framework was also proven to be easily understood and applied by SME managers and entrepreneurs.

In order to carry out replication of the pilot program and dissemination of the case teaching materials effectively, it is recommended that the APEC community support these efforts. The capacity building program may be replicated in cooperation with the Intellectual Property Experts Group (IPEG) and SME Working Group within APEC as well as with other organizations outside APEC, such as government agencies, NGOs and private organizations/groups engaged in SME capacity building and development.

Development of a Next-Level Training Program on IAM

There should also be an effort to develop a more in-depth, application-oriented training program on SIAM, with special attention devoted to Valuation, Commercialization, and Protection of IAs. Likewise, training materials should be expanded to cover other types of intellectual assets that were not covered in the project, such as brands and trademarks, industrial designs, and indigenous technologies (e.g., herbal medicine, nutrition, and others). This more advanced training program can be provided to SMEs that have already started IAM in their respective companies.

Development of SIAM Toolkit and Other Documentation Tools for IAM

The expressed interest of participants in the pilot seminar to do hands-on documentation and reporting of IAs in their own enterprises with some supervision should be encouraged and supported. For a start, a SIAM Toolkit for SMEs should be developed. This Toolkit can help guide SMEs through the process of identification and documentation of their IAs, as well as assist them in managing their IAs effectively in a sustainable manner.

Setting up Information Sharing on IAM

To support future IAM development efforts, it will be useful to have an information sharing platform for collecting and disseminating knowledge links on a website. The initiative of IPEG called “iPac” may be tapped for this purpose. Useful information may include current guidelines, contract forms and terminologies, consultancy services, government assistance, and advanced training programs on IAM.

Exhibit 1

APEC Pilot Seminar on Strategic Intellectual Asset Management

Day 1

Part I - Discovering and Unleashing the Value of Intellectual Assets

Introduction and Orientation

Intellectual Asset-Driven Supply Chain and Business Model
Small Group Discussion — Case: Ice Breaker
Plenary Case Discussion: Ice Breaker

Framework for Intellectual Asset Management
Presentation-Discussion — Case: Hong Kong Institute of High Performance Computing

Part II – Valuing and Protecting Intellectual Assets

Estimating the Value of Intellectual Assets
Small Group Discussion — Case: Tanikei Manufacturing Ltd
Plenary Case Discussion: Tanikei Manufacturing Ltd

Commercializing Intellectual Assets
Presentation-Discussion — Case: Pictor (A)

Protecting Intellectual Assets
Presentation-Discussion — Case: Magna International

Wrap-up and Assignment for Day 2

Day 2

Review-Preview

Part III – Leveraging Intellectual Assets for Growth & Profits

Strategic Management of Intellectual Assets
Small Group Discussion — Case: Malaysia Plastic Sdn. Bhd.
Plenary Case Discussion: Malaysia Plastic Sdn. Bhd.

Evaluating the Strategic Use of Intellectual Assets
Presentation-Discussion — Case: UXB2B

Sustaining Strategic Advantage from Intellectual Assets
Small Group Discussion — Case: PT Apora Indusma
Plenary Case Discussion: PT Apora Indusma

Wrap-up and Assessment

Appendix

References and Resources

A selected list of resources, useful websites, and references are included below:

Intellectual Capital Statement, Hong Kong: 2009
http://www.ipd.gov.hk/eng/pub_press/publications/IC_Statement.pdf

Various reports and guidelines, Japan
http://www.meti.go.jp/policy/intellectual_assets/english.html

Guidelines for Survey and Research Report on Intellectual Asset-Based Finance
http://www.meti.go.jp/policy/intellectual_assets/pdf/Survey%20and%20Research%20Report%20on%20Intellectual%20Asset-Based%20Finance.pdf

Intellectual Asset-Based Management Manual
http://www.meti.go.jp/policy/intellectual_assets/pdf/ManualE-2.pdf

Why intellectual asset management is crucial
http://www.meti.go.jp/policy/intellectual_assets/pdf/Japan%20METI.pdf

Perspective of Intellectual Assets Based Management Reports and Empirical Analysis and Research of Disclosure
http://www.meti.go.jp/policy/intellectual_assets/pdf/report-E.pdf

Guidelines for Disclosure of Intellectual Assets Based Management
http://www.meti.go.jp/policy/intellectual_assets/pdf/GuidelineforIAM.pdf

List of Intellectual Capital Reports available from the internet

Finland ¨C Creadesign Oy ¨C IC Report 2005
http://nhki.si.is/media/nhki/Creadesign_IC.pdf

Denmark - Oracle - IC Report - 2005
http://nhki.si.is/media/nhki/Oracle_IC.pdf

CMM IC Report ¨C 2002 to 2007
http://www.cmm.ki.se/omCMM/eng/reports.htm

Oesterreichische Nationalbank ¨C 2003 to 2008
http://www.oenb.at/en/presse_pub/period_pub/unternehmen/wissensbilanz/wissensbilanz.jsp

Germany - MFG - AnnualReport_2007 - ICS
http://www.mfg-innovation.com/fileadmin/_mfginno/downloads/MFG-AnnualReport_2007.pdf

Belgium - Cowi - IC Report 2008
http://www.cowi.com/menu/publications/cowisownmedia/annualreport2008/Documents/Intellectualcapitalreport.pdf

Sri Lanka - People Leasing Co Ltd - HC Report 2008
http://www.plc.lk/pdf/annual_report2008/human_capital_management.pdf

Relevant Harvard Business School Notes and Cases

Product #9-801-192 Note
Intellectual Asset Valuation

Product #9-704-493 Note
Intellectual Property and Strategy

Product #9-802-161 Note
Legal Aspects of Entrepreneurship: A Conceptual Framework

Product #9-309-024 Note
Note on Trade Secrets and Covenants not to Compete: Comparison of Law in the United States and the European Union

Product #9-396-412 Case
Skandia AFS: Developing Intellectual Capital Globally

Product #9-610-085 Case
Carrot or Stick? Getting Paid for Innovation at Tessera Technologies

Product #9-803-095 Case
Sheila Mason & Craig Shepherd

Product #9-309-112 Case
The DiagnoFirst Opportunity

Product #9-603-064 Case
Collabrys, Inc. (A)--The Evolution of a Startup

Product #9-803-063 Case
Dr. John's Products Ltd

Product #9-610-057 Case
From Imitation to Innovation: Zongshen Industrial Group

Asia-Pacific
Economic Cooperation

Magna International, Inc
Canada

The Challenge of Integration into Global Supply Chains

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The case was developed with the cooperation of Magna International solely for educational purposes as a contribution to the project entitled "IPR Strategies for Emerging Enterprises — Capacity Building for Successful Entry to Global Supply Chain," conducted under the auspices of the Asia-Pacific Economic Cooperation (APEC). The case is neither designed nor intended to illustrate the correct or incorrect management of the situation or issues contained in the case.

Introduction

In 2009 there was a limited number of major automobile manufacturers (OEMs) such as Ford, General Motors and Toyota, and the competition for their business was intense among the major autoparts suppliers. Innovation in the design of automotive parts and manufacturing processes was crucial to securing new contracts as automobile models changed and technology evolved. Innovation and design also played an important role in achieving the price milestones established in the contracts that existed "at will" with the major OEMs, which meant that they were subject to cancellation at any time. An industry marked by constant innovation required special corporate processes to recognize an innovative idea that had value and to commercialize it.

Magna International Inc.[2] (Magna) was the leading automobile parts manufacturer in North America with sales exceeding $20 billion. It had worldwide operations, and a substantial and growing presence in Southeast Asia. Innovation and the management of its intellectual assets were at the heart of Magna's corporate strategy; it had developed a culture intended to achieve it.

Nevertheless, Magna did not define itself as a technology corporation because it did not patent each and every product, attribute, or manufacturing process that its employees developed. It sought patents only for those technologies related to its core business operations.

History of the Company[3]

The story of Magna was that of its founder, Frank Stronach. Mr Stronach was born in Austria and immigrated to Canada in 1954. In 1957 he established Multimatic Investments Limited, which was a tool and die company (with annual sales of $13,000), expanding into the production of automotive parts in 1960 with its first contract from General Motors. By 1968 its sales had grown to $2.6 million. From 1976 to 1979, Magna implemented a product diversification strategy, organizing its various divisions into product groups. By 1979 its annual sales had grown to $108.3 million.

In the 1980s Magna introduced many automotive innovations, such as co-developing the integrated child seat, which has been recognized by the Smithsonian Institute as one of the great inventions of the 1980s. By 1989 its sales had grown to $1.2 billion.

In the 1990s Magna expanded into Europe, acquiring a number of automotive systems suppliers. It acquired Steyr-Daimler-Puch, one of the world's leading automotive technology and engineering companies with complete vehicle assembly capabilities. Magna also perfected and introduced into its manufacturing processes a form of high-pressure hydroforming technology, which used water pressure to bend and form metal. By 1999 Magna's sales had reached $9.3 billion; it was named the world's top auto parts company by Forbes Magazine.

In the following decade, Magna evolved rapidly, expanding to $23.7 billion in annual sales. Its growth was spurred by the formation of the Magna Steyr Group, which according to Magna, was the "world's leading supplier of niche vehicle assembly and concept development." Magna acquired the worldwide operations of New Venture Gear,

which specialized in drivetrain products, as part of a new operating group, Magna Powertrain. In 2006 Magna also acquired CTS, Porsche's car top systems subsidary and added its first two plants on the African continent. In 2008 it announced the development of an electric vehicle. In 2009 Magna reached an agreement with General Motors to purchase its Opel manufacturing division. GM cancelled the transaction after it went through its bankruptcy process.[4]

Distribution of its International Operations

As of September 2009 Magna had 242 manufacturing operations and 86 product development engineering and sales centers in 25 economies on five continents. It had a number of product divisions including body and chassis, exterior, closure, interior, seating, vision, electronics, powertrain, and roof systems. It also had complete vehicle engineering and assembly operations for automobiles such as the BMW X3, the Mercedes-Benz G-Class, the Saab 9-3 Convertible, and the non-North American versions of the Jeep Grand Cherokee, the Jeep Commander and the Chrysler 300. Magna's customers included companies such as Acura, Aston Martin, Bugatti, Cadillac, Lincoln, Shanghai Automotive Industry Corp. and Volvo. In fact, Magna had 72 different customers, representing a wide range of automobile manufacturers from all over the world.[5]

Magna's main operations were in North America, with 38, 100 employees, 123 manufacturing operations and 29 product development, engineering and sales centers. In Europe, it had 28,550 employees in 94 manufacturing facilities and 38 product development, engineering and sales centers. The highest concentration was in Germany, with 35 manufacturing operations, and 15 product development, engineering and sales centers.

Magna had a strong and growing presence in Southeast Asia, with 5,140 employees. It had a total of 15 manufacturing operations in China, two in India, one in Japan, and four in Korea. It also had five Development, Engineering and Sales Centers in China, four in India, four in Japan, two in Korea, and one in Thailand.[6]

Innovation as a Corporate Strategy

The process of innovation is, by its very nature, chaotic in the sense that it is subject to a sensitive dependence on initial conditions. This means that small changes in the innovative process can have significant, unforeseeable consequences. For example, a highly valuable innovation might be missed because an engineer might not recognize its value. Although there is value in an idea, the true asset in the innovation process is the ability to recognize an idea's value and to sustain the innovation cycle long enough to achieve commercialization. According to Kenneth Arrow, "it is difficult, if not impossible, to predict the course of innovation." He said:

> We are dealing with a complex system in which the outcome is not easily predictable. Indeed, predictions in the whole modern history of the information business have been very poor. *AT&T* did not realize the consequences to it of the development of the transistor, which eventually destroyed its monopoly. *IBM* was hesitant about entering the electronic computer industry altogether and failed to

> understand the potential of PCs; otherwise, it would have made a very different contract with Microsoft. *Xerox* developed the basic ideas that developed into Apple and took no economic advantage of them. This unpredictability is precisely what would be expected of a complex self-organizing dynamic system. But it also means that the government is not in a position to predict either, and interference to pick the winner of this dynamic process is likely to be counterproductive.[7]

Magna was built on a culture of continuous innovation. This commitment was reflected in its philosophy identified as "Fair Enterprise" set out in its corporate constitution.[8] It states that "Magna will allocate a minimum of seven percent of its before tax profit for research and development to ensure its long-term viability." In 2007 research and development spending amounted to $725.5 million.[9]

Magna was able to create a corporate culture of innovation in no small part by allocating seven percent of its income before taxes to innovative activity. It supported this spending with programs intended to "collect, evaluate and prioritize ideas for more independent projects, taking the corporate strategy and other factors into consideration."[10] Magna collected ideas from the staff which were then reviewed by what might be considered an internal innovation receptor, an interdisciplinary body of experts. A preliminary study was undertaken of the most promising ideas and if successful, the business case for the innovative idea was prepared. A market survey was done to gauge the consumer's point of view and the technical feasibility of the concept was evaluated. An idea that made it this far through the innovation process was then analyzed in depth as to its technical feasibility; this involved assessing the business model in terms of the number of units likely to be sold, run time and production location. A development strategy for the innovation was then determined.

Magna also engaged in innovative activity through research cooperation with scientific partners, particularly in the European Union. These activities included research into hydrogen storage systems for automotive application, high-density power electronics for hybrid electric vehicle powertrains, fuel cell hybrid vehicle systems and highly integrated combustion electric-powertrain systems.[11] Magna also had a series of research and development relationships with a number of partners.[12]

Other sources of innovative activity were the co-development agreements between Magna and the OEMs. These were detailed agreements allowing Magna and manufacturers such as Chrysler to develop particular technologies. One example was the powered lift on the rear hatch door of the Chrysler minivan. The challenge of this technology was to ensure that it would operate over a period of years in harsh weather conditions, while closing firmly and performing effectively with the required level of safety. The design also had to manage production in a way that made the cost competitive. Once Magna had built a prototype, it was presented to Chrysler and the technology was then co-developed, with Magna given the initial contract to manufacture the parts in production.

Magna's need to constantly innovate was due to the negotiating power of the OEMs. A parts supplier like Magna might have had 25% to 30% of its business with a single OEM such as Ford, General Motors or BMW. A specific part might be produced for a period of five years. The process started with a Request for Quote ("RFQ") which was sent out to competitive parts manufacturers. The OEMs always wanted more than one source for the part and so the contract was split between at least two parts suppliers. The competition between the part suppliers was fierce with margins being very low, even in

the first year of production. The OEM contracts generally required that the price of the part be reduced from three to five percent each year of the contract. This forced Magna to focus entirely on process and manufacturing improvements to ensure that the reduction in price was met.

Apart from the process improvement, Magna also attempted to keep abreast of new technology and, where possible, take a leadership role. As indicated above, one of the innovations that Magna introduced was the perfection of "hydro-forming" part fabrication in the mid-1980s. Automobile parts must be fashioned out of sheets of metal. The traditional way to do so was through the use of large stamping machines to punch out the part, but this process did not meet the exacting standards of modern part manufacturing tolerances. Magna was able to perfect the forming of automobile parts through processes involving pressurized water. This technology was one of the catalysts to the growth of Magna.

Some of the key technologies that Magna was developing related to hybrid and electric vehicles. Hybrid vehicles were of particular interest because of the projected near-term widespread adoption of the technology in the marketplace. "Think of getting highway mileage downtown – it is truly remarkable."[13] Magna was also pursuing a leadership position in electric automobiles and was producing a Ford electric car which was projected to sell only a relatively small number of vehicles over a period of five years. However, Magna hoped to break even on its investment in the project. The true return to Magna was the experience and know-how that could be used in the further development of electric automobiles.[14]

The Protection of Intellectual Property

With innovation being so important to its business, Magna had a well-developed intellectual property strategy in which the filing for patents was a crucial element in this strategy. However, Magna was not a technology company and did not look for, and patent every innovation that might qualify for such protection. IBM was a good example of a technology company, reaping more than $2 billion from its intellectual property portfolio. By contrast, Magna took a much more functional approach to the question of intellectual property protection. Magna patented those innovations that were important to its core business – the production of motor vehicle parts. It did not seek to patent innovations if they were not directly related to achieving greater efficiencies in meeting its clients' needs. While IBM might undertake basic scientific research, Magna undertook applied research which attempted to apply technology in the marketplace.

Magna held as many as 500 patents in Canada on various aspects of automobile technology.[15] Identifying innovations which should be patented was made by Magna's engineers who were involved in the innovation process and dedicated to ongoing improvement. The engineers provided reports justifying the allocation of limited resources and reporting on the successes achieved. The engineers or the legal department reviewing the engineering reports identified the technology to be patented. Once a decision had been made that the innovative technology was core to the business, patent applications were filed in those jurisdictions where the technology would be deployed in manufacturing processes. These included North America, Europe and the so-called BRIC economies (Brazil; Russia; India; and China). It was not economically feasible to patent each technology all over the world due to cost factors.

While Magna obtained patents in these various jurisidictions, it did not always mean that they could be enforced. In its 2009 Annual Information Form, Magna identified a material business risk that it faced involving the "difficulty in protecting intellectual property rights."[16] One way Magna discovered patent infringement was through the "Request for Quote" process issued by the OEM. The Request contained a detailed description of the automotive part that was the subject of the quotation. Each request was analyzed by one of Magna's engineers to find out if a competitor might be infringing Magna's patent, that is, if Magna held a patent over the technology embodied in the part. The competitor would be infringing Magna's patent if it was already manufacturing the part or began doing so in response to the quotation. If it appeared that a Magna patent was or would be infringed, the information was conveyed to the legal department after which Magna made the decision whether to commence an infringement lawsuit or to negotiate a voluntary license.

Magna's intellectual management strategy also involved guarding against infringing third party patents to avoid paying substantial damages. This represented a business risk for Magna. Therefore, as part of the innovation process, the scope of existing intellectual property rights in the field had to be reviewed.[17] This process was important because under the contracts negotiated with the OEMs, Magna was required to provide indemnities to pay for damages that might be awarded because of the supply of automotive parts that breached a third party patent.[18]

The challenge of managing the relationship between Magna and the OEMs impacted on the management of its intellectual property portfolio. The OEM sometimes forced Magna to license its technology to Magna's competitors because the OEM did not want to be dependent on one source of supply but to promote competition between suppliers for each automotive part. Hence, Magna was guaranteed a production volume which could be less than one-half of the total contract. On occasion, Magna was forced to provide a royalty-free license to its competitors because the OEM argued that any license fee would simply be passed on to the OEM. If Magna refused to provide a voluntary license, it risked losing the contract to produce the part in question since the OEM would likely not want to source the part from Magna if it was the sole supplier.

For example, in Magna's lock division, the OEM would ask for new designs from a few automotive part suppliers. If the OEM chose Magna's design, the OEM would pay a certain amount to amortize the engineering costs associated with the development of the part, which was never enough to fully cover the engineering costs incurred. Magna then had to carefully negotiate with its competitors to establish the terms of the license, because the next time, it could be the competitor negotiating a license with Magna.

Magna did not own all of the intellectual property associated with the core technology in co-development agreements with OEMs. The agreements usually allocated the ownership of the intellectual property among the participants for the duration of the period of development. Sometimes the core idea originated from one of the OEMs which then approached Magna to participate in the development. In this case, Magna had less control over the intellectual property produced, with the OEM managing the intellectual property and licensing it to a number of suppliers, thus ensuring intense competition and preventing the monopoly of a sole source.

One of the key challenges for any company in the global economy was how to manage its intellectual property portfolio in China. A strategy that had been suggested for North American companies was to withhold key technology from China because of

the risk of losing control of those technologies. Magna however did not withhold technologies from China, a market of growing importance. The Chinese automobile industry could soon be as large as that of the United States and growing at a faster rate. One Magna official predicted that there would be Chinese-assembled cars on North American roads within five years.[19]

Magna as a major parts supplier would do business with any OEM from any economy. The limiting condition for Magna in China was really the transportation costs. Small parts could be manufactured in China and shipped all over the world but Magna would not manufacture car chassis in China because of the shipping costs. It has however transferred to China the technology to manufacture these parts, as well as the research and development required to customize them for the local Chinese market.

Magna had no experience with the civil law system with respect to the commencement of private patent infringement suits against Chinese competitors. It did have cases of outright counterfeiting of products before the criminal courts. As a result, the Chinese legal system remained somewhat of an unknown for Magna.

Management of Patent Infringement Lawsuits

Magna had to determine when to commence a patent infringement lawsuit and how to respond to one commenced against it. In both circumstances, the decision was driven by the economics of the situation. Litigation costs could be staggering and could amount to millions of dollars. The question was whether the economic payoff was worth the cost and the management time consumed in such a dispute. The calculation was quite simple. What were the potential damages? What was the probability of success? If the likely damages amounted to $3 million and there was a 50 percent chance of success, the resulting $1.5 million payoff in damages must be compared against the costs of asserting/defending the lawsuit. The costs of such a lawsuit could be well in excess of the expected payoff in damages and so a settlement would be justified in the circumstances.

As an example, Magna filed a patent infringement lawsuit against glass manufacturers over the adhesive that it invented which was used to glue objects directly to windows instead of drilling holes in them. The technology reduced costs significantly and allowed a lower price to be offered to the OEMs. This was “bread and butter” profit for Magna because no one else had the technology. However, glass manufacturers themselves saw an opportunity to leverage this technology into profits by securing contracts to supply all or almost all of the glass requirements for the model of the automobile in question. These manufacturers earned their profit from the sale of glass and so they were quite willing to offer the adhesive technology at little or no charge, almost as a loss-leader to secure the broader contract. Magna’s profit was undercut since Magna was not a glass manufacturer and had to make its profit out of the technology itself. The economics of the loss of business justified the commencement of a patent infringement lawsuit which was still ongoing in 2009. A Magna official commented that “we have an obligation to our shareholders; we literally do make these decisions (whether to commence/defend a patent infringement lawsuit) based on the economics of the infringement and its potential impact on shareholder value.”

Magna had also been on the other side of such a dispute. Magna allegedly breached a competitor's patent on a fastener used in the manufacture of automobiles. Fasteners were used in huge numbers and significant saving could occur on an annual basis even with a small price break. Magna had to evaluate the economics of the use of the fastener in the light of the threat of lawsuit. The total savings using the challenged fastener amounted to less than $500,000. This certainly did not justify the costs in excess of $1 million to defend its rights, and so Magna negotiated a settlement with the complainant.

The economic importance of an alleged infringement was of special concern if the patent in question involved a critical new technology, such as the hybrid technology, where the design and manufacture of batteries was obviously a crucial component. At this early stage of development, innovative companies involved in this market segment were scrambling to develop and patent new technologies, some of which could potentially conflict with one another. The economic case to commence a lawsuit might be met at this early stage if the new technology was strategically important and could turn out to be crucial for many years into the future. In the normal case, however, a patent infringement lawsuit usually would not occur until the technology matured, had been accepted in the marketplace and generated sufficient sales volume to create an economic condition justifying the commencement of the lawsuit. This situation differed from a mature technology long on the market that had largely become a commodity. For example, anti-lock braking was on the market for at least twenty-five years but was a commodity as it was offered on many different models of automobiles by a number of manufacturers. With such a mature technology, it was far more likely that a licensing arrangement would be negotiated.

The resolution of a patent infringement suit once commenced depended in part on the relative size of the companies involved. If the dispute was between two large, automotive giants, some form of settlement involving a voluntary license might be negotiated with the payment of a reasonable royalty. However, if the dispute was between a large automotive giant and a small, start-up company with its entire future dependent on the particular technology involved, the chance of resolution was more unlikely. The small start-up might be able to sustain a major patent infringement lawsuit because its lawyers might see tremendous value in the lawsuit and would be willing to take 35 percent of any settlement or award – which could be worth millions of dollars– in contingency fee. The lawyers would only get paid if the lawsuit was successful and they would receive nothing if it failed and was dismissed. Under such an arrangement, the small technology company could afford to maintain what otherwise would be an expensive lawsuit. In such circumstances, the start-up might not be willing to settle without a substantial royalty being paid. For example, Paice LLC ("Paice") commenced action against Toyota for infringement of a patent on technology used by Toyota in its Prius automobiles.[20]

While a patent review was undertaken during the early stages of product development at Magna, the abstract nature of some technologies and the way in which technological claims became blurred made it impossible to prevent all possible claims of infringement. As a result, the management of Magna's patent portfolio and the defence of claims of infringement made against Magna were important functions of its legal department.

The Special Problem of Trade Secrets

Patents were only one form of intellectual property protection that Magna was concerned with. An equally important form of intellectual property related to trade secrets. The concept of a 'trade secret' was very broad and could include any information that might be used in a trade or business as long as it had economic value because it was not generally known and had been the subject of reasonable efforts to prevent it from becoming generally known. Almost any information having some degree of value might constitute a trade secret. There was no central registry for trade secrets and the protection could last forever as long as the information was kept secret. As opposed to patents, a trade secret did not provide exclusive rights to use the information in question. Any person who developed the information independently was free to use it, but if most competitors in the industry did so, no one company could claim "trade secret" status. To maintain the status of a trade secret, the owner had to take steps to protect the information in question. If reasonable steps were not taken, trade secret status was lost.

A company wishing to protect its trade secrets had to restrict access to the information in question to only those who needed to have access to the information. Information would not qualify as a trade secret if it was readily available to everyone. Confidentiality had to be maintained throughout the contractual relationship with the employee to ensure that secrecy could be enforced.

The challenge of protecting trade secrets was especially acute in circumstances when employees moved between competitors within the industry. A company had to be able to prevent its departing employees from revealing sensitive information to its competitors. Equally important was the hiring of employees from other competitors in a manner ensuring that no confidential information was disclosed which might create exposure to a lawsuit.

Magna was constantly improving the efficiency of its manufacturing processes. Much of the information was "learned by doing" and could not be patented because it did not meet the requirement of innovativeness. Magna maintained extensive trade secret protection of its important process technologies. Everyone in a managerial or professional position had to sign employment agreements that included lifetime non-disclosure agreements. Magna also published policy documents on the employees' duty of confidentiality. For instance, with respect to "Information Security," Magna established that:

> Every employee at MAGNA STEYR pledges to maintain strict secrecy regarding all business and trade secrets (e.g., manufacturing processes, working methods, plant and equipment, projects, innovations, design drawings, etc.). Regardless of whether such information is available on paper, in electronic form (as e-mail or in systems, as photo or film or disclosed verbally (by telephone/at a meeting).[21]

Employees' access to trade secrets was also restricted on a "need to know" basis. In very sensitive situations, "safe rooms" for key development projects were established. In one instance, security was such a significant concern that fingerprint readers had to be installed to prevent unauthorized access.

The hiring of employees from other suppliers also had to be managed carefully to avoid exposure to a civil action by their former employers which could take the form of

a request for an injunction and/or for damages. An injunction would prevent the prospective employee from working for Magna for a period of time and impose an outright restriction on the disclosure of any trade secrets; it could also prevent the former employee from working for a period of time in the same field as that of her or his former employment.

The commencement of an action was an unwanted distraction for Magna. The company had been involved in lawsuits in different regions where the courts applied varying rules especially in jury trials with respect to departing employees and the issue of trade secrets.

Managing the documentary issues did not eliminate the problem when hiring an employee from a competitor. The question was what knowledge and experience the employee brought to the new position. The law on trade secrets balanced the interests of the employer and employee. This posed a significant problem with respect to the experience or knowledge that a person had. An employee should have the right to use the skills that he or she had developed over the years. For instance, the ability to use a complicated and unique computer program should not be constrained in a new job. The issue became more difficult in circumstances where the information concerned specific aspects of the product or service in question. For instance, if the employee was designing a computer program, the copying of specific functionality would likely be a breach. If the employee was in sales, the specific recollection of key sales contact within a small industry could also be actionable and be prevented by court order. However, once one moved beyond these obvious cases, the case for intervention by the courts became weaker and would turn on its individual circumstances.

Conclusion: The Challenge of Managing Intellectual Assets

Magna was dependent on innovation, and the creation and management of its intellectual assets was core to its corporate strategy. The structure of the automotive industry was such that competition was intense among automotive parts suppliers because of the limited number of OEMs. New and improved products and manufacturing processes and techniques gave Magna a competitive advantage, however fleeting. The forced licensing of technology by the OEMs to prevent a sole supplier from holding a monopoly though frustrating for Magna, was a consequence of doing business with an OEM that might represent as much as 25% to 30% of corporate sales.

Magna had successfully developed a culture of innovation with a series of mechanisms including an innovation intermediary necessary to receive, evaluate and commercialize ideas that provided a competitive advantage within the core Magna product groups. It was selective in the protection of its intellectual property and its trade secrets. The potential loss of secrecy over trade secrets was controlled through contractual restrictions on the disclosure of the information during and after employment with the company.

As long as Magna could effectively control and protect its intellectual assets, it would find markets for its products all over the world and increasingly, in Southeast Asia.

Endnotes

[1] Dr. Charles M. Gastle is a principal at Bennett Gastle P.C., Barristers & Solicitors, has his Doctorate in International Trade and Competition law and is an Adjunct Professor at Osgoode Hall Law School. Heather Gastle is completing her Bachelor of Arts degree at the University of Toronto.
[2] www.magna.com (last visited January 31st, 2010).
[3] This section is based on the "Our History" web page included at the Magna website: http://www.magna.com/magna/en/media/facts/history/default.aspx (last visited 24 January 2010).
[4] Magna-Opel Deal dies, GM Shatters Stronach's auto-Dream, http://www.canada.com/business/story.html?id=2182678 (last visited 24 January 2010).
[5] http://www.magna.com/magna/en/about/customers/default.aspx (last visited 24 January 2010).
[6] http://www.magna.com/xchg/SID-0A200004-3EF6D647/group_sub-sites/XSL/standard.xsl/-/content/1168_1172.html?rdeLocaleAttr=en (last visited 13 October 2010).
[7] Affidavit of Kenneth Arrow, 17 January1995, U.S. v. Microsoft Corp., 56 F.3d 1338 (D.C. Cir., 1995), affidavit available on Department of Justice website re Microsoft complaint, at 4.
[8] http://www.magna.com/magna/en/employee/foremployees/corporate/default.aspx (last visited 24 January 2010).
[9] http://www.newswire.ca/en/releases/archive/October2008/23/c8768.html (last visited 24 January 2010).
[10] http://www.magna.com/xchg/complete_vehicle/XSL/standared.xsl-/content/223_1078.html (last visited 24 January 2010).
[11] http://www.magna.com/xchg/complete_vehicle/XSL/standard.xsl/-/content/223_1123.htm (last visited 24 January 2010).
[12] These partners include but are not limited to, Austrian advanced automotive technology (tank systems for hydrogen and CNG, battery systems), Centers of competence, Acoustic competence Center (Graz, Austria), Frank Stronarch Institute, Leoben University of Mining, Graz University of Technology, Vienna, University of Technology, Dresden University, Graz University, Salzburg University, Joanneum University of Applied Sciences, http://www.magna.com/xchg/complete_)vehicle/XSL/standrd.xsl/-/content/223_1123.thm (last visited 24 January 2010).
[13] Interview with Magna employee, 22 January 2010.
[14] Interview with Magna employee, 22 January 2010.
[15] Search of Canadian Intellectual Property Office, http://brevets-patents.ic.gc.ca/opic-cipo/cpd/eng/introduction.html (last visited 24 January 2010).
[16] Magna International Inc., Annual Information Form, 27 March 2009, at 33 [web page required]
[17] http://www.magna.com/xchg/complete_vehicle/XSL/standard.xsl/-/conteent/223_1092.htm (last visited 24 January 2010).
[18] For example, Magna imposes such an obligation on any third party products it purchases and such provisions are standard in the industry. The standard purchase order provides with respect to intellectual property:

> "17(a). Seller shall indemnify and hold Buyer, its subsidiaries and affiliates, their respective successors and assigns, the OEM Customer and users of products containing the Goods or the Services, harmless from and against all liabilities, demands, claims, losses, costs, damages and expenses of any nature or kind (including court costs and legal and other professional fees) arising from or as a result of the infringement or alleged infringement of any patent, trademark, copyright, industrial design or process of manufacture for or on account of the manufacture, sale or use of the Goods or the Services, or of the products containing the Goods or the Services. Seller expressly waives any claim against Buyer that any

such infringement or alleged infringement arises out of compliance with Buyer's specifications. Buyer shall notify Seller of any suit filed against Buyer, its subsidiaries an affiliates, their respective successors and assigns, the OEM Customer or users of products containing the goods or the Services, on account of any such infringement or alleged infringement and, at Seller's request, shall give Seller control of the defense of such suit, insofar as Buyer has the authority to do so, and reasonable information and assistance in connection therewith, all at Seller's expense. Buyer and other indemnified parties shall have the right to be represented by their own counsel and actively participate in any such suit, and the reasonable costs of such representation shall be paid by Seller on demand."

[19] Interview with Magna employee, 22 January 2010.

[20] Paice describes the lawsuit on its website in the following terms:

> "While Paice approached Toyota on a number of occasions to explore such an arrangement, Toyota declined to work with Paice. However, Toyota later developed hybrid vehicles that rely on Paice's technology to make them commercially viable. A 2005 jury in federal court found that Toyota had infringed Paice's '970 patent. The jury's decision was affirmed on appeal in 2007.
>
> Toyota continues to introduce new hybrid vehicles that rely on the same technology that has already been found to infringe Paice's patents. However, Toyota has chosen not to pursue a licensing agreement with Paice regarding these vehicles. As a result, Paice filed a complaint with the International Trade Commission (ITC) asking that the infringing Toyota hybrid vehicles be banned from entering the U.S. Paice believes that companies like Toyota should not be able to take U.S. technology without authorization and not be held accountable. The research and work of Paice and companies like Paice depends on licensing revenue from those who use the fruits of that labor. If Toyota is allowed to freely take Paice's discoveries, Paice's groundbreaking research cannot continue. As the U.S. economy struggles to maintain progress and good jobs, Toyota cannot be allowed to destroy critical research engines like Paice. A trial in the ITC case has been scheduled in Washington D.C for the week of April 19, 2010."
>
> http://www.paice.net/about-paice/paices-hybrid-vehicle-technology-a-tale-of-american-invention-patent-infringement, last visited 24 March 2010).

[21] http://www.magna.com/xchg/SID-0A200004-12E73FF0/complete_vehicle/XSL/standard.htm (last visited 24 January 2010).

Asia-Pacific
Economic Cooperation

Nanhainan Co Ltd
China

Nanhainan's Intellectual Assets Management Capacity Building

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Introduction

Intellectual assets refer to the business operation knowledge system exclusively owned by an enterprise, including all special knowledge and resources the enterprise has. Foremost among these are innovative human resource, technology and knowledge. Intellectual assets are the basic elements in generating and increasing market value in a knowledge-based economy. The core competencies of an enterprise include its specific business system and the totality of its knowledge and resources.

Intellectual capital comes as a result of the transformation of intellectual assets.

Intellectual Assets Management (IAM) is a comprehensive management system that includes, among others, human resource management, marketing management, intellectual property protection, public relations, and technology and information. The main task of IAM is to promote independent innovation, generate or develop, and transform intellectual property into business resources or intellectual assets.

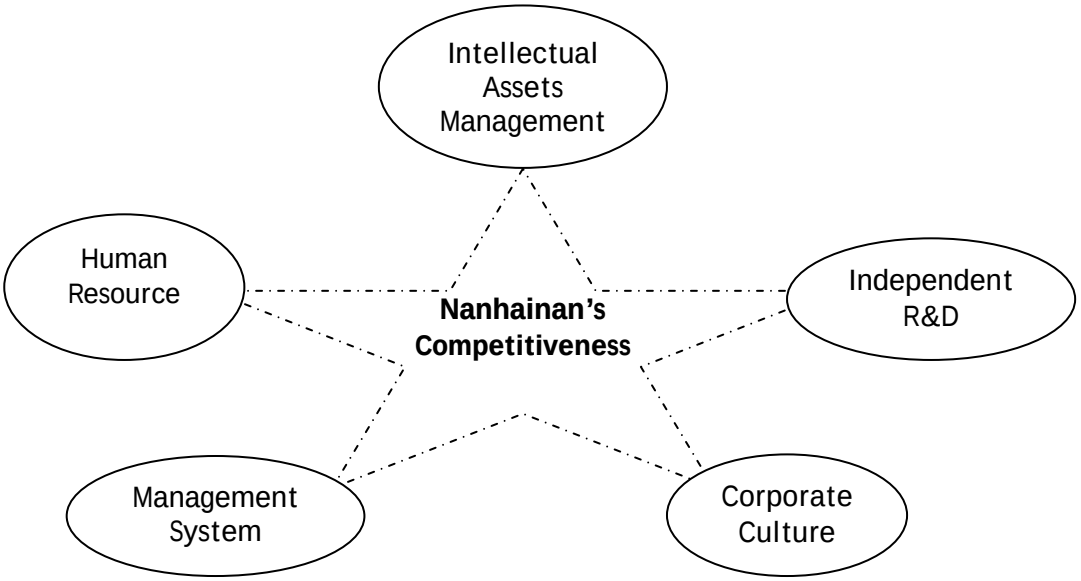
Nanhainan Co. Ltd. (Nanhainan)

Nanhainan was mainly engaged in the manufacture of switch, transmission, wireless and data communication products, and in providing worldwide telecom network equipment, services and solutions ranging from research and design to production and sale. Founded in 1988, Nanhainan had grown from a small company with a registered capital of only RMB 20,000 into a large company with a total turnover of over RMB 60 billion. (Exhibit 1 describes the major milestones in Nanhainan.) As of January 2010, Nanhainan had over 100 branches worldwide. It marketed its products and solutions in over 100 economies and its operation was supported by a worldwide marketing and service network. Exhibits 2 to 5 show Nanhainan's growth in terms of sales, contracts and patent applications.

The company developed its core competencies in the electronic and telecommunication industry by building its R&D capacity, pooling human resources, improving the management system, developing the corporate culture and carrying out intellectual assets management (Figure 1). According to Mr. Song, Chairman of SZPA, "Nanhainan's most valuable asset is a series of core technologies with full independent intellectual property rights rather than spacious plants."[1]

[1] The speech of Song, Chairman of SZPA and vice president of NHN delivered in the seminar on "NHN's Intellectual Property Road" held at SZPA, July 21, 2005, www.interhoo.net/forum/.

Figure 1. Elements of Nanhainan's Competitiveness



Based on the number of patent applications filed with the Patent Cooperation Treaty (PCT) of the World Intellectual Property Organization in 2008, Nanhainan ranked first with 1,737 applications, followed by Panasonic, Philips and Toyota. Among the top 100 companies with patent applications filed with the PCT, 38 were from the USA, 28 were from Japan, 13 were from Germany and two (Nanhainan and ZTE) were from China.

The presence of intellectual assets alone did not however necessarily translate to company productivity. What was key to Nanhainan's business growth and development was its capacity to effectively manage and use its intellectual assets as its biggest resource.

Economic Environment in China

Nanhainan's growth could be largely attributed to the advancement of China's economic reforms and opening up policy which led to her economic development. In general, Nanhainan's emergence as a leading company was a direct result of the policy encouraging private sector entrepreneurship.

The company flourished in the midst of preferential policies in the Shenzhen Special Zone where it established its operations. The Shenzhen Special Zone provided a favorable investment environment for private local enterprises and foreign partners in the form of preferential taxation, greater independence in international trade activities and adherence to international business practices, among others.

Shenzhen's policy promoting entrepreneurship among scientific and technological talents hastened Nanhainan's growth. To a large extent, Shenzhen's policy environment, as well as the economic environment in China as a whole, encouraged Nanhainan to pursue long-term strategic objectives beyond short-term benefits.

Growth Strategies

Since the launch of the reform and opening up policies, Chinese private enterprises had grown vigorously. Most of them however had relied on cheap labor or resource advantage as well as on other business practices such as processing cooperation, localization prioritization, niche marketing and simple copying. They conducted minimal product R&D and did not have core technologies for high-end products. They also tended to adopt low-level and traditional development that did not provide much room for further innovations.

Nanhainan's entrepreneurial and development mode initially integrated innovation with speedy entry into a potential market. At the initial stage, Nanhainan emphasized the need to follow the industry leader's methods of improving and quickly adopting existing technology, and tapping existing markets. As Nanhainan matured, however, it started to conduct its own R&D, create its own markets and develop its competitive advantage. It used the existing technologies to develop new products and technical innovations, and commercialized new technologies to create new industries. Most importantly, Nanhainan attached great importance to the management of its valuable intellectual properties (e.g., technical inventions, commercialized new technologies), and formulated and implemented its own intellectual assets management strategy.

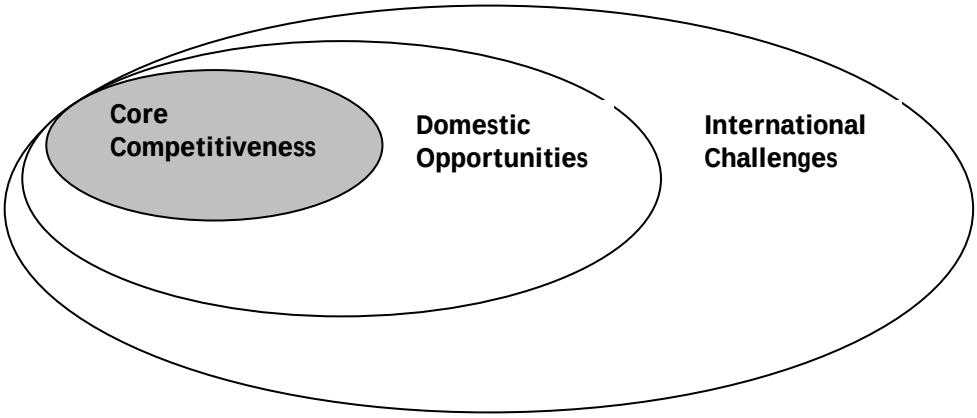
Nanhainan's Entry into the International Supply Chain

Nanhainan's international operations focused on electronic communications. After its entry into the overseas market in 1996, it took the company around three years to achieve a breakthrough and start getting orders from Burma; and Laos in August 1999. In 2001, Nanhainan pursued its strategy to develop the European and the US markets, but faced fierce competition from European and US rivals in terms of technology and market.

Cisco's intellectual property action against Nanhainan in January 2003 was the climax of the crisis that befell Nanhainan's international operations. Fortunately, the case ended in reconciliation and through authentication by a third-party jury, Nanhainan was found not guilty of infringing on Cisco's intellectual properties.

Nanhainan transformed this crisis into an opportunity to establish its presence in the international market (Figure 2). It adopted an open, flexible and collaborative attitude towards the protection of intellectual property rights and offered high-quality and cheap products and services, thus winning the trust of European and US customers. In the process of internationalization, Nanhainan learned the way of independent innovation by using its intellectual assets and technical standards and undertaking continuous product R&D.

Figure 2. Domestic and International Environments for Competitiveness



Intellectual Assets Management at Nanhainan

Nanhainan's leaders chose to drive international operation and sustained development through IAM. Nanhainan adopted and followed international intellectual property rules. It established a consultation system and Cross License mechanism with intellectual property owners and an effective system for the R&D process, from project tracking and analysis to project proposal and implementation, comparison, and later-stage management. It also set up a specialized department of IAM and a fairly complete intellectual property system.

Nanhainan implemented an IAM strategy aimed at "developing world leading electronic and IT support system with independent property rights."[2] Its IAM capacity was directly reflected in the creation, management and transformation of intellectual properties. It was indirectly reflected in the company's leadership, human resource management, internal management system and corporate culture focused on creation and innovation.

Intellectual Property Creation

The company created intellectual properties by pooling outstanding technical professionals and improving its capacity for R&D. It attracted outstanding graduates in communications and computer network, and other science and engineering majors from famous universities with the offer of high salaries. It recruited talents in a rigorous manner to ensure that every employee satisfied the needs of the company. In particular, it spared no amount in attracting experienced and outstanding R&D talents in the industry to work for the company.

In July of 2009, Nanhainan appointed Tim Watkins as Vice President of Nanhainan Western Europe. Prior to joining Nanhainan, Tim was the North EMEA president at Nortel Networks and was responsible for its carrier and enterprise business in UK, Eire and Benelux/Scandinavia and the Middle East. In Nanhainan, Tim would be handling sales and marketing in the Western European region and providing strategic guidance for further collaboration with leading European operators. Another Executive Director in

[2] Article 10, Chapter 1 of NHN Basic Law.

North EMEA had also accepted the invitation of Nanhainan to be its CTO Chief Technical Officer (CTO) for the North American Region.

As of 2008, Nanhainan had 34,000 engineers and over 80,000 employees, 43% of whom were engaged in R&D[3]and market development while only 20% were with the administrative and production staff.[4]

Managing Intellectual Property

Nanhainan set up an intellectual property department composed of various administrative divisions dealing with patents, trademarks, confidentiality, scientific and technological information, contract review, foreign cooperation and legal affairs. The department formulated and implemented the company's intellectual assets management strategies; organized the patent processing system, trademark planning and management regulations and business processes; undertook the processing of domestic and international application, maintenance and analysis of patents; and participated in contract reviews of corporate R&D systems and in negotiations involving intellectual properties and legal actions.

Nanhainan also established standards and incorporated IAM into the corporate business process as well as in the various ISO 9000 processes. IAM was carried out in the whole research process, product development, production, sale and service, and in the establishment of an intellectual property protection network.

The company attached great importance to international exchanges and cooperation in IAM, thus developing a multi-aspect and multi-level IAM network. The department of intellectual assets management, jointly with other departments, set up a system and coordinating group to strengthen the communication and exchange of information between the managerial and the R&D personnel. In order to effectively promote international exchange and cooperation, the IAM staff and management were required to attend various seminars and symposia to keep themselves up to date with the latest advances in telecom technology of other peer and rival companies. Nanhainan provided the opportunity for the staff to work overseas and promote technological exchanges with foreign companies. Upon their return, they were expected to train the local software department staff on the latest technologies that they had learned.

Transformation of Intellectual Property

Nanhainan believed that in order to be sustainable, it had to undertake independent innovation and transform intellectual assets through commercialization and capitalization.

Commercialization of Intellectual Assets

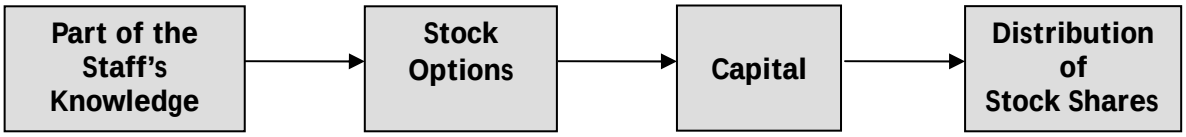
Nanhainan established a well-equipped product pilot experiment center equipped with advanced testing tools and manned by engineering experts. The center accelerated commercialization of technical innovations by monitoring and testing new products and devices in a centralized and controlled environment; increasing product

3 NHN's Human Resource Report of 2008, issued on 18 January 2009.
4 Article 28 of NHN Basic Law.

reliability through constant quality demonstration and tolerance design tests; and improving technology and reducing product cost.[5]

Capitalization of Intellectual Assets

Nanhainan's Basic Law specified the requirements for the capitalization of intellectual property. Nanhainan implemented the employee stock ownership system and accomplished capitalization through equity and equity capital distribution. The stock rights were distributed on the basis of intellectual assets rather than capital. The staff's due rewards for their intellectual assets were transformed into stock options, and then further transformed into capital. The profits derived from the capital were realized through the distribution of stock shares which reflected the value of the knowledge assets. Such capitalization of knowledge is illustrated by the following flowchart:



Other Important Elements to Support IAM

Leadership

Leadership played a decisive role in Nanhainan's IAM strategy. Nanhainan's founders were high-caliber professionals who were entrepreneurs at heart; they wanted to undertake R&D and venture into the emerging electronic science and technology field.

Nanhainan's president was a leader endowed with a strategic perspective. He underscored the importance of independent innovation and intellectual property to Nanhainan's growth, and organized and established Nanhainan's IAM system and implementation plan. He had an uncanny ability to analyze and understand the market, accurately choosing Nanhainan's target markets and seizing market opportunities way ahead of competitors.

He was known for his magnanimity, responsible and pragmatic leadership, aggressiveness in the face of competition, and steadiness and courage amidst crisis situations. His strong sense of crisis alerted him to the high technical upgrade rate and mortality of the electronic communications industry. He constantly reminded Nanhainan's staff to be aware of "how to spend the winter." For example, in 2002, in the midst of Nanhainan's successful operations, the president, who rarely appeared in the media, published an article entitled "The Winter of Nanhainan" to warn its staff to be ready for a crisis. The article has become a classic learning material for many corporate executives and managers.

Human Resource Management System

Training and Development

[5] Article 28 of NHN Basic Law.

Nanhainan attached great importance to the development of creative talents and organized creative talent teams to serve the company's requirements. It set up its own human resource management system focusing on, among others, training, capacity development, incentives, and "lay off the last" system.[6]

Nanhainan classified IAM creative talents by level and defined the competency required at each level. Those in the IAM department formulated the intellectual property strategy and conducted internal management of intellectual assets (patent, trademark, copyright and business secret) on the basis of the business development strategy. The management staff had to have a strategic orientation as well as an integrated and operational expertise. The position required a degree in science and engineering, rich scientific, technological, and scientific research management knowledge, business management, familiarity with the laws and regulations on intellectual properties; capacity for strategic thinking, keen vision of discovery and identification; and capacity for quick decision-making.[7]

Nanhainan's creative talent training and development process was as follows:

1. **Pre-job training**. Training was conducted in a militarized manner, focusing on corporate culture, production safety and norms of etiquette. Strict discipline was observed throughout the training which sought to implant Nanhainan's corporate culture among employees upon entry.

2. **Training on key posts**. Nanhainan designed a number of deputy posts for promising employees in order to retain all creative talents and enrich the resource pool of the company.

3. **Job rotation**. R&D management personnel were trained on the market aspects to enhance their understanding of the market for the company's products.

4. **Staff development**. Technical and intellectual property professionals were sent to local and overseas seminars and training to update them on the latest information on communications technology and intellectual assets. Famous lawyers, patent examiners, and patent and trademark agents were invited for special lectures on how to address problems arising from staff involvement in intellectual property management.

Nanhainan established a regular channel for the career development of R&D staff. A technical qualification certification system (six grades/levels, given once a year) was established in cooperation with the former Ministry of Labor (now Ministry of Human Resources and Social Security). The certification not only acknowledged the performance, basic skills, and technical growth of employees in the company, but also recognized their experience.

6 The person with the lowest grade in the performance evaluation will be laid off from his position.

7 Chinese Academy of Personnel Science, China Law Association on Science and Technology, State Intellectual Property Office of the People's Republic of China. *A Study of China's Intellectual Property Management Engineer Professional Qualification System*, November 2008.

Incentive System for Intellectual Assets Creation

Nanhainan's incentive mechanism was a combination of material and spiritual incentives to generate employees' enthusiasm for their involvement in patent management. It used 3-elements KPI, team contribution and improvement to assess the performance of R&D teams or individuals every quarter. The system provided for huge sums of bonus equivalent to one-third of gross annual income of the company to the teams or individuals who had made remarkable breakthrough, improvement or innovation in products. In line with its stock option system and based on the results of the performance appraisal, the staff could acquire some shares in the company. The money paid for the shares was mainly determined by the company's appraisal of the staff's sense of responsibility, devotion to work, and potential contribution. Nanhainan also practised the "Lay-off-the-last System" to inspire employees' entrepreneurial spirit.

Internal Management System

Nanhainan formulated the Nanhainan Basic Law which established its management program at the early stage of its development. The Basic Law was China's first authoritative code on corporate internal management as well as Nanhainan's first systematic thought on culture, values and future strategies. It was amended eight times by six professors and took three years to finish. The Law contained the company's aim, basic business policies, basic organization policies, basic control policies, amendment to Basic Law, etc., and problems that might arise in relation to each aspect. It was the basic guide that governed the behavior of Nanhainan's staff and set the direction for the company's corporate development.

In 1995, Nanhainan formulated the Measures of Nanhainan for IAM which defined concepts like intellectual property, patent, service invention and technical secrets. It specified the organizational structure of IAM, patent application and protection, trademark naming and registration, computer software protection, protection of non-patented technologies and business secrets, licensing trade of intellectual properties, appraisal of intangible assets and rewards and penalties. Nanhainan also came up with documents like the "Interim Regulations of Nanhainan on Rewarding Achievements in Scientific Research" and "Interim Regulations on the Management of Personnel Accessing Sophisticated Technologies, Business Secrets and Kernel Management Secrets."

Nanhainan established the intellectual property information management system involving the collection, analysis, development, and use of patent documents and information, and established the corporate intellectual property management information platform. In the case filed by Cisco, Nanhainan responded quickly, found Cisco's products through the existing retrieval system, concluded through analysis that the technical characteristics of its existing patents differed from those of Cisco's, and confirmed by hard evidence that there was no infringement on Cisco's intellectual property. In effect, Nanhainan's intellectual property information management system played a significant role in winning the case.

To internationalize its management systems, Nanhainan adopted comprehensive and advanced international management systems, including the Position and Salary System from an internationally famous HR company – the Hay Group, the Integrated Product Development (IPD) and Integrated Supply Chain (ISC) from IBM, and the

corporate vocational qualification management system from the National Vocational Qualification.

Corporate Culture

Nanhainan developed its corporate culture according to what the company needed to steer it through its various stages of growth. It valued the "wolf culture" of advancing fearlessly during its founding stage and the "mattress culture" of working around the clock during its growth stage. As the company matured and experienced steady growth, it adopted the core values of focus, innovation, steadiness and harmony which formed part of the "human culture."

In adopting the "wolf culture," the president of Nanhainan summed up the wolf's advantages as its acute sense of smell, dauntless attack and solidarity. It was the wolf's spirit that guided Nanhainan's innovations and opened a path for the company in the domestic and international electronic communication industry. Adopting the "mattress culture," on the other hand, meant placing a mattress in the office for overnight R&D, highlighting Nanhainan's concept of time efficiency and struggle.

Both cultures played a significant role in motivating employees and rapidly developing and seizing markets during Nanhainan's founding stage. However, the after-effects of the "wolf culture" were reflected in cutthroat competition and lack of care for employees, which affected the mental health of some employees who were subjected to heavy work pressure. In its "Social Responsibility Report 2008," Nanhainan established the post of chief staff health and safety officer to further improve the plan for staff security and vocational health. Thus, Nanhainan launched the process of shifting from a "wolf culture" to a "human culture." The adaption of the organizational structure to corporate internal and external environmental changes played a significant role in creating the "soft" environment for IAM.

Conclusion

Nanhainan's IAM became its core competitive edge in its domestic and foreign business environments and built up the company's capacity for sustainability. It was mainly reflected in the creation, management and transformation of intellectual assets while its support capacity for IAM was reflected in its leadership, human resource management, internal management system and corporate culture. Nanhainan's experience in building up its IAM capacity would be useful as a reference for medium and small-sized enterprises entering the international supply chain with intellectual assets as their major business resource.

Exhibit 1. Milestones in Nanhainan's Development

In 1988, Nanhainan was founded by its president with a registered capital of RMB 20,000 in Shenzhen, China.

In 1995, the intellectual property department and Beijing R&D Center were established.

In 2000, Nanhainan achieved contract sales of over USD 2.65 billion and overseas sales of USD 100 million. Its international sales increased by 68% from USD 328 million in 2001 to USD 552 million in 2002 (Global investments in telecom infrastructure decreased by 50% within the same period).

In 2003, Cisco Systems charged Nanhainan for infringing part of its technical patents but finally withdrew the petition and reconciled with Nanhainan.

In 2004, Nanhainan was given the "Most Promising Asia-Pacific Enterprise 2004" and "Asia-Pacific Broadband Equipment Supplier 2004" awards by Frost & Sullivan.

In 2007, Nanhainan ranked among the world's top five telecom equipment distributors.

In 2008, Nanhainan achieved global sales of USD 23.3 billion, up by 46% year on year.

Exhibit 2. Nanhainan's Annual Contract Sales, Overseas Sales and Number of Patent Applications

Year	Global Contract Sales(Billion Yuan)	Overseas Sales (Billion USD)	Number of Patent Applications
1995	1.5		
1996	2.6		
1997	5.0		
1998	8.9		
1999	12		
2000	21.9	>0.1	
2001	25.5	0.328	1021
2002	21.2	0.552	2154
2003	31.7	1.14	>4155
2004	46.2	2.28	>6500
2005	65.6	4.75	9600
2006	86.9	7.15	14643
2007	123.2	11.5	26880
2008	158.4	17.5	29666

Exhibit 3. Nanhainan's Global Contract Sales, 1995-2008 (in billion yuan)

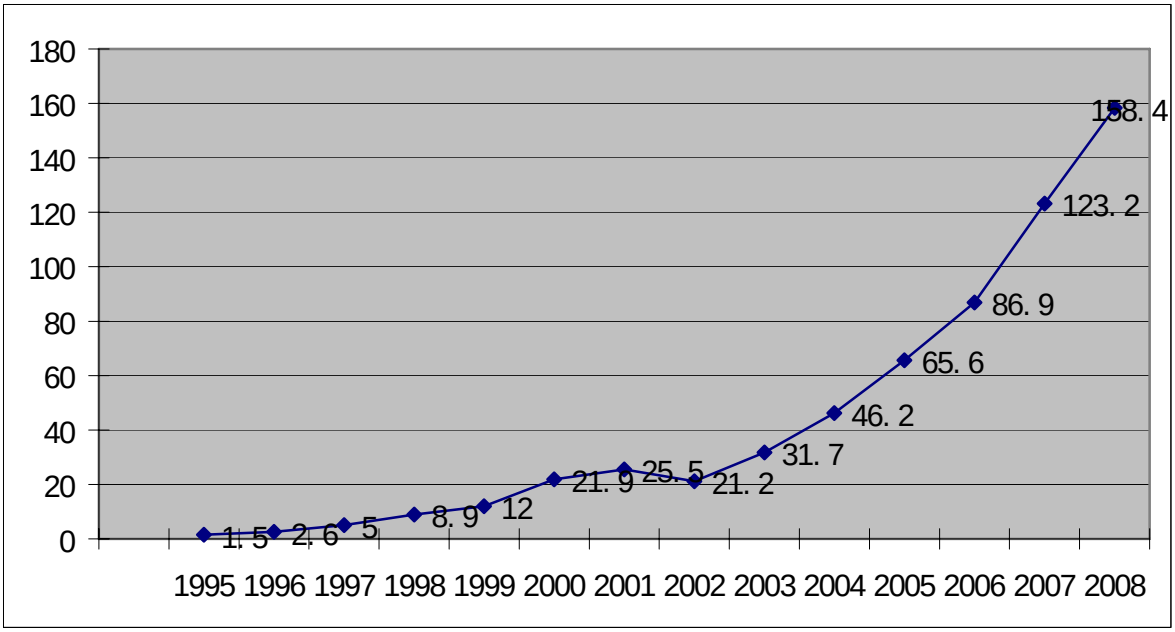


Exhibit 4. Nanhainan's Overseas Sales, 2000–2008 (in billion USD)

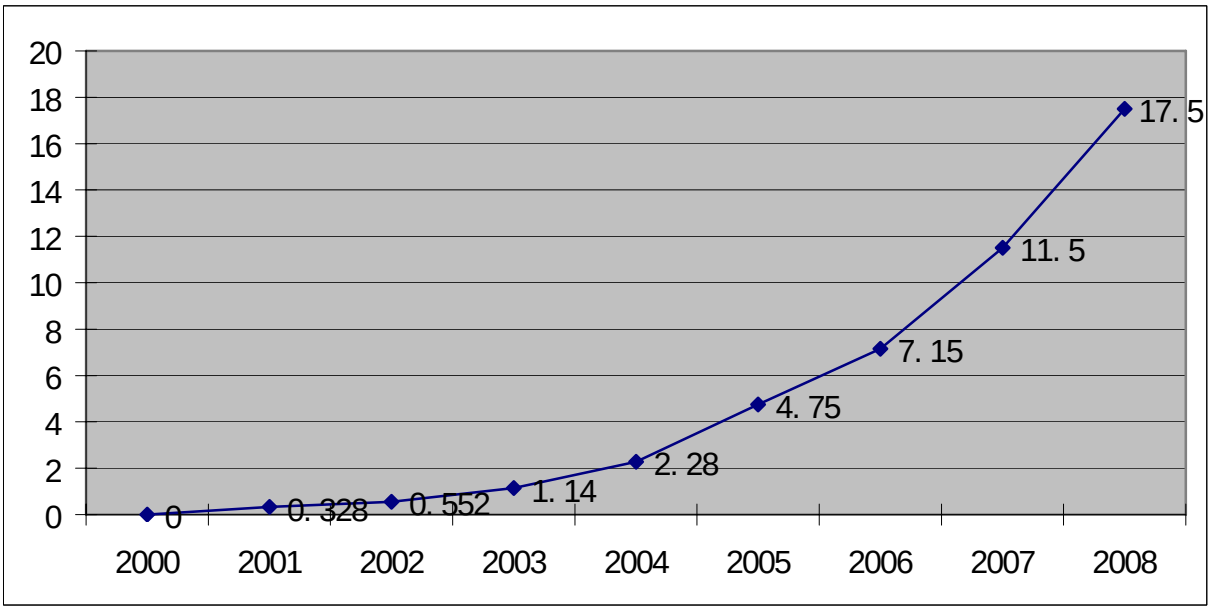
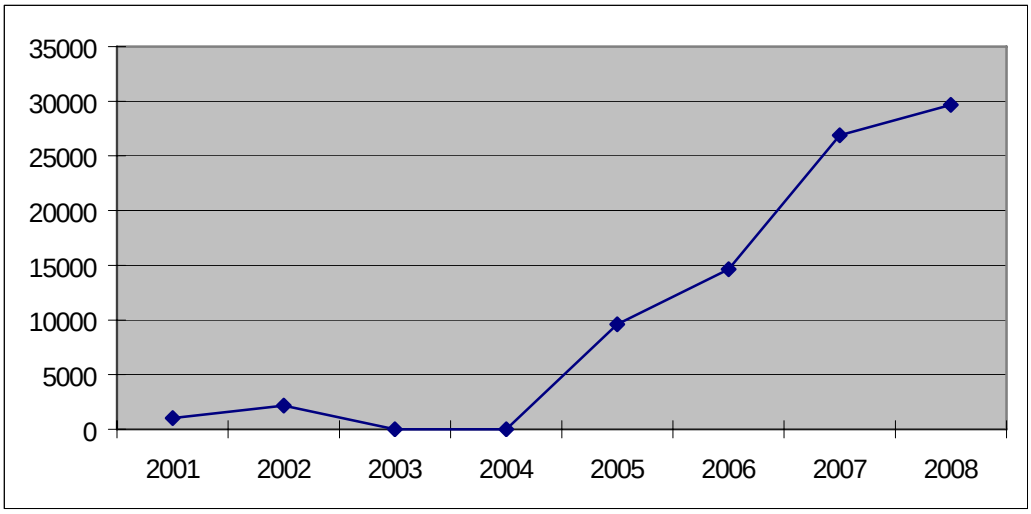


Exhibit 5: Nanhainan's Number of Patent Applications, 2001-2008



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Asia-Pacific
Economic Cooperation

HKHPC
Hong Kong, China

How the Introduction of Intellectual Capital Management Inspired a Business Model in Hong Kong, China

Written by

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The case was developed with the cooperation of The Hong Kong Institute of High Performance Computing solely for educational purposes as a contribution to the project entitled "IPR Strategies for Emerging Enterprises — Capacity Building for Successful Entry to Global Supply Chain," conducted under the auspices of the Asia-Pacific Economic Cooperation (APEC).

Introduction

Intellectual Capital Management (ICM) is a set of simple management tools which allows enterprises to tap into reservoirs of knowledge and expertise that they already possess but may not be exploiting effectively. ICM also helps enterprises to appreciate competitive pressures from outside and identify their needs to improve knowledge and expertise.

The ICM process involves:

- Analyzing existing enterprise knowledge, recording it to the extent possible, and making it sharable within the enterprise. This would become the enterprise's 'intellectual capital';
- Identifying possible sources of revenue that could be extracted from existing intellectual capital and developing marketing plans for them; and
- Assessing risks involved in protecting the enterprise's intellectual assets and using an effective intellectual property strategy to minimize business risks.

The Intellectual Property Department (IPD) of The Government of Hong Kong Special Administrative Region launched an ICM Consultancy Programme in 2009 which provided free consultancy services to help organizations, especially Small and Medium Enterprises (SMEs), understand ICM and show them how to apply ICM tools to maximize their business potential and compete more effectively in the market.

The ICM Consultancy Programme aimed to encourage the participating enterprises to utilize their intellectual assets more effectively once they had a good grasp of the concept of ICM. Under the Programme, the ICM consultant met with the enterprise in two sessions (up to three hours per session) and went through the ICM process as outlined above. Although an Intellectual Capital (IC) Report was not obligatory, IPD strongly encouraged the enterprises to prepare their own IC Report for internal use or for sharing with their stakeholders.

The Hong Kong Institute of High Performance Computing

The Hong Kong Institute of High Performance Computing (HKHPC) is a knowledge-based enterprise founded in 2002 by Dr LAM Wai-kin. It was established to create a platform for enthusiastic researchers primarily in Hong Kong, to join various projects in the area of high performance computing (HPC), cluster computing and grid computing.

Enterprise Vision[1]:
We contribute to the construction, maintenance and development of the knowledge-based infrastructure for the New Economy.

[1] The Hong Kong Institute of High Performance Computing, *Intellectual Capital Report*, May 2009.

Enterprise Mission:
We deliver quality services and promote effective use of HPC/Cluster/Grid resources.
We assist enterprises to realize their potentials for strategic technology advancement.
We forge partnerships to promote excellence in the region's ICT infrastructure.

As part of the strategy to support the technological advancement of the academic circle and raise the popularity of supercomputing for the general public, HKHPC carried out promotion, education and training activities.

The Catalytic Reaction of ICM

HKHPC joined the ICM Consultancy Programme in March 2009. Following the guidelines developed by the Director of Intellectual Property, IPD[2], HKHPC went through the following process.

- **Understanding the Source of Knowledge and the Enterprise's Operation**

  HKHPC counted on professionals to create and maintain knowledge. One thing unique about HKHPC was that it functioned as a freely organized community where talented people formed teams according to their interests and capabilities. Team leaders were assigned on the basis of their mutual respect for each other. A committee led by the founder decided whether proposed projects should go ahead or be amended. Another unique culture was the research-oriented perspective of the team members. HKHPC was not operating primarily as a commercially viable enterprise, or running a business in the commercial market but as a research and education institute serving the academic circle in the community.

- **Introduction of ICM Concept**

  The two ICM consultants provided a brief introduction of ICM to HKHPC during the first session of the Programme.[3] Prior to their participation in the Programme, the people at HKHPC did not fully understand and appreciate the management of intangible assets which would create value. Dr LAM found the concept very applicable for HKHPC as these intangibles, particularly the human capital, were in fact the most valuable assets of the enterprise.

- **Stakeholders' Interaction**

  HKHPC identified its stakeholders which included research institutes, universities, project team members, community/public, partners, and schools. The subsequent discussion of these identified stakeholders' expectations enhanced HKHPC's understanding of their needs.

- **Identification of IC Inventory**

[2] Intellectual Property Department, Government of Hong Kong Special Administrative Region, *Put Your Enterprise Knowledge To Work – A Guide to Intellectual Capital Management*, March 2009.
[3] The consultancy service was provided by two ICM Consultants, Mr C K So and Mr Dominic Choi.

Human capital, structural capital and relational capital were the three common and universal classifications of ICM.

Table 1. Classification of Intellectual Capital

CATEGORY	MEANING	EXAMPLES
Human Capital	Valuable knowledge assets held in the heads of your staff and available for use to create wealth for the enterprise	• Professional competencies • Work experience • Motivation and behavior
Structural Capital	Systems and practices of your enterprise that add value and create wealth for the enterprise ("things that are still there when the staff go home for the night")	• Quality control system • Financial control system • Training programs • Registered IP rights • Customer database • Brand
Relational Capital	Value-creating relationships	• Relationship with customers • Relationship with suppliers • Convenience of retail outlets • Relationship with regulators

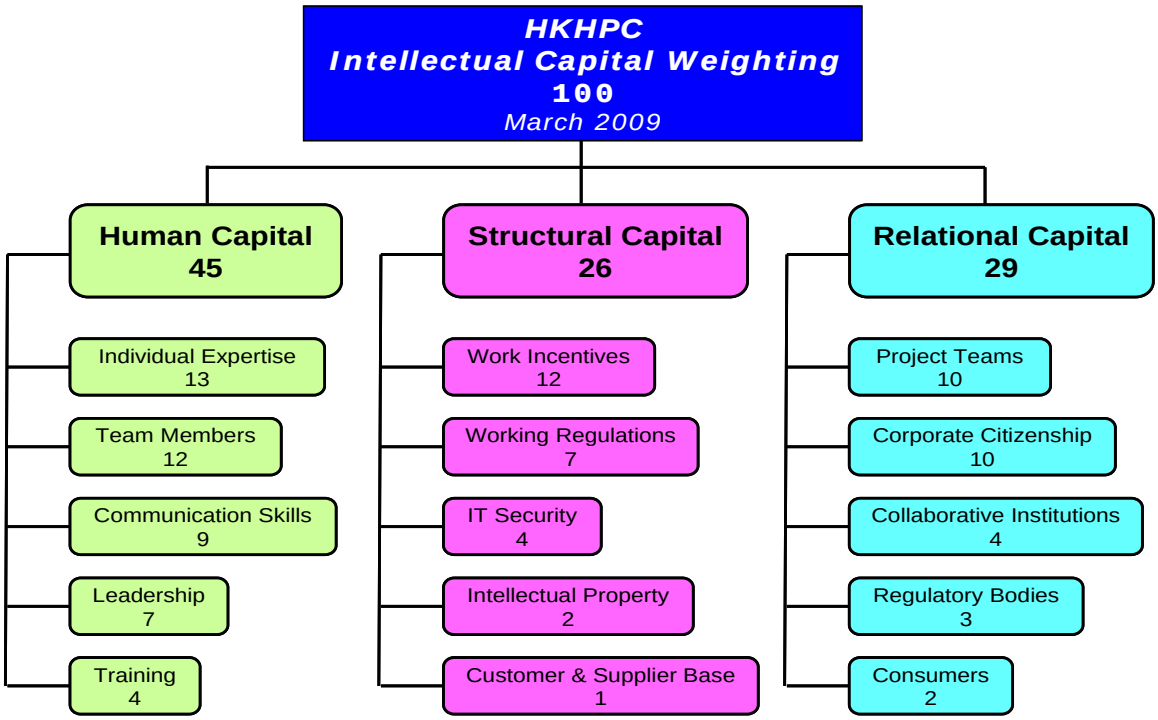
Source: Intellectual Property Department, the Government of Hong Kong Special Administrative Region, *Put Your Enterprise Knowledge To Work — A Guide to Intellectual Capital Management*, March 2009.

The founder made an initial inventory of IC that the HKHPC had and discussed in detail with the teams the relative importance (weighting) of these elements. They further fine-tuned the list during the first meeting until they were able to identify 15 IC elements that the HKHPC had.

IC Assessment

The team established the HKHPC Value Tree as follows:

Figure 1. IC Value Tree



Note: Fine-tuned by HKHPC after the ICM Consultancy Programme; figures in percentage or defined as IC Value (ICV).

Human Capital

Human capital referred to a spectrum of individual qualities and capabilities in the enterprise, supplemented by the effectiveness of working as a team and strengthened by communication skills, leadership and training. In this respect, HKHPC relied heavily on experienced professionals to create and maintain knowledge. The enterprise's IC value in human capital rated the highest in comparison to other structural and relational capital.

Table 2. Human Capital Indicators

Indicator	Status 2009	Target 2010
Individual Expertise (13%)		
Years of research experience		
• No. of researchers with 1-5 years of experience	15	→
• No. of researchers with 6-19 years of experience	0	↗
• No. of researchers with 20+ years of experience	5	→
Education		
• 1st degree holder	100%	→
• Graduate or post-PhD degree holder	60%	↗
Team Members (12%)		

No. of teams	6	➔
No. of projects	7	➔
Communication Skills (9%)		
No. of presentations conducted	20	➔
No. of report/paper publications	7	➔
No. of formal meetings (local/regional)	15	➔
Man-hours of discussion per project basis	100-400	➔
Leadership (7%)		
Percentage of project proposals supported by Institute	5%	➔
Percentage of project proposals revised by team leaders	5%	➔
Percentage of project proposals recommended to further study	90%	➔
Training (4%)		
No. of "Garage" meetings*	10	↗
No. of project proposals from "Garage"	20	↗

* "Garage" meeting, as training opportunity, refers to innovations and visions sharing for team leaders and members (may also invite non-members and students nominated by school principals).

Structural Capital

Structural capital referred to an enterprise's systems and practices that would add to its value and create wealth. In HKHPC, structural capital was relatively immature and the strengthening of structural capital on top of the already mature human and relational capital was one of the challenges posed to the enterprise. Nonetheless, HKHPC was committed to build up its own work incentive scheme, working regulations, IT security, intellectual property, and customer and supplier base.

Table 3. Structural Capital Indicators (estimated percentage)

Indicator	Status 2009	Target 2010
Work Incentive (12%)		
No. of author/co-author on report/paper publications	7	↗
Successful rate* of projects status from "progress report" to "passing out" – project requirements completed	80%	↗
Working Regulations (7%)		
Guidelines for transfer of research result	☑	➔
IT Security (4%)		
Security guidelines	☑	➔
Intellectual Property (2%)		
No. of beta version recorded and available to use	3	↗
No. of transfer of IP to other organizations/researchers	4	↗
Customer and Supplier Base (1%)		
No. of customers - university / school / museum	7	↗

Relational Capital

Relational capital involved value-creating relationship between HKHPC and its stakeholders such as project teams, local community, collaborative institutions, regulatory bodies and consumers. The team members and local community were regarded as the most significant stakeholders.

Table 4. Relational Capital Indicators

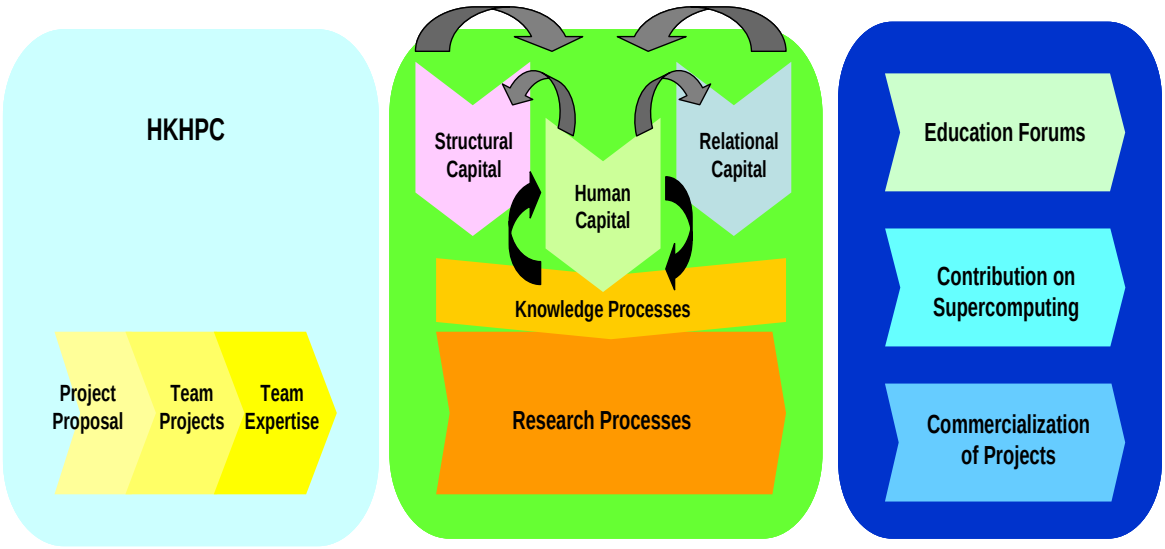
Indicator	Status 2009	Target 2010
Project Teams (10%)		
No. of ongoing project teams	6	↗
Average duration of project teams (months)	18	→
No. of incomplete projects (accumulated)	3	→
Local Community (10%)		
No. of education forum organized	3	→
No. of design competition organized	0	1
Collaborative Institutions (4%)		
No. of local/regional collaborative projects	5	↗
Regulatory Bodies (3%)		
No. of IP right infringement	0	→
Consumers (2%)		
No. of school students attended HKHPC's activities	500	↗
No. of industry associations/schools attended HKHPC's forum	10	↗
No. of contacts built between HKHPC and departments (local/regional governments or public bodies or schools)	50	↗

- **Accumulation of IC in HKHPC**

  HKHPC created IC value by providing a platform for supercomputing researchers to work on projects with bright prospects. Accumulation of IC was at the team member's level instead of at the enterprise level.

  The following diagram depicts the intellectual capital flow of HKHPC over the years.

Figure 2. Intellectual Capital Flow
(From project proposals to the utilization of research results)



- **Risk Analysis**

The team, together with the consultants, discussed the risk associated with the IC inventory. They identified as a priority risk the outcome of losing the key intellectual capital during the process of transferring them among different collaborating parties. The discussion about risks was based on the "Outcome" of considering the "Probability" and the "Effect" of the accompanying risk. Mitigating measures in relation to these identified risks were proposed and subsequently shared among all the Directorates within HKHPC.

The results of some of the risk assessment exercises were recorded as follows:

Table 5. Risk Assessment

Risk	Probability	Effect	Outcome	Mitigation Measures
Ambiguous ownership of intellectual property rights	Medium	Great	Long-term adverse effect	• Awareness of ownership and mechanism to assign/license IP rights • Commercialization model
Loss of IC during the transfer process	Medium	Above average	Significant	• Systematic way of IC transfer • To raise the awareness of the importance of IC among members
Loss of experts with key research knowledge	Low	Above average	Competitive disadvantage	• Incentive programme such as monetary/recognition scheme • Clear path for gaining academic value as well as ownership of research result • Education forums

Note: The "Outcome" should be the numeric result of multiplying "Probability" by "Effect." Quantitative result was not available in HKHPC case.

- **Intellectual Capital Report**

The preparation of an IC report and making it available to the public were strongly encouraged by the Programme. HKHPC prepared its own IC report in May 2009. With the goal of meeting the expectations of stakeholders, the report summarized the core value and innovative capacity of the enterprise as well as documented the whole ICM process.

- **Sharing After the Programme**

Dr LAM shared his ICM experience with the IPD in a presentation ceremony held in August 2009. The founder asserted that the mission of the enterprise was to build a platform for researchers to take part in academic and professional projects on supercomputing in Hong Kong. During the sharing session, Dr LAM further reiterated:

> Intellectual Property is different from intellectual capital management. To make human capital sustainable, you have to convert it to structural capital (permanent records of knowledge held by an enterprise). At present, not many government departments and academic institutions can offer any form of help. Moreover, the exercise also helps us to identify untapped business potential and strengthen the enterprise's structural capital on top of the already mature human and relational capital.
>
> Research is creating knowledge; and knowledge needs financial support. There is always a huge gap between holding a pile of knowledge and realizing it as

concrete business. Supercomputer, for example, embraces both direction and potential; however, you need more steps to turn it into money. I regret to say Hong Kong has no supercomputer centres despite its technological advancement. So we are planning to set up a supercomputer centre in Hong Kong. A unique business model is being carefully devised to ensure its sustainable development.[4]

Mr Stephen Selby, Director of Intellectual Property, Hong Kong, China (left) awarded the "2009 Excellence in Intellectual Capital Management" to Dr LAM Wai-kin, the Founder of HKHPC (right) on 4 August 2009.

Conclusions and Recommendations

Ways of Managing Intangible Assets

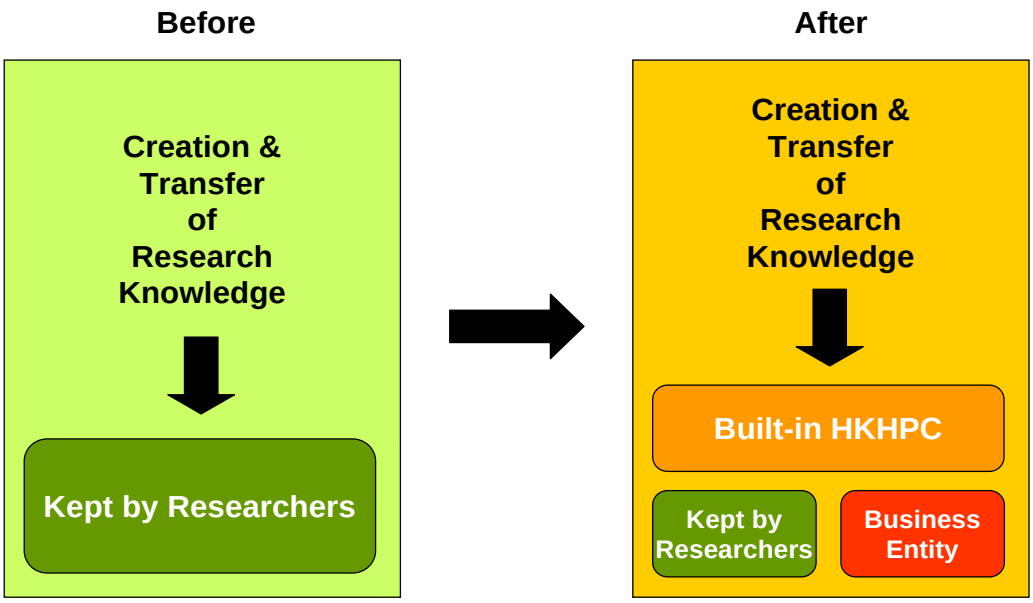
Did the enterprise do things differently when its hidden IC value was uncovered? The answer was definitely a 'yes' in this case. The directors of HKHPC gained an understanding of the significance of the IC value accumulated over the years by its team members. Transfer of research results, though was still in an immature stage and could be done in a more systematic and organized manner. The team members were briefed about the ICM concept and sharing sessions were conducted within HKHPC.

The future economic benefits of IC were assessed. Corresponding strategies especially on technology transfer and commercialization of projects were devised to meet the ultimate goal, i.e., to build a sustainable institute with robust supercomputing research platforms in the region.

The creation and transfer of research knowledge after the ICM Consultancy Programme could be depicted as follows:

[4] *The Standard*, 19 August 2009:11.

Figure 3. Creation and Transfer of Research Knowledge
Before and After ICM Consultancy Programme



Before the ICM Consultancy Programme, the creation and transfer of research knowledge were kept by researchers and the ownership of the resulting intellectual capital was not clearly defined. After the Programme, HKHPC would help maintain a proper record of the research knowledge and decide if a business entity should be set up to hold the corresponding intellectual capital. Participating researchers and/or HKHPC would own the business entity as sole proprietorship, partnership or incorporated enterprise.

Future Outlook and Challenges

The industry of high performance computing, without a doubt, would play a key role in knowledge economies across the region. The founder of HKHPC viewed computation power as the infrastructure of knowledge-based systems in the future.

It is foreseen that the challenges would be coming from outside competition (i.e., other large research institutes in the region) and the insufficient resource (shortage of local brain power) within the economy. Nonetheless, HKHPC had already prepared itself to tackle such challenges and planned some of the education initiatives and forums to address these issues.

Experience Sharing

The paradigm experience in HKHPC served as a good reference for other SMEs across industries and economies. Firstly, value accumulated in an enterprise should be uncovered, identified and recorded. Secondly, intangibles which were not yet commercialized or properly developed should be transferred to suitable person(s) who knew how to make the best out of it.

The Intellectual Property Department had been generating awareness of ICM through its ICM Consultancy Programme. IPD labeled this programme "ICM Lite" since it was clearly not intended as a full-scale ICM support service. IPD hoped to create a market to develop a local ICM support industry.

Within 10 months, over 300 enterprises had enrolled in the programme and the positive feedback for IPD's initiative had been encouraging. Such experience had provided opportunities for sharing among the economies in the APEC Region. Other APEC economies should consider promoting the ICM concept or launching a programme on a similar scale so as to enhance, in the long run, the economic activities and value in the region.

Supplementary Note

Note 1: HKHPC was able to benefit from the ICM Consultancy Programme as echoed by the Founder:

The findings of last year's ICM analysis are indeed very useful. As a result of the exercise, HKHPC's original sponsors support the management's decision to conduct a major re-structuring of the Institute.

1. Formal organizational structures have been introduced to facilitate the creation and transfer of knowledge.
2. New business operations are being set up to realize the identified business potentials.

> The new roadmap reflects that the enterprise is more aware of the importance of securing its intellectual capitals and minimizing potential risks. — Dr Lam

Note 2: HKHPC also gained financial position and industry reputation through the ICM exercise.

The IC report is well received. We have received a number of enquiries on synergy and collaborations after the distribution of our first IC report in May 2009. That is very encouraging. The IC report also serves as an effective tool for venture capital (VC) and new sponsors to better understand the Institute's status and potentials. The investors generally endorse our new business model.

In our recent communications with potential investors, it was generally agreed that the market potentials of the Petacomputing infrastructure and personalized high performance computing (HPC) are great and should not be ignored. We are prepared to share profits with our synergy partners.

> At specially designed workshops/seminars, government officials of medium-sized cities (in mainland China) indicate their intent to investigate and adopt our proposed model of implementing an information and communication technologies (ICT) infrastructure to prepare for the challenges of knowledge-based economy. They perceive this as an important step in upgrading the quality of local manpower.

– Dr Lam

Note 3: Garage meetings – one of the major activities of HKHPC

The garage meetings were organized regularly. The main aim of the meeting was to facilitate and cultivate new project proposals.

Members from different project teams joined the meeting to provide comments on the project. While project team members were encouraged to express their views freely, project leaders were also invited to observe and listen during the meeting. No real decisions were made in the garage meetings. Project leaders might choose to respond by revising their respective projects to incorporate the new ideas gathered from the meeting.

When the new idea received general support during the meeting, the initiator/s were encouraged to submit a new project proposal to the directorate for endorsement.

Note 4: How the weights for the IC items were assigned

Step 1. IC Item Selection

From the original list of structural capital, human capital and relational capital items suggested by the ICM consultants, HKHPC compiled a list of IC items that were relevant to its operation. The list was circulated to senior members for comments and suggestions.

Supplementary Table. List of IC Items*

List of IC Items	
Human Capital	
Personal Ability	Education/Professional qualifications/Licence Work experience Language proficiency Personal network Attitude and personality Commitment
Teamwork	Converge to corporate culture Stick to corporate goal/vision/mission Degree of trust Creativity Execution Division of Labour Synergy
Communication	Communication between supervisor and subordinate Communication between colleagues Communication between departments Knowledge sharing across entire enterprise Communication with management Communicate externally

List of IC Items	
Leadership	Leadership skills Capacity to move forward Goal setting Build corporate culture Encourage innovation Value creation
Training	Voluntary learning Passion on learning Mentors Resources allocated for training Expectation and indicators on training programme
Structural Capital	
Training and Knowledge Sharing System	Job requirement and selection criteria Personnel ability test and database Established workflow/regulation/guideline Continuous training programme and indicator Encouragement of knowledge sharing Work goal and achievement level monitor
Work Incentive	Company culture Ideology/Goal/Vision/Mission Appraisal system (Material/Non-material) Work satisfaction Relation and recognition Ownership of company stock/option
Information Technology System	Security Portable memory device management Information back-up Access control External relation management system Quality control management system
Strategic IP Management	Software asset management Possession of trademark/patent/copyright/trade secret - IP as core development strategy - Value of IP to the company - Income and benefit derived from IP - Exploration/Registration/Maintenance
Creativity and Innovation Management System	Collection/Encouragement/Development/Statistics Resources devoted to innovation development Innovation portfolio management - Categories (Product/Service/Work process) - Risk and Return (High/Medium/Low) - Return Duration (Long/Medium/Short)
Relational Capital	
Supplier	Supplier diversity Supplier stability Communication with suppliers
Customer	Client diversity Client distribution/networking Brand perception from clients Value-added for clients Client loyalty

List of IC Items	
	Client communication and sharing Stability of service level Client feedback and complaint handling
Staff	Communication with staff Staff loyalty Sense of belonging Staff satisfaction Staff commitment
Same Line of Business/Federation	Level of cooperation Strategic alliance/Mutual development Upgrading industry code of conduct Knowledge sharing Resources sharing
Regulatory/ Government	Internal control Compliance with regulation Support government programme Job creation Convey the right message Product safety Occupational safety Environmentally friendly Community service Anti-discrimination

* Suggested by ICM Consultants for general discussion

Step 2. Weight Assignment

Mutually blind inputs from senior members on weighting of relevant IC items were collected and summed up.

Relevant IC items:

- Individual expertise
- Team members
- Communication skills
- Leadership
- Training
- Work incentives
- Working regulations
- IT security
- Intellectual Property
- Customer and supplier base
- Relationship with project teams
- Corporate citizenship
- Relationship with collaborative institutions
- Relationship with regulatory bodies
- Relationship with consumers

The final weighting was expressed in points of 100, or interpreted as percentage. No

monetary assessment was involved in the exercise.

The calculation can be illustrated as follows:

$$W_i = Q_i \,/\, \sum_{i=1}^{n} Q_i$$

Where

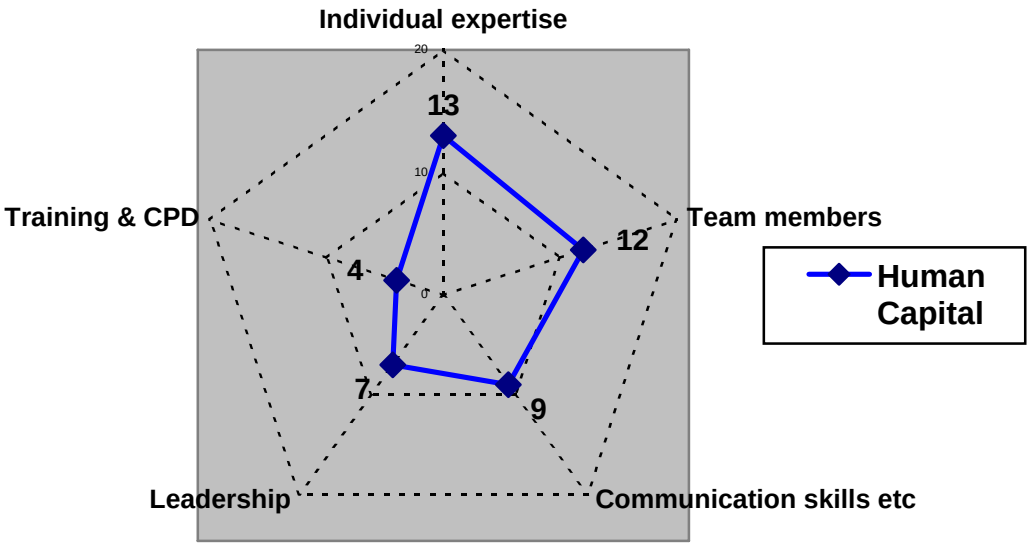
i = 1 to n
n = total number of relevant IC items identified
Q_i = quantitative measure to show value contributing to stakeholder for IC item i
W_i = point value or percentage of IC item i

The key was for the senior members of HKHPC to put up a quantitative measure for each relevant IC item - Q_i. Integers were recommended to show how much an intellectual capital item could contribute to the creation of wealth for HKHPC in the eyes of stakeholders. The same scale had to apply for all IC items. Sum of all W_i had to equal to 100 IC value (ICV) points or percentage.

Step 3. Visualization

To facilitate easier communication, radar charts were used for visualization.

Supplementary Figure. Radar Chart for Human Capital



Note 5: Comments from the Founder of HKHPC

As a beneficiary of the ICM exercise, HKHPC is willing to share its experience with other institutions/enterprises at appropriate occasions. In addition to the clear roadmap for restructuring, the adoption of a new business model, and internal training sessions at HKHPC, we have also offered seminars and consultancy workshops on ICM to

outside parties — including university-based incubators, science & technology parks in mainland China.

— Dr Lam

Asia-Pacific
Economic Cooperation

P T Apora Indusma
Indonesia

An Experience of Holding IPR in a Market with Fierce Competition

Written by

Soegeng Priyono

Founding Partner
DevOne Advisory Co.

The case was developed with the cooperation of PT Apora Indusma solely for educational purposes as a contribution to the project entitled "IPR Strategies for Emerging Enterprises — Capacity Building for Successful Entry to Global Supply Chain," conducted under the auspices of the Asia-Pacific Economic Cooperation (APEC). The case is neither designed nor intended to illustrate the correct or incorrect management of the situation or issues contained in the case.

It was the first month of the year 2010, and Mr Martono Gunawan (also called Kuku) was feeling grateful that under his leadership the company, Apora, which he established way back in 1983 had weathered many ups and downs and had grown significantly. From a garage class machining shop in the downtown area it had developed into a modern manufacturing company situated in a large industrial complex.

Kuku was wondering why his company could not win its fight for more business against its competitors, more especially in the domestic market, in spite of its track record in delivering space-frame projects to more than 24 economies across the world and its IP patents rights on his Bottle Connector System.

By acquiring the patent rights, Apora expected to attract more customers, command a price premium, drive sales volume, enable clear product differentiation and positioning, and hopefully reduce marketing cost. As it turned out, these did not happen as expected; Apora still faced a lot of challenges just to win more business against competitors who did not even hold any patent rights.

Company Background

In mid-1983, Kuku transformed a small machining shop he inherited from his late father into a more modern company and named it Apora. As a trained civil engineer with a passion for steel works, he dreamed of building a world class steel space frame that would not only last for decades but would also provide strong protection against earthquakes, flood and the like.

Assisted by the DUC (Dutch United Consultants), Kuku started to research on space frame component manufacturing. Within six years or in 1989, the company was able to export its products to other ASEAN economies.

In 1995 Apora invented a new system called “Apora Bottle Connector System” that was patented in China, Chinese Taipei, and Indonesia. The patented connector was rigid, aesthetic looking and unique. As such it earned the name “Indonesia Space Frame” in the overseas market.

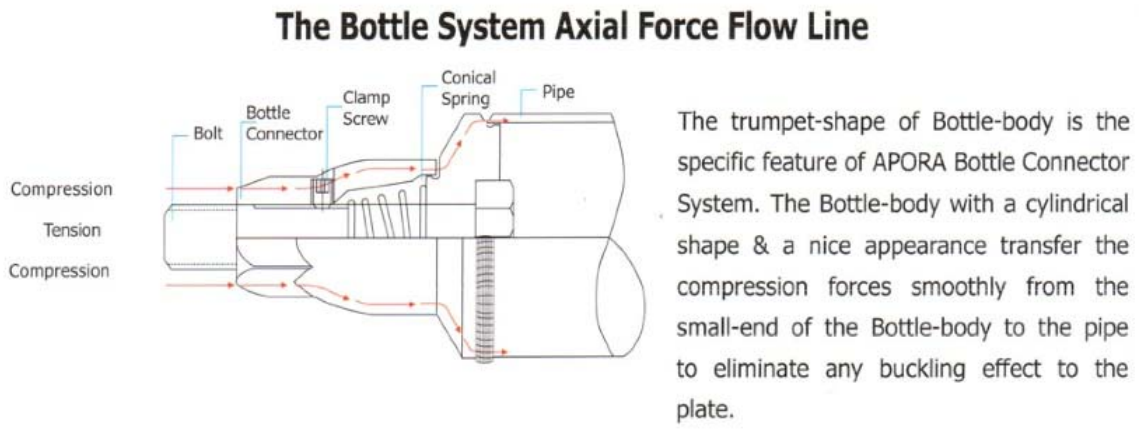
Space Frame

The space frame was a 3-dimensional steel structural network consisting of three kinds of elements: node, pipe and connector set. The structure could be formed into any architectural shape and had the capability for cantilever spanning of up to 100 meters. It was suitable for canopy, exhibition hall, station, stadium, skylight, tower, hangar, auditorium, and other similar structures (see Figure 1).

Figure 1. Sample of Space Frame Application

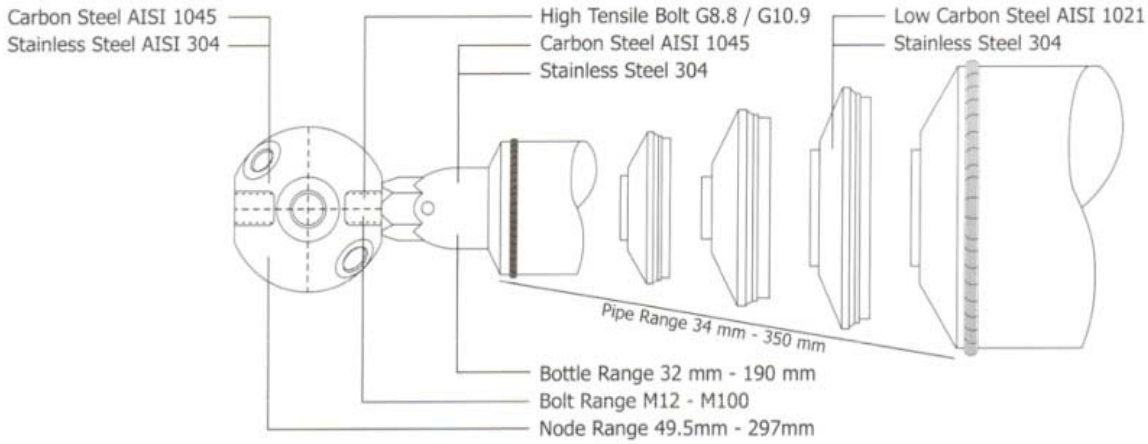
The most important element of a space frame structure was the ball joint, which served as the hub to which several pipes with different forces were connected. To connect the pipes to the node which was shaped as a ball, a special connector was required. This special connector was called the Apora Bottle Connector System as shown in Figure 2.

Figure 2. Apora Bottle Connector System (Patented)



The bottle connector had the following components range:

Figure 3. Components Breakdown



At close range, the connection would look like the picture below.

Figure 4. The Connection

The criteria for the choice of a good space frame include rigidity, lightness, speedy construction, design flexibility and factory finished color selection. It should be rigid enough to withstand earthquake and flood of a high magnitude. It should be light in the sense that it should use materials efficiently as a result of design construction. It should also give the architect flexibility to design the overall construction shape and select the color. How fast the construction could be erected was likewise a very important consideration. Unlike their competitors, Apora was ready to offer their customers a 20-year warranty for their constructions.

Apora's Assets

As a seasoned engineer, Kuku early on realized that breakthrough technology would be the major secret behind Apora's value proposition. He invested a great deal of effort in research and experimentation until finally he found a technique that he believed was to be the winning space frame technology.

Realizing that his practical background came from a material fabrication and machining orientation, Kuku decided to collaborate with academicians from well-known local and overseas universities to enrich and strengthen Apora's offering.

As a result of Apora's R&D efforts, the company had successfully invented the following:

- Simulation software, Apora Smart Program for Space Frame (ASSF) that served as an indispensable tool to visualize, simulate and analyze the forced impact of strong wind, earthquakes or flood on the whole frame structure.

- Apora Node, a machined surface node with an accuracy of up to 0.1mm to ensure that the bottle connector could accurately connect to the node.

- Apora "Bottle" Connector System, consisting of bolt "bottle" body, conical spring and plate. This trumpet-shaped bottle-body was a unique connector system that could transfer compression forces smoothly from the pipe to the node. This system was protected with the following patent rights:

  1. Indonesia Patent No.ID0005548 since October 2000
  2. Chinese Taipei Patent No.117691 since November 2000
  3. PRC Patent No. ZL 96108002.7 since November 2002

- Apora Welding System using a gas metal arc welding (GMAW) to weld the plate to the pipe. This tailor-made automatic welding machine resulted in high welding quality and efficiency.

In spite of the company's three patents, Kuku was not sure if the company could continue to move forward. He was the driving spirit behind the inventions all these years. Already in his mid-sixties, he was wondering how far the existing engineering team could continue to excel without him. He was hoping that at least one of his three siblings would someday want to carry on company operations.

Apora had 40 employees working in the manufacturing floor with Mr Alex

Gunawan as the lead engineer, seven were in sales and marketing, and 13 were in back-office administration.

The company had a production capacity of 10,000 square meters of space frame per month. Extra capacity could be readily achieved by adding shift(s). As a guideline, Apora's unit selling price was $3.5 per kg of installed space frame as compared to the price set by competitors which ranged from $2.4 to $4.1 per kg. The cost structure of Apora was roughly 60% materials, 25% direct labor and 15% overhead.

The space frame unit weight (kg/sqm) varied in different economies depending on the local condition, or whether the structure was designed to withstand hurricane, snow, major flood or extreme temperature changes like 20°Celsius to 60°Celsius. For Indonesia the space frame's typical unit weight varied between 17kg/sqm to 27kg/sqm, depending on structure size and magnitude of load condition.

The total price of space frame could be calculated using the following formula:

Total weight = total area (sqm) x unit weight (kg/sqm)
Total price = unit selling price (USD/kg) x total weight (kg)

Given a certain design, size of structure and magnitude of load conditions, the proponents could come up with the total weight based on their own calculation, knowledge and experience. Multiplying the total weight by the unit selling price would yield the total price. To achieve the lowest total price, a manufacturer could either lower the unit selling price or lower the total weight, or do a combination of both.

As mentioned earlier, rigidity and lightness were two of the important criteria for space frame selection. Whoever could come up with the required rigidity and lightness in weight of the structure would definitely be able to offer a better price. This was where knowledge and experience came into play. Everything however must conform to the provisions of the Steel Code and Space Frame Code. Hence, the lower priced space frame did not necessarily mean the best choice since non-compliance with the Codes could mean higher risk.

The other important asset of Apora was its long-term relationship with customers, business partners and suppliers. Space frame was always a subset of a construction project and never a stand-alone project. As such, the selling had always been done through main contractors, which made relationship management quite sensitive and complicated.

Take the following case as an illustration:

The project owner, say a local government, would want to build a new sports stadium. The first thing that the local government as project owner would do would be to hire a management consultant to prepare the terms of reference (TOR) and run a tender. Next, the main contractors would submit their bids based on the TOR. The winner could then subcontract the space frame part to the manufacturer who could give the best offer.

To win a project, Apora would have to convince the main contractors. It had to develop a good relationship with the management consultant who wrote the TOR, and with the ultimate owner of the project. Once the main contractor had been appointed,

the owner would no longer be in full control of the subcontractor selection. Over the years, Apora had become quite good at managing the various nuances of these relationships in the domestic market.

Sales

Domestic large space frame projects were mostly related to the construction of a new sports stadium, conference hall, train/bus station and airports, among others. The government most likely owned these types of projects. Apora was not keen on chasing smaller projects like windows canopy, rooftop and other similar projects.

Certain large projects were cyclical. Indonesia had a regular agenda to hold a National Sporting Competition Week (PON) at a four-year interval. The host city was rotated among the 35 provinces in Indonesia. To support the event, the host city would usually start building a new sports stadium with all the support infrastructure two years before the event. Apora won the first PON project in 1988 and some of the subsequent PON projects in 1992, 1996, 2000, 2004 and 2008.

The next major bid Apora was very much hoping to win was for the PON 2012 project. The bid was due to be completed in early 2010 so that construction could start immediately after. Pekanbaru, the capital city of the oil-rich Riau province in Sumatra Island would be the host city. The total space frame area for the sports stadium alone was 37,500 sqm. This was roughly equivalent to almost four months of Apora's production capacity and worth $3.5 million-$4 million in revenue. In addition to this project, Riau also planned to build a new airport.

Apora experienced good overseas sales when it exported the products to ASEAN economies in 1989. Sales went up significantly because of demand coming from Chinese Taipei, Malaysia, and Singapore in the early 1990s, and continued on through 1995.

The invention of the Apora Bottle Connector in 1995 marked an important milestone for the company and gradually boosted its overseas sales further up through the end of 1999. In contrast, the domestic sales for the same period were close to none due to the monetary crisis that started to hit the country in July 1997. After 2000, overseas sales started to decline through 2008.

In 2009, both domestic and overseas sales dropped significantly, driven by the world financial market meltdown in the USA. It was indeed a double whammy for Apora.

Competition

Apora's strongest competitors in the international market were manufacturers from China, England, Korea, Mexico, Spain, Turkey, and the USA. However, Apora had already gotten used to aggressively competing with them and had no fear of the competition.

Ten to fifteen years, ago competition was not as sophisticated as it was in early 2010. The fast-changing manufacturing technology, coupled with pervasive Internet technology, made the competition fiercer. Buyers had more options than ever before at their convenience.

In the domestic front, the closest competitors were companies A and B, which were at a lower level than Apora in terms of technology sophistication and were not holders of any patent rights. They were believed to be catching up, however. Among the three, Company B offered the lowest price and had the strongest sales force. Apora had the most sophisticated operations, but also offered the most expensive product.

The local market found the Apora product to be 20%-30% more expensive than those of its competitors, although it was better in terms of quality. The customers, however, did not always need the high specifications of the Apora product. Oftentimes, Apora found it difficult to meet the customers' request to lower the specifications of their product so as to make it more affordable.

Decisions to Make

Kuku contemplated deeply what actions he and his key managers should take to turn around the company situation. He decided to call all his "lieutenants" for a Monday morning meeting the following week.

Asia-Pacific
Economic Cooperation

Tanikei Manufacturing Ltd
Japan

How to Find IP Price and Manage IP Transaction in SME

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The case was developed with the cooperation of Tanikei Manufacturing solely for educational purposes as a contribution to the project entitled "IPR Strategies for Emerging Enterprises — Capacity Building for Successful Entry to Global Supply Chain," conducted under the auspices of the Asia-Pacific Economic Cooperation (APEC).

In April 1996, Mr Taniuchi, the president of Tanikei Manufacturing Ltd met with two businessmen from Chicago in the company's offices in Japan. The visitors were representatives of the steel can manufacturing division and risk management division in Heinz USA. They had come to Japan to ask Mr Taniuchi to sell them the US patents of the "safest pull-top technology in the world" that Mr. Taniuchi invented. Likewise, they wanted to be given exclusive license for the product outside Japan and the US for 10 years; Mr Taniuchi could make and sell the products outside the US, but no other license should be issued to other companies.

During the one-hour meeting, one of the visitors asked, "Mr Taniuchi, what is the price of the rights to the US patent and the exclusive license for your product in the rest of the world except in Japan and the US?" Mr Taniuchi was excited but calmly considered what his price offer should be. He just said, "I will give you my answer after two weeks." They said, "Okay, take your time, but it should not be later than two weeks." In their subsequent discussion of the next step in the IP (Intellectual Property) transaction, Mr Taniuchi felt that his visitors appreciated the value of Tanikei's technology. As Taniuchi saw them off at the Narita Airport, he wondered how he could determine the appropriate price for his IPs.

Company Profile

Tanikei Manufacturing was established in 1963 as a company specializing in the design and manufacture of precise molds. As a small family-owned manufacturing company that supplied its products to big companies for a small profit, Tanikei relied solely on Taniuchi's experience to run the business.

Mr Taniuchi, the president of Tanikei, had acquired the skills and craftsmanship for manufacturing molds in a small metal factory where he worked for 16 years before he put up the company. During those years, Mr Taniuchi learned the skills of experienced workers just by watching them make molds.

Sometime in 1973, Mr Taniuchi visited an exhibit of auto-processing machines used for the design and manufacture of molds. He was shocked to see precise molds that were being manufactured by high-specification machines. Those machines accomplished in less than 30 minutes tasks that would have required several days of manual work. Mr Taniuchi feared that small manufacturing companies such as Tanikei Manufacturing in Japan might soon be taken over by the new machines. He thought that there was a need to develop new technologies which high-tech machines could not imitate. Soon after, he started to develop a number of new products that were not yet available in the market.

Japanese Monozukuri Company

Tanikei Manufacturing was a typical Japanese *monozukur*i company. In Japan, the *monozukuri* company was defined as a company with micro fabrication technology, such as mold and turnery technologies, and the accumulated experience, craftsmanship and expert know-how of its engineers.

The typical monozukuri companies were small in scale, usually comprised of less than five employees. They could be found all over Japan. Ota-ward in Tokyo and Higashi Osaka were famous for their monozukuri companies. The products of these companies– components or molds supported by their technologies – were used as components of products made by many Japanese multinational companies such as Toyota and Sony. It is no exaggeration to say that the quality of Japanese products came from the sophisticated technologies of these small monozukuri companies.

However, as Mr Taniuchi expected, after the 1980's many monozukuri companies found themselves struggling to survive because of aging engineers and company owners as well as the shift of the production base from Japan to overseas locations. Their manufacturing knowledge and expertise were usually lodged with specific workers and were rarely protected by patents. It was not common for these companies to transfer their technologies or license them out to other companies to acquire added benefits. At the same time, they were likely to use the technology mainly for their own small volume production; therefore, their competence was easily influenced by the shift of production to overseas locations and the cheap import substitutes in the 1990s. In addition, due to aging engineers and owners, the transfer of knowledge and know-how became a big issue in the 2000s. In Ota-ward, a program was initiated by the government to transfer the know-how of 100 chosen skilled engineers and preserve their skills among the younger generation.

Technology

Sometime in 1983, Mr Taniuchi read the news about an American pianist who won a Product Liability (PL) lawsuit involving an accident in which the pianist had injured his finger while opening a pull-tab type can. Mr Taniuchi found out that there were about 1,500 lawsuits a year in the US involving similar accidents.

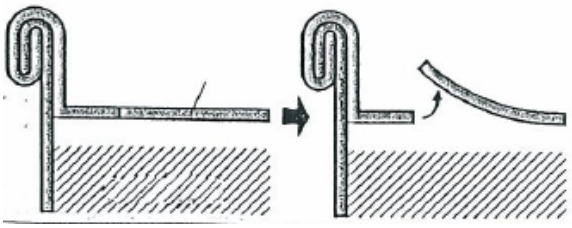
Feeling sorry for the unfortunate pianist, Mr Taniuchi started to design a "safe can top" and created many prototypes which went through numerous trial and error testing for five years. He believed that if his company could succeed in developing the "safest" product, it would be sold all over the world. He made 1/1000 mm adjustment to prevent fingers from touching the sharp edge of the can top. In 1991, he completed the development of the "safest can top" shown in Figures A and B. It was called "the double-safety can top."

Figure A

Figure B

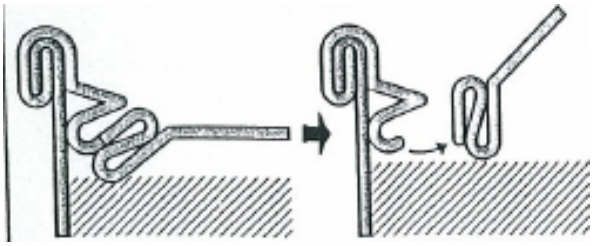
The inner coating material of the original can top lid made it difficult for the lid to be removed from the can. In the case of "Normal Can Top" (Figure C) forcing the can opening made the cutting edge very sharp, resulting in finger injuries.

Figure C. "Normal Can Top"



In "the double-safety can top" invented by Mr Taniuchi (Figure D), the sharp edge of the can top was covered by a smooth enclosing wall and was not exposed on the surface. Unlike the edge of a conventional can top, the edge of the safe can top was naturally rolled up after it was cut. Mr. Taniuchi designed the can top edge to be rolled up in a loop. After numerous tests on the tightness of the loop, Mr. Taniuchi came up with the right shape that could smoothly and safely open the cans.

Figure D. "Double-safety can top"



The double-safety can tops not only ensured safe openings but were also strongly resistant to internal and external pressures. Because the cutting edge of the can was wrapped up in an enclosing wall, its dynamic strength was high. Even if the thickness of the can were to be reduced by 30%, this can top would still maintain the same strength as other conventional can products.

Business Strategy in Tanikei

After successfully developing the safe can top, Mr Taniuchi had to decide how to sell the product or the main technology of the safe can top. His personal goal was not only to attain financial gains but also to make a social contribution. He came up with his innovative ideas because he liked engineering which could give people a better life and make them happy; he wanted to help prevent injuries from can tops. There were three possible business strategies that he considered:

1. Manufacture and sell their new can tops themselves.
2. Manufacture their new can tops through a contract manufacturer and sell them themselves.
3. License out their IP and transfer the technology to can makers.

In considering the first strategy, Mr Taniuchi had to bear in mind that as an engineer, he wanted to manufacture the products in their own factory. The technology of the safe can top was his own idea and he did not want anyone to imitate it. He wanted to adopt the first strategy to keep the trade secret within the company. However, aside from him Tanikei did not have any sales force and network to sell safe can tops inasmuch as the company manufactured molds and metal parts.

Soon after developing the product, Tanikei started the production and export of safe can tops to Chinese Taipei because of a direct order from a can maker. Although it was successful in the beginning, the transaction with Chinese Taipei ended in 1995 due to the rapid appreciation of the value of the yen. In Japan, it was very difficult to sell only can tops to domestic can makers and food companies, the main users of steel cans.

In considering the second strategy, Mr Taniuchi tried to ask some contract manufacturers to produce can tops and sell them to can makers in Japan. The contract manufacturers agreed, but only if they were paid the full manufacturing cost up front. It was a very difficult condition for Tanikei in terms of finances. Likewise, the can makers usually had their own manufacturing process and facility to make steel cans and were not interested in buying can tops. Mr Taniuchi therefore had to give up the second option.

Finally, Mr Taniuchi considered negotiating with large Japanese can manufacturers the licensing of his IPs and know-how. Although this meant that Tanekei would have to give up its own product, Mr Taniuchi still wanted people all over the world to use safe can tops and avoid the same tragedy that befell the American pianist. Also, it was the only way that he could monetize his patents and technology. He thought he would need money to commercialize his invention and develop new products. He thus decided to license out his patents and know-how in the belief that Japanese can makers would be desperate to buy his technology.

Contrary to his expectation however, the Japanese can makers were “cruel” to Tanikei Manufacturing. During the first meeting, Mr Taniuchi showed them the certifications of Tanikei’s IPs and explained the technology of the safe can tops. One of the representatives of a can maker said, “We have invested a huge amount in a similar technology. Do you believe that we can’t develop the same technology that you have invented? Why do you threaten us and want to sell us your IPs?”

At the second meeting, Mr Taniuchi brought a sample of the double-safety can tops and demonstrated how safe the product was. The companies changed their attitude and became interested in the "double-safety can tops" technology. However, before the non-disclosure agreement among them could be arrived at, they repeatedly asked how the product was made. Fearing that his technology might be stolen, Mr Taniuchi hesitated to disclose what the companies wanted to know. Because of this, the companies rejected what he was offering and prevented Tanikei from selling safe can tops in Japan. They refused to use Tanikei's double-safety can top and did not heed their customers' request to use the product. As a result, Tanikei's business did not prosper in the Japanese market.

Fortunately, a famous industrial magazine "The Canmaker" featured Tanikei's safe can top technology. As a result, more than 30 can makers visited Tanikei and admired the invention which had the possibility of replacing a standard pull-tab type can. One of the visitors was from Heinz USA - a company that desperately wanted to be the first in the industry to use safe can tops.

Heinz USA

Heinz USA was founded in Sharpsburg (a suburb of Pittsburgh), Pennsylvania in 1869 by an entrepreneur, Henry John Heinz. Their products included tuna and other seafood products, pet food, baby food, frozen potato products, soup (canned and frozen), sauces/pastes, beans, and other processed food products. They employed approximately 32,500 people around the globe in 2009. Their annual sale was over $10 billion all over the world. They continued to engage in the business of manufacturing and marketing processed food products and ingredients for food products. Their products were manufactured and packaged to provide safe, stable, wholesome foods used directly by consumers, and foodservice and institutional customers.

Heinz had to handle over 150 claims[1] per year mainly on finger injuries incurred when opening cans of Heinz products. Although Heinz had conducted research and developed new technologies in their laboratories, they could not find a solution to the finger cutting accidents. Their company mission was to deliver safe food to consumers but they could not achieve their mission because of lack of technology to address the problem that had already become an important management issue. The company not only had to pay a lot of compensation for damages, but was also risking its reputation and brand image.

The quality control team in Heinz had been looking all over the world for the technology that would make safe can tops. One day, one of the quality control team members in Heinz read the "Canmaker" and found the article on safe can top developed by Tanikei Manufacturing. He called the New York office of JETRO (The Japan External Trade Organization), a government organization promoting technologies of Japanese companies, to ask their help in arranging a meeting with Tanikei.

[1] This figure was disguised.

Negotiation with Heinz on IP Transaction

In September 1995, the representatives of Heinz visited the office of Tanikei Manufacturing and held their first meeting with Mr Taniuchi through the help of JETRO. The Heinz representatives admired Tanikei's technology and started talking about the conditions and contracts for the transfer of Tanikei's IPs and technology to Heinz.

First, Heinz asked Tanikei to sell four US patents which Tanikei applied for in the US in 1985 and acquired in 1991. Also, while Tanikei could use his IPs in Japan, they wanted to have exclusive license of the patent in the rest of world.

Second, Heinz requested Mr Taniuchi to effect the technology transfer. If Mr Taniuchi accepted their proposal, he would have to stay in Chicago for three months to install the machine and teach the engineers in Heinz how to make the double-safety can tops. They would pay $120,000 for the technical assistance.

Mr Taniuchi answered through an interpreter, "I need time to think about your proposal." After the meeting, he considered what he had to do. He was moved by the enthusiastic attitude of Heinz, which was completely different from what he experienced from Japanese can makers.

Reacting to the first condition that Heinz would obtain the US patents and license the IPs except in Japan, Mr Taniguchi felt that he would not want to give up the worldwide market and limit Tanikei's IP and production to Japan. However, he thought that since it would never be possible for Tanikei alone to sell their can tops in the world market, it would be better to accept the Heinz offer as suggested.

As for the second condition on technology transfer, Mr Taniuchi was worried that he would have difficulty in communicating with the Heinz staff because he could not speak English and had never been abroad. He thought however that "Even if the language and culture are different, the spirit of an engineer would be understood. I should do it if my technology is needed anywhere in the world." He also made a decision to go to Chicago and teach his technology.

Tanikei Mfg and Heinz held several meetings and talked about the details of safe top cans and how the technology transfer could be done. Mr Taniuchi was not used to negotiating conditions in a businesslike manner, especially with American counterparts. It was very hard for a Small and Medium-sized Enterprise (SME) such as Tanikei Mfg to negotiate with a large firm like Heinz. Because a typical SME in Japan usually had annual sales of $1 million with 4-5 employees, it could not afford to hire a professional staff who was knowledgeable in IP related matters.

Mr Taniuchi was getting very tired with the negotiation regarding the conditions of the sale and the IP pricing. After his last meeting with the Heinz representatives who asked him again at what price he wished to offer his IPs, he hired a professional consultant with prior experience in IP transaction who was introduced to him by the government office in Ota-ward in Tokyo. With the help of the consultant, the problems in negotiation were gradually solved.

General Methods of IP Valuation

To help him determine the price at which he was willing to offer his IPs, Mr Taniuchi called his IP consultant and asked the latter how the IPs could be valuated. The consultant taught Mr Taniuchi how they could figure out the value of his IPs based on the three methods of IP valuation that were generally used for the valuation of other assets. These were:

1. Cost approach method

The cost approach method focused on costs needed to create the IP asset. Under this method, there were two ways to evaluate the IP value, namely, the historical cost approach and replacement cost approach. In the historical cost approach, the valuation was arrived at by accumulating all costs such as Research & Development (R&D) costs in the past to realize current assets. The replacement cost approach estimated the costs necessary to develop the IP at its present state.

In the cost approach method, IP value represented the total costs to create the asset or costs needed to replace the asset. For example, if a company used $2 million as R&D cost to create an IP, or needed the same amount to replace the IP, its value was estimated to be $2 million. However, it would be difficult to prove the relationship between costs to create or replace asset and economic values from the assets. For instance, $2 million of R&D cost might be just cost used and the IP might not make any profit in the future. Therefore, valuation arrived at using the cost approach might be considered as reasonable and fair valuation, only if it were done with the utmost objectivity.

2. Market approach method

The market approach method was used to evaluate assets based on the market transaction price. For example, if an IP in a similar technology area was traded at $1 million, the value of the IP was estimated to be close to $ 1 million. This approach was appropriate for valuation of assets that could be traded in the market, such as equities of companies and real estates. Although the method was highly objective since it made use of transaction prices among third parties, it would be difficult to find similar transactions that could be used as the benchmark for the valuation of the IP under consideration. Also, generally speaking, it was very rare for IP to be transacted separately from the whole business. In such cases, it was very hard to estimate IP values from the whole asset.

3. Income approach method

The income approach method presented values of future cash flow derived from assets. Similar to equity valuation using DCF (Discounted Cash Flow) method, it indicated valuation of future income to be acquired by utilizing the IP assets. Otherwise, future saving cost could be used for the valuation. It was essential to maintain credibility and stability of the forecast of future income used for valuation. Generally, the present value in this method was calculated using the following formula.

$$PV = \sum_{t=1}^{T} \frac{FCF_t}{(1+r)^t}$$

PV: Present Value
FCF: Future Cash Flow
r: Discount Rate
T: Time

A typical income approach method in IP valuation was the royalty-relief method, a simple method with a practical application. In addition to valuation of technology and patents, it could also be applied to valuation of brands and trademarks. Even if a company were able to use its own patent freely, the basic assumption was that if the patent was being licensed to a company at the fair royalty rate, the company might have to pay some royalty to a third party. The fair royalty rate could be estimated from royalty rates used for a similar technology. "Assumed royalty" was calculated from sales based on the business plan multiplied by the estimated royalty rate of a similar technology.

Value of IP in royalty - relief method

= *Discounted present value of assumed royalty revenues*
= *Discounted present value of (forecasted sales in each period x estimated royalty rate)*

$$= \sum_{t=1}^{T} \frac{ARR_t}{(1+r)^t}$$

PV: Present Value
ARR: Assumed Royalty Revenue
(forecasted sales in each period x estimated royalty rate)
r: Discount Rate
T: Time to expiration of IP

When selecting the valuation approach from the three alternative methods, the features of each valuation and the purpose for evaluation must be considered. In conducting economic valuation of intellectual property rights, the income approach such as royalty-relief method was often considered to be appropriate, if the focus was on the profitability of intellectual assets.

Valuation of Tanikei's IP

Mr Taniuchi tried to estimate the value of Tanikei's patents on his own, using the three valuation methods. He calculated the total value of the sale of US patents and exclusive license in the rest of world, assuming that the entire license fees were to be paid one-time and up front. He learned that the general discount rate was 8% and the duration of the IP was 10 years.

Using the cost approach method, Mr Taniuchi estimated the development cost of the double-safety can top. He spent five years in developing his product from scratch to the complete model. He spent 100 days every year at $300 per day, the salary paid to Mr Taniuchi and another product development staff. They spent an additional $300,000 a year for materials and patent filing.

As for the market approach method, there were no public data on an IP transaction of similar products. When Mr Taniuchi met the patent attorney and other IP professionals, he was told that the data on IP transaction was rarely disclosed because it was usually a small-scale private transaction. Because of the lack of data, Mr Taniuchi had to give up the use of the market approach for IP valuation.

Using the income approach method, Mr Taniuchi estimated the amount that Heinz could save on compensation and reparation for finger cut injuries of people buying Heinz products. From 1992 to 1996, a number of their customers had finger cutting accidents while opening can tops of Heinz products (see the following table). Heinz had paid $100,000 for each reported case, including settlement fee and legal fee. Mr Taniuchi estimated that 50% of the cases could have been prevented completely by Tanikei's technology and the compensation costs in 20% of the cases could have been reduced by half.

Number of Reported Cases of Finger Cut Accidents in Heinz[2]

	1992	1993	1994	1995	1996
Number of finger cut accidents	34	43	37	48	52

Using the royalty-relief method, Mr Taniuchi calculated the IP value of Tanikei's technology. He assumed that Tanikei would grant the use of their patent not only to Heinz, but to other can makers in the world as well. He estimated that the market size of global metal can was $1 billion[3] in 1996, and would be stable in the future. According to the royalty data book, average royalty rate for can products was 3%. Mr Taniuchi believed that Tanikei's patents would account for 10% of all patents for producing cans.

Mr Taniuchi's Options

After Mr Taniuchi reviewed the IP valuation methods, he still wondered which method was reasonable both for Tanikei and Heinz. He had to decide the offering price to Heinz in the next meeting. If he offered a high price, they might cancel the IP transaction. However, he wanted to offer his IPs at a price that both parties would be satisfied with. Also, he had to consider how he would negotiate the IP transaction with Heinz; he had never experienced negotiating IP transactions before. He was afraid that the negotiations with foreign companies would be different from those with Japanese companies in terms of negotiation style and business dynamics. One option was to ask his consultant to act as the negotiator with Heinz and to deal with the IP pricing. Otherwise, he would have to directly talk and negotiate with them.

[2] These figures were disguised.

[3] This figure was disguised.

On the other hand, he wanted to achieve another goal - to save many people from injury caused by faulty can top edges. He was afraid that Heinz might dispose of Tanikei's technology once they change their business strategy. He wondered whether Heinz would promise to use safe can top in the future. If not, he wanted to take back his technology and IPs and allow Tanikei or other can manufacturers to use the technology. However, this requirement might not be acceptable to Heinz and they might abandon negotiations for this IP transaction altogether.

Mr Taniuchi knew that he had only three days before he met with the Heinz representatives to give them his final price offer. He had to decide soon not only for the company but more so for himself that he might achieve his goal to make the use of can tops safer for customers all over the world.

Asia-Pacific
Economic Cooperation

Malaysia Plastic Sdn Bhd
Malaysia

To Close or Not to Close, That is the Question

Written by

Muhammad Imran Chen bin Abdullah

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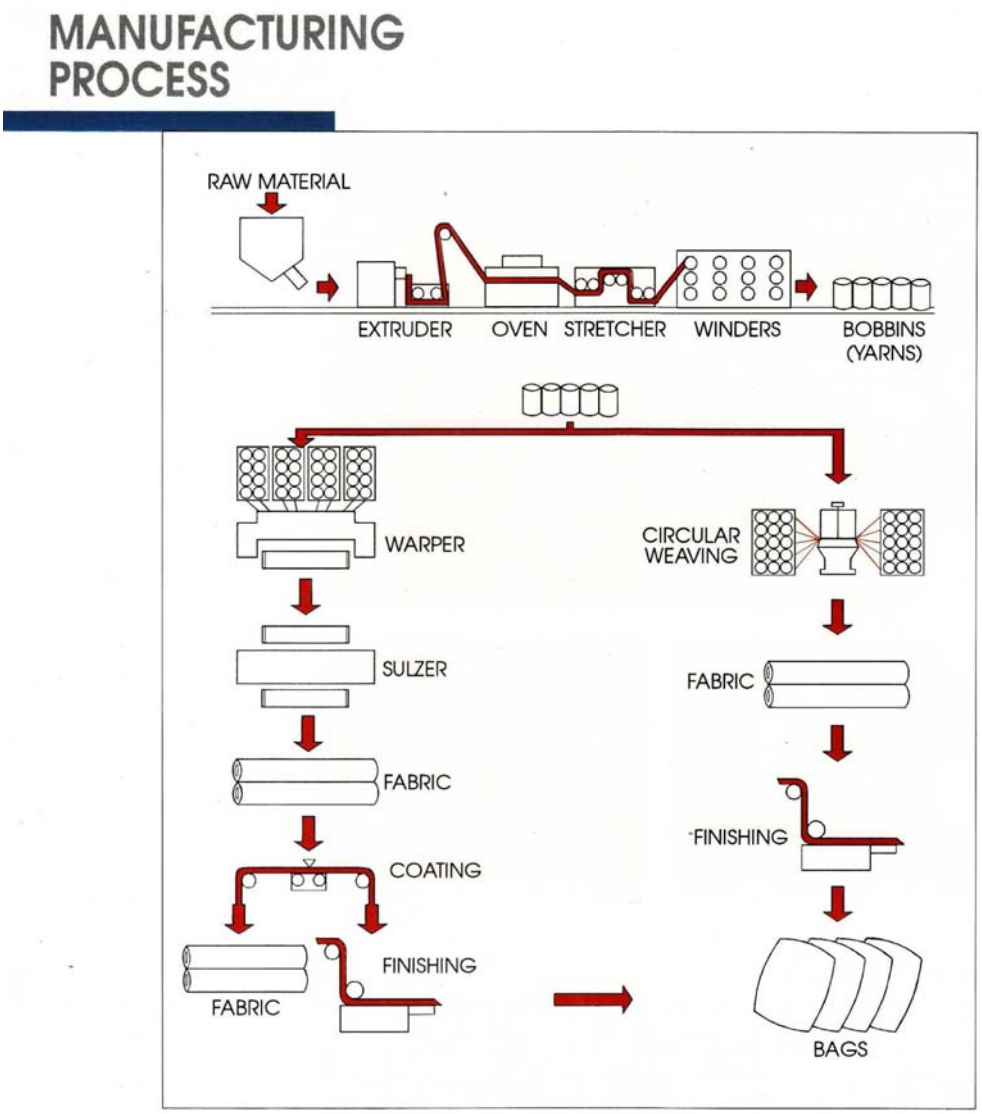
The case was developed with the cooperation of Open University Malaysia solely for educational purposes as a contribution to the project entitled "IPR Strategies for Emerging Enterprises – Capacity Building for Successful Entry to Global Supply Chain," conducted under the auspices of the Asia-Pacific Economic Cooperation (APEC). The case is neither designed nor intended to illustrate the correct or incorrect management of the situation or issues contained in the case.

Names of individuals, organizations as well as figures are disguised.

It was drizzling in the morning of 21 July 2006. From his office window, Mr Tony Yew, the Managing Director of Malaysia Plastic Sdn. Bhd. (MPlastic) could see a lorry loaded with PP circular bags leaving the warehouse. He had just gone through the company's financial analyses from 2003 to the first half of 2006 presented by his Chief Accountant. The financial analyses (see Exhibit 1) at the company as well as at the product type levels showed that in the second quarter of 2006, the company with a revenue of RM10.9 million suffered an operating loss of RM1.25 million. In the previous quarter, it had RM9.7 million revenues and RM0.59 million operating loss. The company had been experiencing deteriorating margin since 2004 which was attributed to intense market competition in the PP circular bags sector. Before the company's financial situation became worse, Mr Yew needed to decide soon whether to close the production of PP circular bags.

Exhibit 1.



Background

Mr. Tony Yew was appointed the new Managing Director of MPlastic in January 2003. He was an accountant by training and graduated with an MBA from a UK university. He had overcome many challenges throughout his 35 years career in manufacturing. Although he had identified profit margin improvement as his priority shortly after taking office, he did not foresee that profit would deteriorate so severely that it would threaten the survival of MPlastic.

In March 1972, MPlastic was incorporated as a private limited company with an RM18 million paid up capital. The company commenced operation two years later to manufacture and supply polypropylene (PP) woven bags used for packing flour, sugar, fertiliser, chemical resins, soya bean, etc. The woven bags industry was at its infancy at that time and was dominated by MPlastic and the other three pioneer manufacturers. All the four companies enjoyed tremendous growth for the next 23 years, benefiting from a growing population that created demand for food, chemical and agricultural products. The woven bag industry reached its peak in the first half of the 1990s. Due to technological barrier, the market was dominated by the four pioneers who had control over the supply and selling price. It was the golden era for woven bags producers.

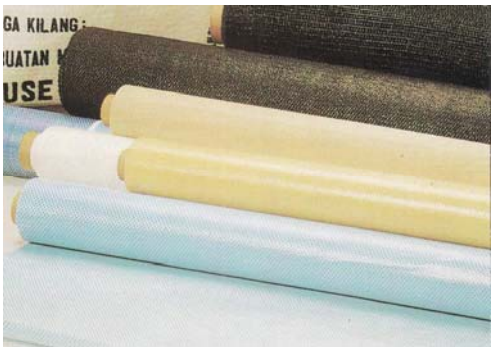
During the golden era, MPlastic PP circular bags production capacity reached six million pieces per month with a workforce of 500. Among the four pioneers, MPlastic was the most stable and consistent in terms of sales performance as it had the advantage of supplying almost 90% of its PP circular bags to a captive market made up of its holding and related companies engaged in flour, sugar and fertilisers production.

Products and Processes

The products of MPlastic were circular bags, tubing bags, fabrics, FIBC, and sewing yarn (see Exhibits 2 and 3).

Exhibit 2.

Polypropylene Woven Bags



Polypropylene Woven Fabrics

Exhibit 3. Bulker Bag or One-Ton Bag

By the end of 2006, MPlastic had invested close to RM80 million in properties, plant, and equipment for an installed capacity (in extrusion) of 350 metric tons per month. However, the actual production was only 260 metric tons (see Table 1) due to sluggish demand.

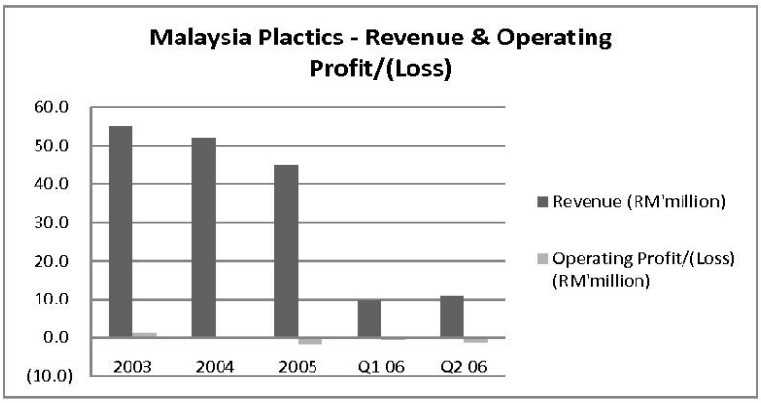
Table 1. Production Capacity as at 30th April 2006

Processes	Monthly Installed Capacity	Monthly Actual Production	Qty Sold	Qty Used for next process	Monthly Capacity Utilisation
Extrusion	350 mt	260 mt	Yarn: 10mt	Circular fabrics: 70 mt Flat fabrics: 180 mt	74%
Circular Weaving	100 mt	70 mt	0	PP Bags: 70 mt	70%
Flat Weaving	250 mt	180 mt	Fabrics: 108 mt	Tubing Bags: 50 mt FIBC: 21.6 mt	72%
Finishing – PP Bags	1.5 million pcs (150 mt)	1.2 million pcs (120 mt)	1.2 million (120 mt)	0	80%
Finishing - FIBC	15,000 pcs (36 mt)	9,000 pcs (21.6 mt)	9,000 (21.6 mt)	0	60%

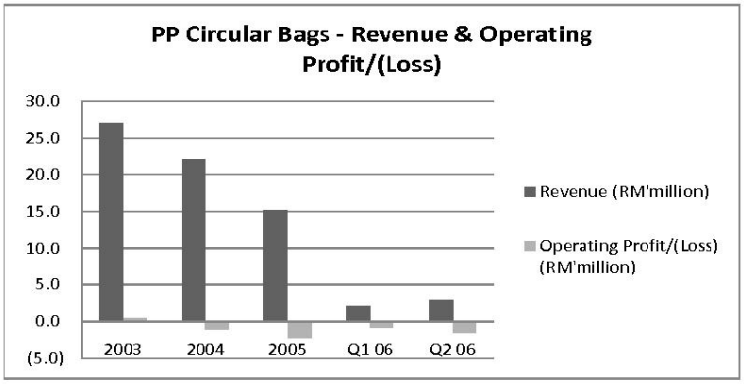
The main product was PP woven bag, which could be made from flat woven fabrics or circular fabrics as shown in the manufacturing process flow in Exhibit 4. Warp and weft yarns were first extruded and wound up in bobbins at the end of the extrusion process. The bobbins were put up in a creel stand, and the yarns were then pulled by a warper and wound up in a warp beam. By setting up the warp beam and weft yarn

bobbins on the Sulzer looms, the operators could produce flat fabric according to the specifications of the final products.

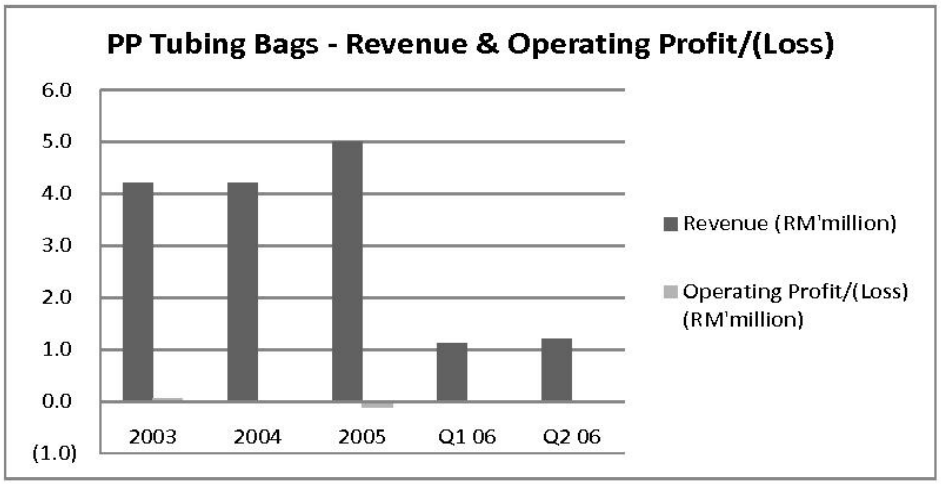
Exhibit 4. Financial Analyses from 2003 to 2006 (Company and By Product Types)



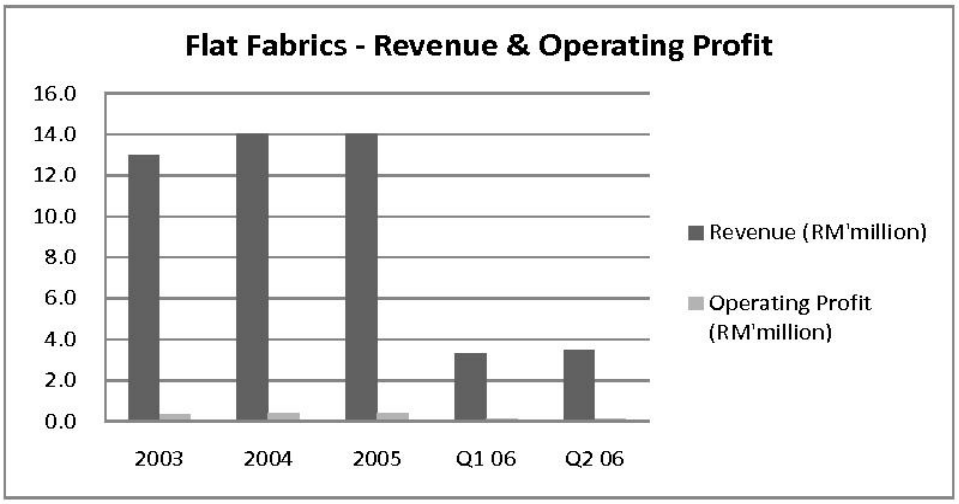
MALAYSIA PLASTIC - REVENUE & OPERATING PROFIT/(LOSS)					
Year/Quarter	2003	2004	2005	Q1 06	Q2 06
Revenue (RM' million)	55.0	52.0	45.0	9.7	10.9
Operating Profit (RM'million)	1.11	(0.38)	(1.64)	(0.59)	(1.25)



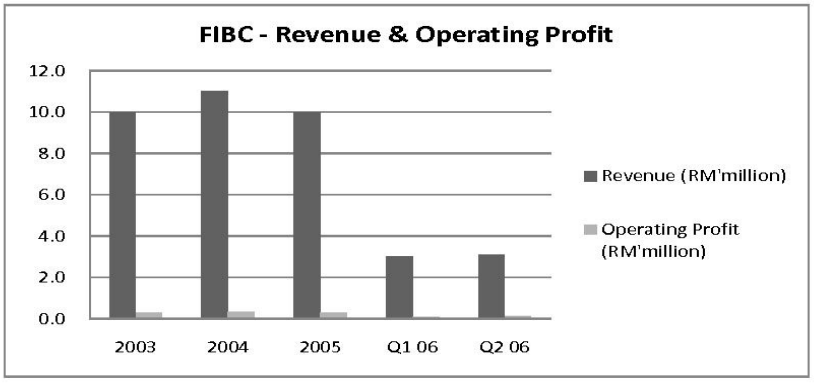
PP CIRCULAR BAGS - REVENUE & OPERATING PROFIT/(LOSS)					
Year/Quarter	2003	2004	2005	Q1 06	Q2 06
Revenue (RM' million)	27.0	22.0	15.1	2.1	2.9
Operating Profit (RM'million)	0.41	(1.12)	(2.26)	(0.78)	(1.47)



PP TUBING BAGS - REVENUE & OPERATING PROFIT/(LOSS)					
Year/Quarter	2003	2004	2005	Q1 06	Q2 06
Revenue (RM' million)	4.2	4.2	5.0	1.1	1.2
Operating Profit (RM'million)	0.05	0.01	(0.10)	(0.03)	(0.03)



FLAT FABRICS - REVENUE & OPERATING PROFIT					
Year/Quarter	2003	2004	2005	Q1 06	Q2 06
Revenue (RM' million)	13.0	14.0	14.0	3.3	3.5
Operating Profit (RM'million)	0.33	0.38	0.40	0.11	0.14



FIBC - REVENUE & OPERATING PROFIT					
Year/Quarter	2003	2004	2005	Q1 06	Q2 06
Revenue (RM' million)	10.0	11.0	10.0	3.0	3.1
Operating Profit (RM'million)	0.30	0.33	0.30	0.10	0.11

Circular fabrics were produced from circular weaving looms, which drew the warp yarns in bobbins directly from the creel stand, without going through a warper. After the weaving process, both types of fabrics had to go through almost similar finishing processes to become woven bags. By comparison, circular bags were cheaper to produce but tubing bags could command better price because of higher quality. Both types of woven bags made up about 38% of the total sales of the company (see Exhibit 5).

Exhibit 5. Income Statement for Q2 2006 by Product Types
(Analysed by Fixed and Variable Production Costs)

	PP Circular Bags	PP Tubing Bags	Fabric	FIBC	Yarn	Total Q2
Sales Volume (mt)	450	150	390	237	30	1,257
	RM'000	**RM'000**	**RM'000**	**RM'000**	**RM'000**	**RM'000**
REVENUE	2,925	1,200	3,510	3,081	198	10,914
Less: Variable Costs of Sales						
Cost of Materials	2,475	825	2,067	1,351	153	6,871
Production Variable Cost	1,170	188	741	943	24	3,066
Total Variable Costs	3,645	1,013	2,808	2,294	177	9,937
CONTRIBUTION	(720)	188	702	787	21	977
Fixed Production Cost	(450)	(180)	(335)	(427)	(6)	(1,398)
Gross Profit/(Loss)	(1,170)	8	367	360	15	(421)
Selling and Distribution Expenses	(88)	(36)	(105)	(92)	(6)	(327)
Administration Expenses	(216)	(2)	(122)	(155)	(5)	(500)
OPERATING PROFIT/(LOSS)	(1,474)	(31)	140	113	4	(1,248)

The second main product was flat woven fabric produced from Sulzer looms. Only about 30% of the flat fabrics were used for producing tubing bags; the rest were used to produce FIBC and sold as laminated or non-laminated fabrics. In contrast, all the circular fabrics were used for producing circular bags.

FIBC, also known as one-ton-bag and bulker bags, were specially designed high quality bag with packaging capacity of between 0.5 metric ton to 1.2 metric tons. MPlastic started this product in 1986 as contract manufacturer for a Japanese company—its first overseas customer—which transferred the production technology to MPlastic. It was a successful collaboration that had lasted up to 2006. Nonetheless, this product used only about 10% of the flat fabrics produced.

The market for sewing yarns was small and repeat orders were slow. This product was not given emphasis at all.

In addition, MPlastic had tried to broaden its revenue base by investing in two blown film extruders for making 1kg size polyethylene bag and a thermal press machine for making PET egg tray in 1994 and 1996, respectively. Both projects failed after eight and five years of operation due to high production cost and low capacity utilisation.

Business Environment

The business environment where MPlastic used to operate had changed since 1997, the year when most Asian economies were battered by the financial crisis. It was an attack by currency traders with the intention to devalue Asian currencies in all economies, starting with the Thai Baht. And recession spread in Asia like bush fire. The PP bag manufacturers were not spared and were fighting for orders to stay afloat. The fight inevitably ignited a price war that aggravated the already difficult business environment.

All the PP bag manufacturers were forced to downsize over the next two to three years except for one of the pioneer manufacturers, ABL Sdn. Bhd. The company believed that the key to survival was to dominate the market so as to control the bag prices and improve its profit margin; it invested about RM12 million to double its production capacity to 120 million pieces of PP bags per year. Little did they realise that another business threat was looming on the horizon at just about the same time.

In 2001, one year after ABL installed its new capacity, the Malaysian government commenced the Tariff Reduction Programmes under the Common Effective Preferential Tariff (CEPT) Scheme of the Asean Free Trade Agreement (AFTA). Under CEPT, the import duty for woven fabrics and bags was reduced from 20% to 5%, effective 2001; it was further reduced to zero percent from January 2008 onwards. With the reduction in tariff, the imported fabrics and bags were found to be cheaper than the locally produced ones for the first time. This price differential had led to the emergence of converters in the local woven bags market.

Converters, a term unheard of before 2001, were entrepreneurs who sourced semi-finished woven fabrics and unprinted PP bags and converted them into finished PP bags by performing only the cutting, sewing and printing or just the printing processes. The CEPT scheme had opened a floodgate of cheaper semi-finished materials and

removed the technological barrier to the production of fabrics for the converters. The entry barrier was further lowered with the availability of low cost but advanced cutting, sewing and printing machines from China and Chinese Taipei.

Another significant event that affected the PP bag industry was the trend to change the packaging to smaller and convenient sizes using non-woven polyethylene film since year 2000. Previously rice, flour and sugar were packed in 25kg woven bags but gradually rice was sold in 5kg and 10kg packs and flour/sugar were sold in 1kg pack. As such, the market size of PP bags shrunk because of the switch to small packaging (see Table 2 below).

Table 2. PP and PE Bags Monthly Requirement in Malaysia from 2001 to 2006

Year	Monthly Requirements (million pcs)	Percentage Fulfilled by Locally Produced 25kg PP Bags	Percentage Fulfilled by Converters Using Imported 25kg PP Bags	Percentage fulfilled by 1kg size PE Bags
2001	19.6	98%	0	2%
2002	20.6	92%	3%	5%
2003	21.6	86%	8%	6%
2004	22.7	80%	12%	8%
2005	23.8	70%	20%	10%
2006 (Projected)	25.0	60%	30%	10%

By 2004, ABL was unable to survive the competition and went into liquidation. Another pioneer had relocated its entire operation to Vietnam to operate from a low-cost environment. By 2006, MPlastic and the other remaining pioneer manufacturer found themselves losing their market share to the converters. It would be catastrophic if MPlastic could not defend its market share. Mr. Tony Yew knew that the company had to overcome these challenges with innovative solutions, and time was not on its side.

Market Profile and Positioning

The Marketing Department of MPlastic gauged the market share of its three main products in April 2006. The results were tabulated in Table 3 as follows:

Table 3. Products' Market Size and Potential Growth in Malaysia as at 30th April 2006

Product Type	Monthly Sales Volume	Estimated Market Size (Monthly)	Estimated Market Share	Potential Growth (p.a.) in Malaysia
PP Bags	1.2 million pcs	25 million pcs	4.8%	0%
Flat Fabrics	108 mt	180 mt	60%	15%
FIBC	5,000 pcs	140,000 pcs	3.6%	10%
Sewing Yarn	10 mt	50 mt	20%	2%

The marketing report also highlighted that the monthly combined installed capacity of major manufacturers and converters for PP bags was about 32 million pieces. Since the market size was only 25 million pieces, it was noted that the combined installed capacity was bigger than the market size by seven million pieces. The growth rate was expected to be zero. The gap of supply and demand was expected to widen even further when the trend of packing goods in smaller sizes of 1kg, 5kg, and 10kg continued.

Surprisingly, in spite of the adverse market condition where supply exceeded demand, certain medium sized companies were expanding capacity hoping to grow their size and market share, and new converters continued to enter the market. The price war was likely to be intensified and every manufacturer was fighting for survival.

In terms of the supply of flat fabrics, MPlastic had the biggest capacity of about 250 metric tons per month, and the largest market share. However, the company's capacity was not fully utilised. It sold about 108 metric tons of its fabrics to the market, used 50 metric tons for producing tubing bags and 22 metric tons for FIBC (see Table 1 above).

In the case of FIBC, 71% of the market share was held by six major suppliers. Each of these suppliers sold between 10,000 and 25,000 pieces a month. The balance of 29% of the market share was taken up by smaller suppliers like MPlastic.

In addition to the abovementioned production, the company also outsourced some of its products to sub-contractors in Myanmar and Indonesia to take advantage of their lower cost base.

Finally, with the help of the Chief Accountant, the Marketing Report summed up MPlastic's market position as follows:

1. The woven bags sector would remain very challenging due to unfavourable pricing and stiff competition. It was tougher for MPlastic when it still needed to address other escalated but uncontrollable operating costs (e.g., electricity, transport, payroll, etc.) which had eroded the profit margin. The income statement for Q2 2006 by product types (see Exhibit 5) analysed the contribution and profitability of each product type. PP bag prominently showed negative contribution and operating loss for the quarter.

2. MPlastic was in effect competing with the PP bag plants in Indonesia and Vietnam. Although superior in all aspects of product quality, MPlastic failed to meet the customers' requirement for cheaper bags. On the average, MPlastic's cost of PP bags sold was RM7.10 per kg in Q2 2006 while the converters using imported Indonesian PP bags priced the bags at RM6.50 per kg.

3. To achieve cost leadership position, MPlastic would need substantial capital investment in order to achieve economies of scale. Based on a recent study, the cost of building a production capacity equivalent to 20% of the market size would need capital investment of a minimum RM30 million. Since the potential growth for PP bags was zero, the investment would therefore be highly risky.

4. Flat fabric was the most promising sector which was not saturated and had room to expand. Other than the conventional fabric for FIBC, MPlastic sold flat fabrics

for foil lamination, geotechnical application, tank lining and special industrial usage. In the applications mentioned, the fabrics were either imported from developed economies at premium prices or produced by only one to two local competitors. In order to penetrate the market, MPlastic collaborated and engaged with construction materials suppliers, earthworks and infrastructure consultants, chemical tank producers, awning, shades and umbrella manufacturers, etc., to jointly develop the fabrics they needed. These customers would produce and market the end products while MPlastic would focus on designing, producing and improving the fabrics.

Under this collaboration and future expansion in this sector, MPlastic would not require any capital investment. Since the flat fabrics could be sold between RM8.00/kg to RM13.00/kg according to their application, MPlastic could utilise its unutilised capacity, technology and know-how to gradually migrate its product range from commodity type to higher value products.

5. In the FIBC business, MPlastic had developed local and overseas customers to lessen its dependence on the Japanese customer. Other reasons for developing the FIBC business were:

   a. Small capital investment – it needed only about RM90,000 to purchase ten sets of sewing machines and one cutting machine to increase the capacity to 15,000 pieces per month.
   b. The additional 6,000 pieces of FIBC would require about 15 metric tons of flat fabrics, thus helping the utilisation of fabric production capacity.
   c. Possessed the know-how to produce food grade quality, non-static, contamination free, and other special usage FIBCs.

6. In the fabrics and FIBC sectors, MPlastic was able to compete in the global supply chain on product quality. However, it had to maximise its capacity utilisation in order to lower its fixed overhead costs and achieve a certain level of cost competitiveness.

   It was noted that to enter the global supply chain, the company would need to service a wider range of customers, broaden its customer base, and supply higher value products. It was not an option, but key to the survival of the company. The entry into the global supply chain was made possible by identifying and managing its intellectual assets in order to explore and exploit the company's competitive advantage.

Intellectual Assets

MPlastic had been privately owned since its incorporation. Its manufacturing facility and office were situated on a seven-acre land in an industrial park about 70 km south of Kuala Lumpur, the capital city of Malaysia. The facility, which was constructed in two phases in 1973 and 1992, respectively, had a total built up area of 200,000 sq. ft. It was installed with top of the range European extruders and weaving machines. This technological advantage in extrusion and weaving had given the company leadership position in the industry. However, while the company had maintained its leadership position since its inception, it had lost its cost competitiveness since 1994.

In April 2006, the Managing Director had identified the intellectual assets of the company together with the Plant Manager, Marketing Manager and Chief Accountant. The intellectual assets were in the form of human, structural and relational capitals. They were developed over a period of 33 years and were described as follows:

1. Human Capital

By 2006, about 20% of the 330 employees had worked with the company for more than 25 years, 50% between 15 to 25 years, 20% between 5 to 15 years and only 10% worked for less than five years. The Managing Director also noted that the middle-level managers carried a total of more than 90 years experience in PP bags and fabrics production, marketing, and product development. These managers were often invited and encouraged to participate in decision making as well as implementation of the company's short and long term strategies.

The high proportion of long-service and skilled employees had contributed to knowledge creation and served as the repository of knowledge within the company. The key skills and knowledge created in the process were in the areas of:

- Plastic resins and additives
- Yarns production
- Weaving
- Lamination and finishing
- Quality inspection and control
- Market and industrial knowledge
- Product development

Most employees, including the middle-level managers, acquired their skills and knowledge from overseas and local training and accumulated work experience.

The company had also implemented succession plan since 2001 to ensure systematic transfer of skills, knowledge and responsibility to the successors.

2. Structural Capital

All the company's products were certified under ISO 9001:2008 Quality Management System since 1994. The company had well documented procedures and work instructions on processes covered by the System. The day-to-day operations of the company were run on Enterprise Resource Planning (ERP) software, which was installed in 2004. Furthermore, there was semi-annual assessment of the company's business risks covering operations, financial, and environment according to the Enterprise Risk Management programme. The organisation was well managed in most, if not all, aspects of the business.

In addition, the employees had cultivated a quality conscious, continuous improvement, problem solving and creative attitudes. These attitudes were instrumental in helping the company to overcome many challenges encountered

in previous recessions in the 1970s, 1980s and the 1997 Asian financial crisis.

3. Relational Capital

MPlastic had transformed itself from a manufacturer of PP bags into a partner in collaborative manufacturing with overseas customers. The company had been the FIBC contract manufacturer for a Japanese company for twenty years. In 1999,the company was involved with two Australian companies in product design, material sourcing, trial run, sample development and product enhancement. Some of the special purpose products made for these Australian customers were grain cover, umbrella fabrics, awning fabrics, foil-laminated fabrics, and weed cover fabrics. MPlastic had just signed a scrim supply agreement with one of these two customers for long term development and supply of fabrics. This customer relationship was built through years of cooperation and trust.

Other than overseas customers, MPlastic had been servicing a few important local customers who placed consistent monthly orders. In this association, support (in terms of quality, delivery and services) and long-term relationship were given priority. The consistent orders arising from the relationship built up with these overseas and local customers would utilize about 55% of the production capacity of the company.

MPlastic also maintained good relationship with vital suppliers like resin producers and spare parts manufacturers to ensure that the company obtained the best support and pricing.

Decision Time

The Managing Director met with the Plant Manager, Marketing Manager and Chief Accountant whom he had invited to help him with an important decision and to formulate a sustainable and growth strategy. He started with the purpose of the meeting and then paused to ask two important questions:

1. Is there a future for PP-woven bag business in Malaysia, and is MPlastic competitive?
2. What is Mplastic's strategy for growth and sustainability?

The team had to leverage on each other's skills, knowledge and experience to draw up a proposal for the approval of the Board of Directors. To a large extent, intellectual asset management skills were needed for charting and executing the turnaround strategy for the company.

Asia-Pacific
Economic Cooperation

Icebreaker Limited
New Zealand

Nothing to Hide: Managing Intellectual Assets Throughout the Supply Chain

Written by

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The case was developed with the cooperation of Icebreaker Limited solely for educational purposes as a contribution to the project entitled "IPR Strategies for Emerging Enterprises – Capacity Building for Successful Entry to Global Supply Chain," conducted under the auspices of the Asia-Pacific Economic Cooperation (APEC).

An Overview

New Zealand, an economy with just over four million people, was regarded by economic analysts as a relatively small market, whose sustainable profitability could only be achieved by improving its competitiveness in the international market. Hence, while agricultural (e.g., meat products, dairy products, wool, etc.), horticultural (e.g., fresh and processed fruits, vegetables and seeds) and forestry (e.g., logs, wood chips, sawn timber, paper and pulp) products still made up more than 50% of all New Zealand exports, the economy had transitioned from a traditionally agrarian economy heavily dependent on concessionary British market access to one that was globally competitive.

During the last few years, New Zealand had been increasingly gaining a strong competitive advantage in telecommunications, electronics, wine, tourism and textiles. The exponential growth of the apparel industry could be seen in the increase in clothes exports amounting to NZ$315 million in 2007 from NZ$194 million in 1997 (The Economist, 2005). As of November 2009, New Zealand's total textile and clothing exports had reached NZ$580 million.

Within New Zealand there was a dynamic and very competitive clothing market. As of February 2008, there were 3,901 specialist clothing stores, the largest in terms of number of outlets. In March 2009, sales in New Zealand specialist stores reached NZ$2,556 million, the third largest sales record after supermarket/grocery stores and department stores, with sales of NZ$14,521 million and NZ$3,805 million, respectively (Albertson, 2009).

Notwithstanding the vitality experienced by the New Zealand clothing market during the last few years, finding the opportunities to grow in a sustainable fashion was a big challenge. All the while adhering to the ethical way of doing things throughout the supply chain, emerging firms in this sector had to negotiate their way through a hostile environment that was characterised by two large forces: the power of big international brands and the threat of unfair competition from illegal companies whose business was counterfeiting promising products.

An Innovative Idea[1]

Like most of the inventions that marked the progress of humankind, the origins of Icebreaker could be traced back to the convergence of two well-matched elements: kiwi[2] ingenuity and an unanticipated encounter that occurred in Pohuenui, one of the islands in the Marlborough Sounds, in the northeast of the New Zealand South Island.

[1] The information provided in this case has been largely obtained from Icebreaker's website and an interview with one of its senior managers.

[2] *Kiwi*, which names the flightless bird endemic to New Zealand, is the colloquial expression that refers to New Zealanders and has been extended to anything of New Zealand origin, including the currency (i.e., kiwi dollar).

The Origins

In the early 1990s, Brian Brakenridge, who owned 3,000 merino sheep in Pohuenui, was frustrated not only with the prices he was getting for his high quality merino but also his inability to control its final application; the merino was just being re-exported to other markets after mixing them with Australian wool. Brian clearly understood the benefits of woollen apparel. He was after all a wool farmer and a dedicated user of wool. He was convinced that fine wool had very strong technical benefits in outdoor applications although these benefits were little known, largely unproven and poorly promoted.

Brian's approach was somewhat unconventional for his main priority was to build understanding, integrity and respect for a merino wool prototype product rather than to deliver a final product to the market. Despite the advantages of wool, he was aware of the negative sentiments and perceptions that people had of wool apparel such as being heavy, coarse, itchy, smelly when wet, etc. His research on the benefits of merino wool convinced him that differentiating wool apparel would require promoting its features under a completely new light. However, he first had to prove that that these technical benefits could be applied to products or garments meant for the outdoors.

After a trip to the United States, where he met the owner of an outdoor store in Washington who knew about the quality of the merino fibre, Brian and his wife convinced a Christchurch manufacturer to produce some merino garments. By the mid-1990s, Brian's production, under the label of Ice Breaker, was still limited and the market for his garment products was restricted to the occasional tourists at his Pohuenui lodge and a store in Blenheim, the main city in the Marlborough region. He made sure that information about the unique benefits of merino wool was included in some of his earliest promotional material. At that time, the production was limited to some very basic garments. The purpose of these initial models was twofold: to generate some feedback from consumers; and to subject the garments to some of the most extreme applications possible.

The fledging Ice Breaker received some wonderful feedback and endorsements from adventurers and sportspeople who were given garments to test. Sir Peter Blake, an internationally renowned yachtsman, and Graeme Dingle, an experienced adventurer and climber, both from New Zealand, extolled the quality of the merino wool garment they tested. Words of endorsements also came from overseas: a helicopter pilot working for the United States Fish and Wildlife Department in the Yukon, a dog sled race competitor in Alberta, Canada and an elk hunter in Montana, USA.

From Ice Breaker to Icebreaker

It was in 1994 when a major turning point for Ice Breaker came about. Jeremy Moon, a marketing graduate from Otago University who happened to be backpacking at Brian's farm, discovered the extraordinary quality of the merino wool fabric. Jeremy was delighted by the astonishing thermal performance in the outdoors of the merino clothing developed by his farmer host. At a time when the outdoor apparel industry was dominated by synthetic fibre, Jeremy came up with a far-reaching idea, one that could build on what Brian had achieved, and would take the fibre to the international level.

"My passion for the limitless potential of merino wool grew so strong that I ended up totally captivated by the challenge of building a company based on nature and the outdoors." The idea was to turn the natural characteristics of merino wool into a clothing system for humans.

Jeremy immediately recognised an opportunity to create an entirely new product category from a fibre that was grown in New Zealand's mountains, had enormous thermal qualities, could be worn next to the skin, and didn't acquire an unpleasant smell when worn for weeks on end. Jeremy quit his job, mortgaged his house, bought half of Brian's business and spent three months writing a business plan. The company's original name, Ice Breakers Base Layer Thermal Underwear, evolved into Icebreaker Nature Clothing or in short, Icebreaker. Jeremy thought that Icebreaker sounded more active and forward thinking, evoking the relationships between people, people and nature, and between merino wool and the human body. In 1995, Icebreaker started trading and became the first company in the world to develop a merino wool layering clothing line for the outdoors, including underwear, mid layer and outerwear.

However, Jeremy's initial enthusiasm for the incomparable quality of the merino fibre could not be directly translated into immediate exceptional economic results. The first three years were bumpy and an acid test to his personal determination and faith in the unique characteristics of the product. Yet, failure was not an option. Jeremy knew that he had pinpointed a unique business opportunity that would attract the ever-increasing ethical consumer market by fostering a symbiotic relationship between business and nature. Jeremy strived to make his dreams come true. In a relatively short period, Icebreaker expanded its range of products from an initial modest collection of five styles, two colours and four unisex sizes into a wide range of designs.

Breaking into the International Scene

The growing sales in New Zealand confronted the Icebreaker management team with a major decision-making point: to go or not to go international. Besides the major and most obvious advantage of having a larger market, going global could also offer the opportunity to mitigate risks whereby gains in outperforming markets could offset losses in the underperforming ones as well as balance cyclical and seasonal sales across markets. Taking a firm to the international market, however, was not risk-free and could be very challenging.

After his bad experience with a distributor in Australia and following a careful selection process, Jeremy opted to establish relationships with the finest merchants in both Australia and New Zealand. Within five years, Icebreaker became the largest outdoor clothing brand in Australasia. A key element of this success was the meticulously planned marketing strategy focusing on a rigorous selection of the best outdoor retailers and relationship building with their staff. After all, at the core of the retail industry was an intensely personal business that required having the right people at the sales counter and engendering employee loyalty.

Then, the company decided their next move: Europe. In 1999, a distributor in the Netherlands, who had bought Icebreaker clothing while visiting New Zealand, expressed his interest to introduce the product in the Netherlands. Icebreaker decided to accept the distributor's proposal; it turned out to be the right decision for the company. After seven years in the Dutch market, sales went up from NZ$100,000 to

NZ$8,000,000. The Dutch connection had opened the internationalisation path beyond Australasia; the next market to be penetrated was the United Kingdom and from there expansion was unstoppable. By 2005, over half of Icebreaker's revenue came from overseas sales.

Icebreaker Now

The company had certainly come a long way from the time the idea of producing high-quality merino wool garment struck Jeremy in 1994 and the company subsequently adopted a combination of state-of-the-art technology and the best nature could offer. In 2010, Icebreaker products could be found in 2,000 stores in 30 economies. Icebreaker had grown to become a multicultural, synchronised and cohesive team of over 225 people distributed in Australia, Canada, Czech Republic, Germany, Switzerland, the United States and certainly in New Zealand. The New Zealand-based team numbering 85 represented the largest group; 75 of them were based in the headquarters in Wellington, others worked in the sales offices in Auckland, Christchurch and Wanaka.

The Icebreaker team were always experimenting with merino and always asking questions about the new potential of the fibre. They were encouraged to go snowboarding or mountain biking and wear the garments the whole day even when sleeping. Jeremy and his team were convinced that this was the only way to field test the product. (The spirit of Icebreaker is reflected on its well-developed website, www.icebreaker.com).

Different Actors throughout the Supply Chain

There was a long series of processes and a number of participants involved in Icebreaker's operations, starting from the sourcing of raw materials to the marketing of finished products in retail outlets. Each of the participants contributed his or her unique intellectual assets, which were managed in a coordinated fashion.

The Kiwi Sheep Farmers

Icebreaker became the first outdoor apparel company in the world to source merino wool directly from sheep farmers when it implemented its supply system in 1997. From its first contract for just 700 kilograms of wool in 1997, Icebreaker had grown to become a major buyer of New Zealand's merino production. Its contract for 2.5 thousand tonnes of pure merino worth about NZ$30 million for the period 2006-2008 was recognised as the largest merino contract in the world.

The growers located in the Southern Alps of New Zealand constituted the first link of the supply chain. They supplied fleece to The New Zealand Merino Company which served as a facilitator that connected sheep farmers to retail brands. The New Zealand Merino Company not only guaranteed compliance to both fibre quality and animal welfare but also set base standards for environmental care and social sustainability, and ensured traceability back to farm gate.

Since animal welfare was paramount to Icebreaker's ethical commitments, five

basic animal welfare requirements were imposed: a) freedom from thirst and hunger, b) provision of appropriate comfort and shelter, c) prevention of (or rapid diagnosis and treatment of) injury, disease or parasite infestation, d) freedom from distress and e) the ability to display normal patterns of behaviour. To become an Icebreaker supplier, farmers must not *mules* their sheep (*mulesing* is the practice of removing strips of wool-bearing skin from around the sheep tail to prevent *myasis*, commonly known as flystrike). In addition, the growers who supplied merino fibre to Icebreaker were also required to meet minimum standards of care for sheep dogs. If any of these criteria was not met, the growers lost the right to supply to Icebreaker at least for one year, during which they needed to prove that the problems that caused the revocation of their contract had been addressed.

From the New Zealand Southern Alps to Shanghai

The collected merino wool was then shipped to China for top making. Top making involved scouring (cleaning by wet processes through a series of bowls in order to remove grease), carding (breaking up locks and unorganised clumps of fibre), combing (aligning the individual fibres so that they were more or less parallel with each other) and superwashing (making wool shrink resistant in order to make it machine washable). Initially, top making was done in New Zealand. However, the technology available at this plant only allowed producing higher micron fibre, so the lighter fibre had to be produced offshore. Since 2005, the top making process had been subcontracted to a French plant near Shanghai, China which not only recycled and cleaned its water, but also extracted the lanolin as a by-product to be sold to the cosmetics industry.

The next step in the supply chain was yarn spinning in which spinning machines twisted and re-twisted the roving into yarns. In the past, Icebreaker contracted out the spinning process to three plants in Australia and one plant in Korea but this arrangement only added lag time and increased the complexity of the process. Thereafter, the yarn spinning was done in a large German-owned mill near Shanghai which reused the heat from processing in its air conditioning system. As a result of the move to China, Icebreaker obtained improved and consistent quality, cut the production costs and significantly reduced the lag time.

Clothing Manufacturing Process

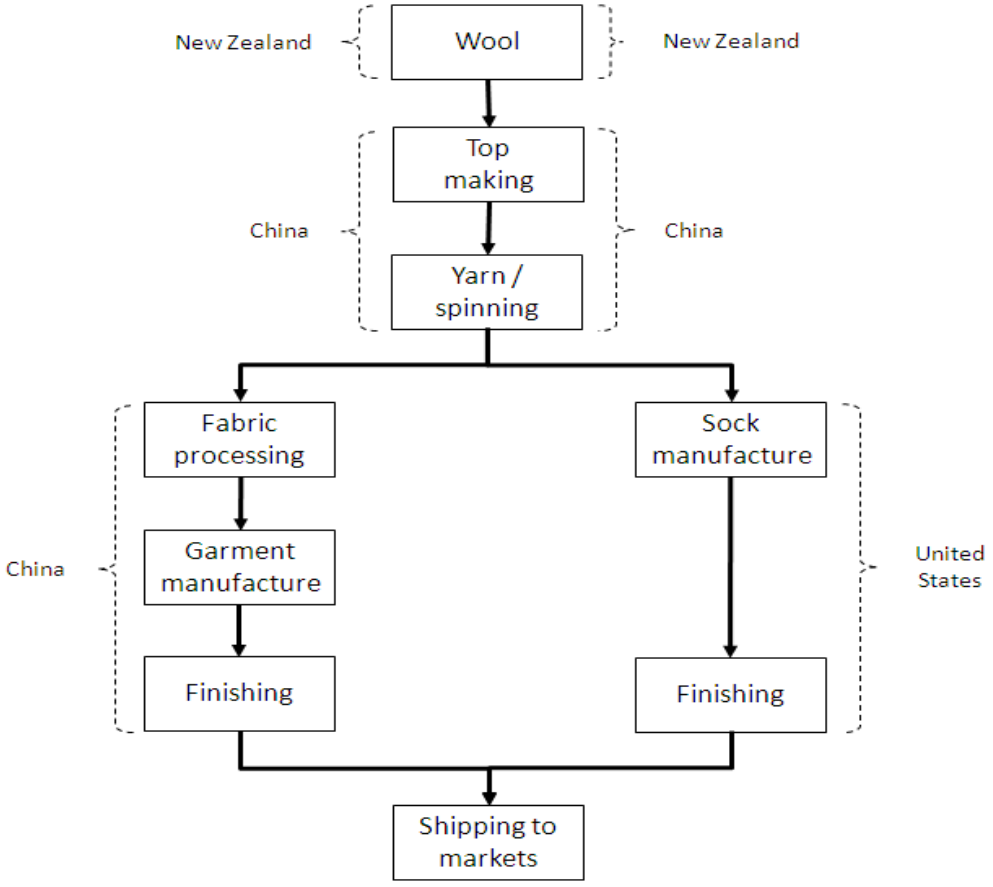
Once the merino fibre had been spun, the clothing manufacturing process could start. At this point, depending on the final product, the material followed two different paths: the fibre to be used for manufacturing socks was shipped to North Carolina, USA while the yarns to be used for garment manufacture were sent to a textile and garment manufacturing plant in Shanghai. Regardless of the piece of clothing to be manufactured, every piece of garment, including socks, was designed in Portland, USA.

Certainly, cost leadership was not Icebreaker's generic strategy. The approach the firm had taken was well-aligned with what Porter (1980) characterised as a segmentation strategy, by which the uniqueness of the product in terms of quality and innovation, was promoted in the relatively narrow market of outdoor enthusiasts. Thus, the decision to move the manufacturing process offshore could not be attributed to a cost-reduction plan; other factors were taken into consideration. During Icebreaker's

early years, the New Zealand textile industry was shrinking and access to state-of- the-art technology that turned out better quality products could only be found overseas. In addition, overseas manufacturing plants had much higher production capacity than those in New Zealand.

The final product from the US-based factory and the China plant was shipped to all Icebreaker markets, which included: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greenland, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Poland, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, the United Kingdom and the United States. The total process throughout the supply chain, from greasy wool collection in New Zealand farms to finished goods in the aforementioned 30 markets, took between 33 to 43 weeks. All the links throughout this complex supply chain had to be flawlessly managed to guarantee a high degree of coordination and achieve the desired results. Figure 1 illustrates the company's supply chain.

Figure 1. Icebreaker's Supply Chain



"A Mini United Nations"

Throughout the supply chain, from the merino sheep farms to both the sock and garment manufacturing plants, a strict quality assurance programme was in place. As explained above, The New Zealand Merino Company acquired the merino wool from New Zealand growers according to quality specifications defined by Icebreaker. Quality

assurance throughout the production process was outsourced to a Japanese inspection service and a Chinese quality control company. To complement this multinational workforce, a German company took care of the logistics aspects. As Viv Feldbrugge, the Technology, Quality and Environment Manager affirmed, "Icebreaker is a mini United Nations."

Despite the challenge imposed of having the different stages of the production process outsourced to different teams working across several time zones, Icebreaker was able to efficiently and effectively manage the relationship with their business partners along the supply chain. The design office in Portland and the manufacturing plants in both Shanghai and North Carolina worked in close coordination with each other to ensure that the designs developed by the Portland office were technically feasible. The Icebreaker staff at the Wellington head office was always kept in the loop. E-mail, conference call and videoconference technologies facilitated the communication among the parties.

Working Towards a Common Goal

The idea that Jeremy Moon conceived while backpacking on a sheep station grew to become one of the world's finest brands in the outdoor garment industry. More importantly, Icebreaker was able to rally to its founder's vision several partners with unique skills spread across different locations. How was it possible? What was the motivation for coming together and working in a collaborative fashion?

Icebreaker stipulated that its industrial suppliers must demonstrate impeccable business ethics; have an up-to-date and impeccably maintained manufacturing plant with access to the latest technology; respect their staff and provide them with good natural light, clean air and a healthy environment; be part of, or working towards, a global quality management programme (e.g., ISO 9001); and be part of, or working towards, a global environmental management programme (e.g., ISO 14001, Oeko-Tex, etc.). In summary, Icebreaker's business partners had to demonstrate strong social and environmental ethics.

Indeed, finding the right partners required much energy and resources. Icebreaker looked for the best possible partners not only in terms of technology and production capacity but also, and most importantly, in terms of mindset that was akin to the company's "narrow and deep" guiding philosophy. Icebreaker strived to work with just a few, but really committed partners who were not exclusive providers to Icebreaker, but who recognised the rising number of ethical consumers whose needs they could satisfy by joining efforts to offer an attractive product.

A co-dependent relationship was successfully established among the business partners. It was in the business partners' own interest to work collaboratively with Icebreaker in an alliance of mutual benefit. It was here where the "narrow and deep philosophy" bore fruits.

Icebreaker successfully brought the world's best technology, a trained, experienced workforce and a commitment to adopt social and environmental ethical practices. For instance, in September 2009, 25 people from China, Germany, New Zealand and the United States gathered together in Wellington for a supply chain

summit meeting, an ideal forum for exchanging ideas and discussing the next steps.

Transparency

Technical specification, manufacturing know-how and brands were all registered and protected by intellectual property rights; however, Icebreaker went beyond a legalistic and defensive approach. At Icebreaker, they knew that the protection of their intellectual assets relied more on their own capabilities and their continuous innovation rather than on simply creating legal barriers that were necessary but not sufficient to guarantee sustained growth and competitiveness. It was this proactive approach, combined with strong links established with their business partners through the "narrow and deep philosophy," that allowed Icebreaker to protect their intellectual property in the long-term.

Garments resembling Icebreaker design had been found in the market but they could not be characterised as counterfeit products; they might not even be presented in a court as evidence of forged goods. Hence, it was well and good that Icebreaker was a long way ahead of its imitators. The creative designs as well as the quality of both the raw material and the manufacturing process gave Icebreaker products their unique characteristics which could not be easily reproduced. Furthermore, Icebreaker targeted the ethical consumers who would hardly be engaged in acquiring products of dubious origin. Typical retail prices for original Icebreaker garments ranged between NZ$39 for women's bodyfit or NZ$50 for men's boxer to NZ$499 for an outwear jacket.

Icebreaker recognised the power of the Internet and took advantage of this tool to attract the ethical consumer. Since transparency and traceability were the key elements for the organisation, in August 2008 Icebreaker introduced the *Baacode* (*baa* from the bleating sound made by sheep) to make the supply chain transparent. The *Baacode* was a tag attached to Icebreaker garments with a unique code matching each piece of clothing to the batch of merino fibre from which it was produced. Thus, customers were given the opportunity to track the product they bought all the way from its point of origin in the New Zealand sheep stations, to the factories in China, and to the retail shelves in 30 economies by keying in the *Baacode* on Icebreaker's website. This innovative feature was not only difficult, if not impossible, to duplicate but also drew in the ever-growing ethical customer market.

In addition, Icebreaker products could be purchased online through some retailers' websites. Icebreaker used the Internet to communicate its philosophy, promote its products, and share its staff's stories with the general public. The *Holy Sheep!* blog, where latest news, product releases and events related to Icebreaker employees, friends and customers were posted on a regular basis, proved to be an effective means to be in touch with the wider Icebreaker community; indeed, it offered the opportunity to get an insight of what was going on at Icebreaker.

Looking Ahead

The impressive growth Icebreaker had experienced in a relatively short period spanning just over a decade, from a small business to a major player in the international outdoor garment industry, had been a rewarding journey for Jeremy and his team.

Innovation proved to be the key element for this continuous activity of capturing and giving form to free-flowing ideas, which were later realised in well-defined processes and tangible products. One of the latest developments at Icebreaker, SF 140 UL, illustrated this permanent process of intellectual assets creation. The SF 140 UL was a type of clothing that was cool when it was hot and insulated the wearer from the colder weather.

Undoubtedly, it was the permanent search for innovative products and processes that contributed to the growth and development of Icebreaker just as the strength of its name opened doors in the financial system for the company. Ultimately, sound and strong intellectual assets management practices throughout its supply chain had allowed Icebreaker to operate in a fully transparent fashion.

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Asia-Pacific
Economic Cooperation

Pictor Limited
New Zealand

Making Diagnostics Accessible to the World (A)

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The case was developed with the cooperation of Pictor Limited solely for educational purposes as a contribution to the project entitled "IPR Strategies for Emerging Enterprises – Capacity Building for Successful Entry to Global Supply Chain," conducted under the auspices of the Asia-Pacific Economic Cooperation (APEC). The case is neither designed nor intended to illustrate the correct or incorrect management of the situation or issues contained in the case.

With the new Pictorial method of diagnostic laboratory testing for human, animal and food immuno assays, Dr. Sarita Kumble was excited with the idea of contributing to the health of the developing world, which did not have access to laboratory testing. Before she could bring the product to the market, she needed to ensure that the technology was used correctly and also make it commercially viable. A small start-up company with a big task, she needed to make sure her steps were right so that the technology she and her husband, Dr Anand Kumble, developed would be safe, effective and make a contribution to the world.

Dr Sarita Kumble's challenge was to address a number of concerns: how to identify which part of her discovery needed to be protected, how the intellectual assets (IA) protection should be managed, and how the IA should be valued. Likewise, she also had to formulate the strategy for commercialization and market the plan to potential investors, so as to ensure the financial health of the project, as well as to protect their IA from being used by others.

By the latter part of 2009 progress with both the development of the Pictor system and the manufacturing process of the test panels had been made, thus allowing Dr Sarita Kumble to enter into commercial contract negotiations. She knew that she had to get her unique product to the market as soon as possible considering that diagnostics development was a very competitive sector.

In January 2010, and with contracts well into the negotiation stage, Dr Sarita Kumble had to make some key decisions: to prioritize product development, raise sufficient funds to take Pictor to a new level of manufacturing, and recognize that the raising of those funds was dependent on both forthcoming contracts and the intellectual asset (IA) valuation.

Company Profile

In the mid 2000s and in good Kiwi style, Dr Sarita Kumble laid linoleum on her suburban Auckland garage floor and set up a research laboratory to test her ideas on miniaturizing and multiplexing enzyme linked immunosorbent assay (ELISA) technology. After a year or so, her research results indicated that she had a product that she believed – based on her previous biotech start-up experience – could be commercially viable. In 2005, Drs Sarita and Anand Kumble formally established Pictor Limited. The name "Pictor" described the "pictorial" of the test result gained from a simple scan of the test membrane.

Dr Sarita Kumble took on the CEO responsibilities while Dr Anand Kumble took charge of business development. Pictor had a number of small shareholders including Dr Lee Mathias who was also a fellow director of the Drs Kumble. The company employed a specialist biomedical engineer and a scientist who both worked on the research and development of the products.

The product, the miniaturization of ELISA technology used existing technology in a form that suited the needs of communities with limited or no access to affordable laboratory tests in 2009. The technology could be used for human and animal pathology and the testing of food products. Because the technology was miniaturized and multiplexed, simultaneous measurements of multiple disease indicators, in multiple

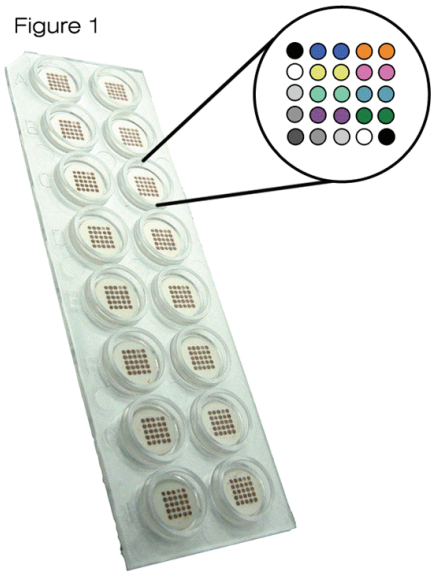
patient samples in parallel, could be undertaken. The result was volume throughput at speed.

Pictor Technology Point of Differentiation

In managing the IA protection process and its valuation, Dr Kumble's first job was to identify the point of differentiation of the company's product from other diagnostic products in the market.

Dr Kumble developed a method to stabilize dots of ELISA reagent into a membrane without the reagents "running" into each other. Pictor's products simultaneously conducted up to eight diagnostic tests in individual sample wells with only 50 micro litres (a drop of blood is 200 micro litres) of patient samples. The tests were based on the principle of "micro arrays" in which a pattern of clearly demarcated dots of reagents required for individual tests were printed on the bottom of individual wells in a 16 (or 96) -well device. In addition, self-validating tests were conducted with each sample to ensure that the prescribed tests had been correctly carried out. This feature could not be incorporated in conventional diagnostic tests. Figure 1 shows the layout of a typical test panel of eight pairs of tests, seven grayscale control dots and two dots which ensured correct alignment. All the reagents necessary for sample processing were provided in the test kit.

Figure 1



Another differentiation point of Pictor's products was the use of a standard flat-bed scanner to read the test endpoint thereby lowering setup costs significantly. The image data was analyzed using proprietary software providing an easy to read printout of the results within two minutes of test completion. In addition, Pictor's products could be used in laboratories with limited complex diagnostic equipment and minimum medical infrastructure.

Pictor initially targeted products for infectious and autoimmune diseases. Beta testing1 for these two panels had been completed by the end of 2009 resulting in the first negotiations for firm orders from customers.

Human Pathology Market Structure

The global IVD (*in vitro diagnostics* are tests using patient samples such as blood, urine and saliva) market was estimated to be US$42 billion in 2007 and projected to

[1] Beta testing is undertaken in the "real world" environment by those who are going to use the product. This phase follows Alpha testing which is designed to demonstrate that the product is feature complete and functional.

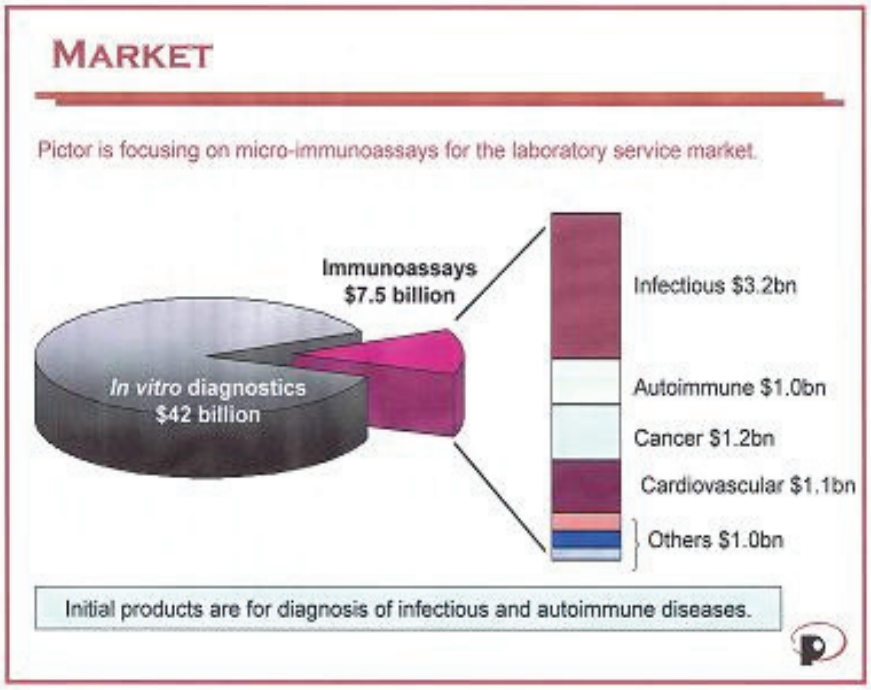
grow 6% annually until 2012. A significant portion of the total market growth was a result of increased test usage in emerging economies that were investing in healthcare infrastructure and insurance coverage for an increasingly affluent middle class. These markets were expected to experience 10% to 20% annual growth. Historically, third world economies did not have easy access to affordable diagnostics.

The IVD market was dominated by Abbott and Siemens which accounted for 60% while other major players, Roche and Beckman Coulter, had approximately 9% share each. Others like bioMerieux, Fujirebio and BioRad had strong presence but, like the dominant players, had high setup costs.

Diagnostic consumables were sold directly to pathology laboratories by the manufacturer or their agents mostly through the lease of an analyser provided at a low price. The laboratories however had to purchase compatible kits at market price.

Pictor was targeting the immunodiagnostic segment of the IVD market, which had the highest demand for innovative new products and an estimated value of US$7.5 billion in 2009 (Figure 2). Immunoassays were among the most widely used IVD tests, constituting 16% of the total diagnostic market (Marchant, 2006). The IVD market was driven by the need for cost-effective tests, with advances in genomic technologies making early stage diagnosis possible.

Figure 2. Estimated Worldwide Immunoassay Market by Clinical Segments (Marchant, 2006)



Segmented by end-user, the IVD market comprised:

- Private and hospital Diagnostic laboratory services
- Blood processing and screening
- Point-of-Care testing in hospitals and clinics
- Self-testing (over the counter tests)

Commercial clinical laboratories catered to 41% of this market, with hospital and physician-office laboratories making up 54% and 5%, respectively (IBIS, 2009). There were over 200,000 registered laboratories in the US alone.

By the beginning of 2010 the directors of Pictor had realized that they had to be more specific in their market share objectives. The Drs Kumble set their immediate goals for the company.

Initially, Pictor's strategy was to focus on the diagnostic laboratory service market and clinical laboratories in hospitals and clinics. These services were usually owned by large corporations with sophisticated distribution channels within their organizations.

An alternative strategy was to license the technology to existing manufacturers of IVDs. In 2009 and up to March 2010, Pictor had been working with a company specializing in the manufacture of autoimmune IVDs. This option was not disregarded although the Pictor directors considered the difficulty in establishing the value of royalty fees at this stage of the business cycle, the risks of the licensee owning the market and excluding Pictor, piracy of the technology and, in the longer term, the expiration of patents. However, Pictor had entered into an agreement to custom manufacture kits using the said company's reagents.

The Pictor directors also considered investigating whether there was a buyer for the technology. But without the manufacturing process being tried and tested at that time it was considered unlikely. By January 2010 the directors had confirmed the strategy to manufacture PictArray™ products in New Zealand, regardless of the source of reagents, to ensure quality control in the early stages of product development and to maintain the integrity of the product. It was also considered important to demonstrate to future investors that a semi automated manufacturing process was possible.

Pictor's Current Disease Areas Focus: Autoimmune Diseases

Autoimmune diseases included rheumatoid arthritis (RA), multiple sclerosis, juvenile diabetes and lupus among others. Typically, the testing of multiple disease markers was required for a definitive diagnosis of disease. The demand for these tests was growing with the 2007 market estimated at US$250 million; it was predicted to grow 10% annually and estimated to reach US$410 million in 2012. With the right pricing, it would be possible to tap into the much larger potential market.

Among autoimmune diseases, RA affected approximately one percent of the world's population. Pictor developed and validated a test panel that could screen patients for markers of RA and could also be used to follow treatment efficacy and disease progression. Table 1 shows the incidence and market size of RA in some of the regions Pictor wanted to target for its products. Pictor forecasts showed that it aimed to capture 1% of the autoimmune market in India and Europe by 2012.

Table 1. Incidence and Market Size for Autoimmune Diseases

Region	Incidence ('000)	Potential Market Size ($m)
United States	3,050	244
Europe	2,900	232
India	9,800	784
Australia	200	16
New Zealand	40	3.2

Source: The Autoimmune Outlook to 2013; Business Insights, 2009.

Infectious Diseases

In 2007, the World Health Organization (WHO) estimated that over 180 million people worldwide were infected with Hepatitis C virus (HCV), and a further 350 to 400 million people were chronically infected with the Hepatitis B virus (HBV), a virus 100 times more infectious than HIV. Pictor had developed and validated a test panel that, in addition to screening patients for active HBV infection, could also be used to follow markers that identified resolution of the infection and also tested for an early marker of liver cancer. Table 2 shows the worldwide market potential for hepatitis testing. Pictor forecasts showed that by 2012, its goal was to capture 1% of the market in India only.

Table 2. Potential Market Size for Hepatitis Testing

Region	Screening ($m)	Diagnostic ($m)
Africa	1,097	58
The Americas	1,324	70
Europe	1,312	69
Asia	2,462	130
Western Pacific	2,605	137
TOTAL	9,605	506

Source: Global Hepatitis Strategies; Kalorama Information, 2007.

Pictor's Value Proposition

Key benefits of the PictArray™ technology and process:
100-fold lower capital cost to set up
Could be used without special technical training
Proprietary software-driven rapid data analysis
Scalable from small clinics to mass screening centers
Single screening technology platform for multiple disease detection.

With these benefits in mind, the Drs Kumble had structured the pricing of their products based on the estimated value of the technology, the comparatively low manufacturing cost, the high distribution cost, and the high cost of IVDs in the world market.

For example, the manufacturing cost for a Rheumatoid Arthritis screening kit that could test sixteen samples was estimated to be $NZ80. The sales price would be

based on the volume of purchase ranging from $NZ120 to $NZ200 per kit. Increasing manufacturing efficiency and throughput could further reduce production costs, resulting in a cost per test of less than $NZ1.

Table 3 highlights the cost benefit of using Pictor's products compared with other multiplexed tests in all markets. These alternative technologies also required specialized training for system operation and data analysis.

Table 3. Comparative Setup Costs and Kit Costs of Multiplexed Tests (Unit: NZ$)

Company	Product	Setup Costs (Instrumentation)	Kit Costs (Price/test)
Pictor	PictArrays™	250	1.00
Luminex	xMAP Technology	120,000	1.30
BD	Cytometric Bead Array	125,000	4.60
MesoScale Discovery	Sector PR400 Imager	250,000	2.00
BioRad	BioPlex	500,000	0.90
Genesis Diagnostics	Genearrayt	30,000	1.10

Source: Individual company websites, marketing and sales documentation on behalf of Pictor.

One complication however was that at the beginning of 2010, the actual demand for the product in this format or for a similar product was still unknown; hence, all projections were based on the volume of tests using conventional technology. However, as a result of the positive beta testing results, the initial 1,000 autoimmune kits produced by Pictor had already been committed to a prospective customer, and up to 10,000 kits were expected to be sold in the first year. The first year forecasts placed the anticipated total kit sales at 13,800.

Intellectual Asset

Dr Kumble specified the IA to be protected as the "assay membrane and method of use thereof." Her decision focused on the technology's ability to hold the reagent dots to the membrane as well as on the process of analysis because the ELISA technology itself was already well established and being used in diagnostic systems.

The protection of Pictor's miniaturized and multiplexed (micro array) process was important as the ELISA for single tests was the most widely used format which had well-established protocols for the measurement of single proteins. Further, Pictor's micro array format meant that a small amount (50 microlitres) of serum was enough for testing to be undertaken. This would have major implications for screening, especially of babies and children.

Intellectual Property Strategy

By mid-2009, the Pictor directors had agreed that the IA to be owned by the company was the assay membrane and the process of use, including the copyright of the software developed for analyzing and reading the tests. This was because the directors were still not sure whether the company would have the capacity to increase its capital

to fund the potential manufacturing demand in the future. That is, while Pictor would own the science on which the technology was based, it might in the future, license others to manufacture and/or use the Pictor system.

Considering the importance of managing quality in the early stages of manufacture, by the end of 2009 the directors had agreed that Pictor would manufacture kits for human pathology in New Zealand Dr Kumble recognized that IA protection required the help of experts in the field. She worked with DLA Piper, a San Diego-based law firm specializing in biotechnology asset protection, and AJ Park in New Zealand to strategize the management of the intellectual property portfolio and patenting of Pictor innovations.

The Processes and Costs of Intellectual Asset Protection

A Patent Cooperation Treaty (PCT) application was filed in October 2007 with the United States PTO (International Patent Application Number PCT/US2007/082732) to protect the process for manufacturing arrays and testing samples using these arrays.

Under the PCT, the initial protection was to last for 18 months after which patents had to be filed in specific regions to continue the asset protection. The regional patents for Pictor technology were filed in key markets in July 2009 for protection in Australasia, Europe, India and the United States of America since these markets were considered the most receptive to the Pictor technology. Although Dr Kumble realized that it was risky not to adopt IA protection in other markets, the costs were considerable, hence her decision to limit the company's asset protection to the above-mentioned markets – a decision which the directors also supported.

A preliminary Freedom-to-Operate (FTO) [2] search gave Dr Kumble the confidence that the Pictor technology could be taken to market without infringing on the patent rights of others and therefore reduced the risk to Pictor directors and shareholders. At the same time, the company also considered adopting some strategies to protect Pictor should there be some infringement of the patent. However, given the financial constraints at that time no actual budget was allocated for this intervention. Instead, the directors opted for a strategy that would bring the product to the market as quickly as possible. In addition, Pictor filed for copyright protection of the data analysis software with the United States Patent Trademark Office (PTO) in March 2009.

A third aspect to asset protection arose in December 2009 as the manufacturing process became more refined. The biomedical technician had started working on the possibility of converting to a pneumatically powered system the manual punch and drag system for creating the dots. Likewise, the Drs Kumble started to focus their attention on the protection of the manufacturing system. They began preliminary work with DLA Piper in San Francisco and made arrangement to visit the patent attorney in May 2010 during their visit to the USA as part of their prize as finalist for the Health Focus Challenge sponsored by TECHNZ. These costs had not been estimated in March 2010.

[2] "Freedom to operate", abbreviated "FTO", is usually used to mean determining whether a particular action, such as testing or commercialising a product, can be done without infringing valid intellectual property rights of others. Source: www.patentlens.net.

As of March 2009, the total expenditure for the Pictor project amounted to $NZ 752,085. Costs of protecting the intellectual asset as at December 2009 was $NZ 270,000 with ongoing annual maintenance costs of $NZ 30,000.

Valuing the Asset

Identifying the value of the IA and the record of its protection created a further challenge for Dr Sarita Kumble. Dr Anand Kumble conducted a research on the global diagnostics market to determine the comparative prices of similar tests done by other companies. He used the data as the basis for the business plan presented to potential investors as part of an information memorandum. In that way, the approximate value of the company could be determined based on future potential sales. The directors however knew that using a financial formula would not give an accurate valuation of the IA, but given the financial constraints of the company, the value used in the information memorandum was a "best effort."

No matter how difficult, the valuation of the IA was paramount in establishing the company value and therefore the value of shares issued. There was a risk in undervaluing the technology, which took more than three years to get to the commercialization phase, as well as in overvaluing it since it could discourage investors. Thus, valuation of the company had to be balanced between what the technology might be worth and what the market could bear at a particular time. Pictor did not have a definitive valuation at December 2009 but Dr Kumble intended to prioritize the establishment of the IA value as soon as funds were available.

Decision Challenges for Pictor

The value proposition for investors was that Pictor technology changed the traditional paradigm for immunodiagnostic tests because of its ability to perform multiple tests and multiple disease detection, in parallel and with no major setup costs. Pictor technology required low to medium level of technological skill. It offered speed and simplicity, compatibility and also familiarity with traditional systems; it was scalable from small clinics to large diagnostic laboratories. These benefits would result in significant cost savings to clinical diagnostic laboratories.

On the other hand, the potential investors required Pictor to provide sufficient protection for its IA while bringing the concept to the market and to continue to provide the same protection even when the business had already been established.

At the end of 2009, Dr Kumble and her fellow Pictor directors assured the investors that the company's IA was protected and that what was important was the method of use of the Pictor process and the protection of the accompanying software rather than the basic science. Valuation of the IA was critical in determining the pricing structure of the kits as well as in setting the parameters for the future sale of the company. Investors wanted to be assured that the company had also planned its exit strategies.

The company was on track to meet its development objectives of having the first contracts for manufacturing kits by the end of 2009 and the first order filled by mid March 2010.

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Asia-Pacific
Economic Cooperation

Pictor Limited
New Zealand

Making Diagnostics Accessible to the World (B): Financing the Company

Written by

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The case was developed with the cooperation of Pictor Limited solely for educational purposes as a contribution to the project entitled "IPR Strategies for Emerging Enterprises – Capacity Building for Successful Entry to Global Supply Chain," conducted under the auspices of the Asia-Pacific Economic Cooperation (APEC). The case is neither designed nor intended to illustrate the correct or incorrect management of the situation or issues contained in the case.

In 2005 Pictor founder Dr Sarita Kumble started developing a multiplexed miniaturized version of enzyme linked immunoassay (ELISA) technology in the laboratory that she put up in the garage of her suburban home in Auckland, New Zealand. Dr Kumble had enlisted the assistance of her husband, Dr Anand Kumble. The couple provided much of their early work in the company for free, having sought equity from family and friends.

In 2006, the research laboratory operations moved to a leased space in central Auckland. Dr Sarita Kumble had kept a lean organisational structure at Pictor, employing only a scientist and biomedical engineer to help her and her husband.

The Pictor third share issue that arose in early 2009 involved Dr Lee Mathias as both a shareholder and director. Much of the equity raised at this point had been "matched" by development grants from TECHNZ (part of the Foundation for Research, Science and Technology), the research and science development organisation of the New Zealand government (www.frst.govt.nz.com).

As CEO, Dr Sarita Kumble was faced with decisions recognizing the wide ranging uses of the technology and the various business models through which commercialization could take place. With the first contracts due to be signed by the end of 2009, it was apparent that, notwithstanding what Dr Sarita Kumble's decisions would be on what strategy to pursue, a large capital infusion would be required to commercialize the product as soon as possible. The implications of the commercialization strategy and the terms of the capital raised for the business were key to the decision-making process of the company.

Commercialization Alternatives

Pictor technology could be used in the diagnosis of many diseases and the monitoring of the efficacy of some drugs. It could be used in human, animal and food pathology and therefore had a huge range of applications, from individual blood testing, population screening and herd testing to public health food testing.

The commercialization strategy decision had to include alternatives including manufacturing the product in-house, licensing the technology to others, selling the technology outright and entering into joint ventures with diagnostic service providers. Given the wide range of applications and panels which could be developed, Dr Sarita Kumble likewise recognised the need to focus on one or two products and get these to the market as quickly as possible. Hence, the idea of licensing the PictArray® technology to others or even selling the technology outright would have to be set aside in the meantime.

Licensing PictArray® Technology

The Pictor directors took the advice of experts on the licensing of technologies and considered the implications of maintaining product quality, piracy of the technology, the future of the Pictor system once any licensing agreement had run its course, and the challenges in establishing a pricing mechanism based on individual kit

manufacture. The positive side of licensing, however, meant that apart from marketing and legal costs, the capital requirement would be limited.

Selling PictArray® Technology

Selling the technology outright had always been an option for Pictor and would remain an option following the chosen commercialization path. The Pictor directors were faced with some important decisions on when to sell in relation to the business life of the Pictor, to whom to sell in order to ensure that the technology would continue to be applied as originally conceived by Dr Kumble — to address the needs of the growing market of those who did not have access to diagnostics. Most importantly they had to decide on how to establish the price for the Intellectual Asset (IA).

In early 2010 only a small amount of revenue was being obtained by Pictor from actual product sales; therefore, any company valuation would have to be based on expected revenue coming from the application of the technology. The directors were aware that selling too early might not maximise the return for the shareholders and, conversely, holding on to the technology for in-house manufacture would mean facing the risk of not being able to raise enough capital to continue to be in business.

Commercialization Deliberations and Decisions

Based on their known capability to manufacture in late 2009, the need to assure quality of the product, and the decision to focus on two tested panels, the directors deliberated on the following two-pronged strategy:

Strategy 1: Pictor would develop and market test panels, PictArray® Autoimmune panel 1 and the PictArray® Liver panel 1, to clinical diagnostic laboratories. The first test panel, the PictArray® Autoimmune Panel I, was beta tested in India and Sweden. There had already been discussions for an exclusive supplier agreement with a major Indian diagnostic laboratory for 2010 and an agreement in principle had been reached by January 2010.

Strategy 2: Pictor would develop test panels such as the PictArray® Autoimmune panel 2 according to the specifications of Euro-Diagnostica, a Swedish company specializing in the manufacture and distribution of testing reagents for autoimmune diseases. The strategy was to leverage their expertise and marketing capabilities for product sales. The risk associated with bringing a new product to market would be mitigated by working with established players seeking to increase their market share or to enter new markets.

Dr Sarita Kumble believed that this strategy would result in early revenues from product sales and development fees. Pictor would be marketing the technology through targeted customer visits. It intended to conduct presentations in trade shows as well as publish articles in scientific and trade journals.

By January 2010 the directors had confirmed Dr Kumble's decision to manufacture the three panels for human testing only. The directors decided that in the early phase of business commercialization, in-house manufacturing would be the most

likely option to ensure product quality and allow for further product and manufacturing system development.

Estimating the Capital Required for Expansion and Commercialization

Future Production and Associated Manufacturing Costs

At the end of 2009, Pictor had the manufacturing capability to produce 60 test kits per day, which was sufficient to meet the sales demand at that time. However, sales forecasts (Appendix 1) to 2011 indicated target sales of 13,800 kits. This would require an expansion of manufacturing capability and would include the purchase of one more microarrayer and other equipment for the development of the 16-well slide testing format. The total cost of these additional requirements was estimated at NZ$80,000.

The Drs Kumble identified the need for further research and redevelopment of the products, particularly in relation to those contracts requiring customised panels of tests. At the beginning of 2010, this was estimated to cost NZ$180,000, including the cost of consumables and of some contracted services.

Dr Anand Kumble worked with a financial analyst to develop a spreadsheet that reflected all costs associated with production. Accurate costing of the manufacturing process was an important milestone for the Drs Kumble in understanding the structure of their business. The Pictor board recognised the importance of the tool in determining the strategic direction of Pictor.

Human Resource Requirement

An expansion of the human resource likely to be required was also determined. At January 2010, Pictor had four staff working on all aspects of technology development and commercialization. The plan was to hire three additional staff: one for business development, one to strengthen ongoing product R&D, and another as a manufacturing assistant. This brought the total human resource cost to NZ$460,000 per annum.

Operations

Raising financing from local sources would enable Pictor to upscale the manufacturing component of the business locally and in so doing maintain the quality which Dr Sarita Kumble desired. In many instances, manufacturing was outsourced to New Zealand based solely on pricing. However, it was often at the cost of quality. The long-term goal was to ensure that the PictArray® products would be perceived as a quality, low-cost, high-volume business.

The implications of domestic in-house production included the following: a) up-scaling of the human resource production capability; b) expansion of the

manufacturing laboratory capability; and c) increase in the overhead relating to the above-mentioned production capability build-up.

Marketing and Distribution

Dr Sarita Kumble was convinced that establishing the manufacturing base in New Zealand would allow her to manage the production carefully and to tweak the manufacturing system. This would include outsourcing to a local company the manufacture of the 16-well and 96-well slides, including the insertion and gluing of the membrane inside the wells. However, New Zealand was a long way from the rest of the world and while it had an established reputation for clean, green and quality products, its distance from Pictor's market had to be conquered.

The development of offshore marketing and sales capability presented a huge challenge. The Pictor directors sought assistance from their contacts, some of whom were already in place but did not have formal contracts to act as agents for Pictor.

The Drs Kumble had established strong ongoing relations with New Zealand Trade and Enterprise, New Zealand's national economic development agency (www.nzte.govt.nz) and, through the Focus on Health Challenge planned to maximise relationships and contacts in the USA during the May 2010 roadshow (www.nzfocusonhealth.com).

The directors had considered a strategy which they felt would maximise their opportunities to get PictArray® technology to the market in both a timely manner and at the least cost. By April 2010, they were considering partnering with Eurodiagnostica for marketing and distribution of the autoimmune and RA panels in Europe. They knew that while the manufacturing process was not expensive, the cost of marketing their product would have a greater demand for funds.

Investment

With the commercialization strategy confirmed, an information memorandum was prepared, forecasts for manufacturing and sales were developed and presentations were crafted to entice appropriate investors to Pictor (www.pictordx.com).

The directors of Pictor Limited prepared the company to "go to the market", and to raise NZ$1 million to fund the expansion of the manufacturing capability and business development of the company. The international "credit crunch" of 2008-2009 had made investors wary of start-up companies, especially in the biotech sector where many investors had been badly burnt in previous years.

As CEO of Pictor, Dr Sarita Kumble was faced with the challenge of identifying not only equity investors but the type of investors who would understand the technology and its implications for the global market.

The anticipated use of the NZ$1 million raised in the fifth round was:

Item	Estimated Budget ($)
Salaries and Wages	450,000
Capital Expenses	80,000
Business Development, Marketing and Sales	180,000
R&D Expenses (including consumables and contract services)	180,000
Legal	60,000
Facilities (including rent and general expenses)	100,000

Forecasts

The directors of Pictor had determined the amount of capital that they had to raise based on forecasts that showed a conservative sales start as reflected by the two small initial contracts. That would be followed with a sharp rise in sales, especially to India as a result of the negotiations which were underway by the beginning of 2010. The Indian company had indicated an additional order of 1000 kits in 2010, followed by up to 10,000 kits over the following year.

Assessing Alternative Investor Options

The directors had identified potential sources of funds. These included trading banks, merchant banks, venture capital funds, government-linked funds, and government funds.

Making the Project Attractive to Potential Investors

Dr Lee Mathias approached the company's bankers, Westpac, which was prepared to provide a loan to finance capital equipment, including that required for the development of Pictor business. The loan had an interest rate of 7%, a term of three years and had to be secured by the capital equipment. It did not however provide for debt servicing.

Dr Mathias also approached several merchant banks and high net worth individuals. As a company in the early stages of development but well past the angel financing or start-up phase, Pictor was in a difficult situation; the directors found that investors wanted a larger investment and greater control of the company than the directors felt necessary. Likewise, the potential investors were unable to offer the necessary expertise for the international commercialization of a new diagnostics technology.

It soon became clear that specialist investors would have to be identified. They should preferably have a rudimentary understanding of ELISA technology and its wide use in invitro diagnostics. They would need to be open to learning about the impact that a simplified diagnostic system could have on global market growth, and be sympathetic to the concept of making such healthcare technology available to economies previously denied access to diagnostics because of cost.

The directors considered which organisations should be targeted for investment based on their perceived understanding of the technology and its potential to change the global diagnostics paradigm.

Government-Linked Investment Funds

By early 2010, Dr Sarita Kumble was concerned that the timeline for development would not be met. Negotiations with Curekids Ventures as the lead investor were reignited. Discussions had taken place since late 2008 but had not progressed until early 2010. That investment meant that Curekids Ventures (www.curekidsventures.co.nz) would lead K ONE W ONE, a private investment trust, and NZVF (www.nzvif.co.nz), the government-funded venture capital investment fund, in a NZ$750,000 investment. While there was going to be an initial shortfall, Curekids had indicated during negotiations that a further NZ$250,000 tranche could be available the following year, if required by Pictor.

Drs Anand and Sarita Kumble provided all the necessary documentation and undertakings. In the latter part of March 2010, the directors met with Maxine Simmons, CEO, and Roy Austin, Chairman of Curekids Ventures. The proposed terms included ownership by Curekids Ventures of up to 2,500,000 shares at a share price of $NZ.40 which would be sustained, provided 80% of the projected revenues were achieved over the first 18 months of the loan. If not, the penalty was a devaluation to $NZ.32. The proposed ownership being surrended represented 25.2% of the company. The agreement also stated that some decisions, including the sale of the company, would require the approval of the director appointed by the consortium.

Government Support

In addition to the Curekids consortium, Dr Kumble had commenced negotiations with TECHNZ (www.technz.co.nz) for a further and final grant to sustain the research and development aspects of the business. A positive indication was given subject to a final interview and visit from a senior manager scheduled for early May 2010. The grant provided that TECHNZ would match up to $1 million each dollar raised or spent by Pictor for R&D. The directors considered acceptable the grant conditions such as monthly reporting and the meeting of agreed milestones as they had always met their targets in the past.

Impact of Financing Decisions

The Drs Kumble, as founders of the company, recognised the importance of new money. They were aware of the experience of biotech start-up companies whose owners had been reluctant to divest shareholding in return for finance; as a result these companies had foundered. They also knew that obtaining financing from private and government sectors meant that not only would the company's shareholding be diluted but also that a new director representing new investors would be expected.

The existing directors were keen in having an infusion of new blood and ideas into the business and looked forward to moving Pictor forward. It was agreed with the new investors that Dr Mathias would become the Chairman.

With the news from both TECHNZ and Curekids, the Drs Kumble and Dr Mathias set off for a much needed Easter break, reflecting on what other avenues for equity they could have considered — or was the government-linked package the best way to go? The anticipated term sheet would answer that for them. Hopefully, the financial projections that they did would provide them the answer (See the Appendix).

Appendix: Grants, Sales and Contracts

Grant Income:			Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10
Current grants	Anticipated balance at 31/ 12/2009													
TBG grant	$130,000	$90,000	$30,000	$30,000	$30,000									
EDG grant	$25,000	$10,000							$10,000					
CureKids	$20,000	$12,000		$4,000		$4,000		$4,000						
Anticipated grants														
TBG grant	$1,000,000	(for 24 months starting May 2010)					$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000
EDG grant	$30,000	(for 12 months)												$15,000
Total grant income	$1,205,000		$30,000	$34,000	$30,000	$4,000	$40,000	$44,000	$50,000	$40,000	$40,000	$40,000	$40,000	$55,000

Sales													
	Potential Customers	RLS						RLS+ two additional customers (at rate of ramp up same as Customer 1)					
PictArray Autoimmune Panel I	Number of units (at cost/ kit of $150)	50	100	200	500	500	500	600	800	900	1,500	1,500	1,500
	Total revenue from sales	$7,500	$15,000	$30,000	$75,000	$75,000	$75,000	$90,000	$120,000	$135,000	$225,000	$225,000	$225,000
PictArray Liver Panel I	Potential Customers				One new customer						one additional customer (at rate of ramp up same as Customer 1)		
	Number of units (at cost/ kit of $150)				50	100	200	500	500	500	550	600	700
	Total revenue from sales				$7,500	$15,000	$30,000	$75,000	$75,000	$75,000	$82,500	$90,000	$105,000
PictArray Autoimmune Panel II													
	Potential Customer	EuroDiagnostica											
	Number of units (at cost/ kit of $150)				50	50	150	200	200	200	200	200	200
	Total revenue from sales				$7,500	$7,500	$22,500	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000
Total units sold (manufacturing capability can account for these numbers with an additional machine)		50	100	200	600	650	850	1,300	1,500	1,600	2,250	2,300	2,400
Total revenues from kit sales		$7,500	$15,000	$30,000	$90,000	$97,500	$127,500	$195,000	$225,000	$240,000	$337,500	$345,000	$360,000

Contract Income													
Rheumatic Heart Disease Panel	$25,000				$25,000								
Autoimmune/ Infectious disease Panel						$25,000				$25,000			
(we are talking to a couple of groups about developing a panel to monitor HIV infection and treatment and TNF blocker therapy for RA)													

Asia-Pacific
Economic Cooperation

Universal eXChange, Inc
Chinese Taipei

The Financial Service Platform of UXB2B

Written by

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The case was developed with the cooperation of Universal eXchange, Inc. solely for educational purposes as a contribution to the project entitled "IPR Strategies for Emerging Enterprises — Capacity Building for Successful Entry to Global Supply Chain," conducted under the auspices of the Asia-Pacific Economic Cooperation (APEC). The case is neither designed nor intended to illustrate the correct or incorrect management of the situation or issues contained in the case.

One morning in early January of 2010, Chrissy, the CEO of UXB2B, came to a meditation for the future of her company. Having entered the 10th year since its inception, UXB2B was undergoing a change of growth pattern. Chrissy recalled those difficult and hard-working days in the first five years, while the company was encountering the bursts of internet bubbles so that made drastic changes, and the corporate was repositioned to the ongoing service model. Ever since, the company had been developing steadily, in which the business model and quality service were quite contributing to its success.

Chrissy had a doctoral degree in computer and information science, and studied in the US graduate school before joining a national defense research institute. She worked in the research institute for 15 years and had been a leader of software teams. She was invited to be one of co-founders of UXB2B in 2000 by the Board Chairman of UXB2B, Mr. Chung, who was a Chief Financial Officer of a major company.

While UXB2B enjoyed the increase of business transactions on their platform, the top management was considering the growth of revenues and exploration of new markets in the future. It gave Chrissy a chance to review the corporate competencies and prepare for the changes in the dynamic market. Moreover, most of the corporate values UXB2B had were intangible assets, such as human capitals, customer relationship and company structures. Chrissy considered if a measurement of the company's performance in the use of its intangible assets may offer some insights for their next-level strategy.

Company Profiles and Business Model

Universal eXchange Inc. (UXB2B, where B2B stands for Business to Business), an electronic commerce (e-commerce) company providing the financial service platform and service for trading partners, was established in Taipei City in January of 2000. It designed and operated an integrated information system, in which it communicated the purchasing orders, the payment and the financing requests among the participating companies and banks.

The major shareholders of UXB2B were China Steel Corporation (CSC) Group- and Far Eastern Group-invested companies. The mission of UXB2B was to build a professional, secure and efficient B2B e-commerce service to enhance the business competitiveness of the enterprises in a digital economy. Their vision was to be a world-class B2B e-commerce solution provider.

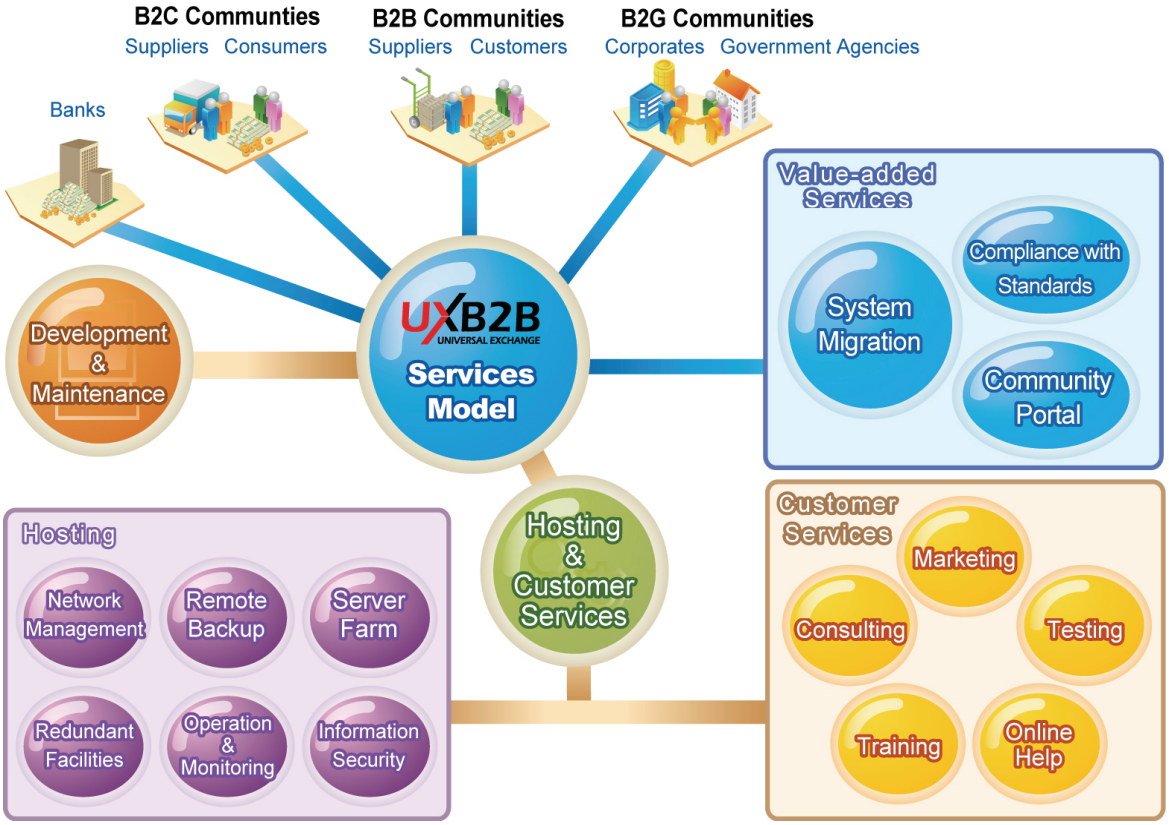
A Unique Service Platform Facilitating Sales, Procurement and Financing on the Web

Prior to the introduction of internet and e-commerce infrastructures, financial operations and services required many documents writings and people meetings, in order to cope with the domestic and international needs for procurements and sales. The transactions among buyers and sellers mostly engaged the banks for financial warranties, loans and collaterals. There were heavy paper work produced and costs generated among the trading companies and financing organizations. The system

designed by UXB2B was to provide an integrated platform to facilitate the financing-accompanied transactions efficiently. This financial service platform was the first and the only of its kind in Chinese Taipei as of 2010.

UXB2B offered the systems and services of eSales, eProcurement and eFinance. The model was called "SaaS(Software as a Service)", which facilitated an automated and interconnected system for the buyers, sellers and banks to meet the needs of payments, contracting documents, and many relevant processes. A major buyer or seller, who had many counterparts of transactions, would be interested in such a financial supply chain on the internet as the transactions were followed by voluminous documents, payments and financing matters. Figure 1 illustrated the business and service model in the platform.

Figure 1. Service Model and Information Flow of UXB2B



The Key to Success

It seemed not as difficult a service as the UXB2B provided at the first glance, since process automation and network services were common after the launch of world-wide web. But there were hurdles to overcome for the transactions along with financial services to be integrated in a platform by a neutral party. Some of them were technical issues, but mostly the mutual trusts and information security of trading and financing in the internet.

The technical matters were primarily the digital signatures, the electronic seals and the internet security. Technological instruments were required to abide by the

electronic signature law, eUCP (electronic Uniform Customs and Practice), etc. Build-up of technical support and use of modern know-how were not considered a major difficulty of UXB2B's business development.

Instead, the trading concerns and organizational inertia among the participants were the prime hurdles, especially the integration of management of information system of each company and every bank with the financial platform provided by UXB2B, where internal process was altered and confidentiality was disclosed, to some extents, so as to cope with the structural needs of new system. As a matter of fact, whoever intended to join the financial platform had to negotiate the terms and conditions with the leader and banks in the supply chain, as the major buyer/seller controlled the trading information and the banks had to evaluate the financial status of each participant for future loans and services. The leading buyer/seller had to link their internal system, such as the outputs of its enterprise resource planning (ERP), to the platform of UXB2B. The other participants could take advantage of the standardized formats and configurations provided by UXB2B.

Among the participants of this eService platform, the financing institutions, i.e., banks in this case, were the most cautious to join. The security management and internal control were prime concerns of the banks; moreover, the management structure and control process were quite diverse among the banks. Each bank required customized information system to participate in the financial service platform. UXB2B offered such service projects, in order to convince and invite as many banks to the join the platform.

A market leader played the central role of the platform and attracted many trading partners to use the financial platform. The trading platform was utilized by the contractual relationships in which mutual trust and information sharing were held among the participants. It was the China Steel Corporation that foresaw the benefit of having such a system and was willing to offer incentives, including investing on platform construction, subsidizing the participating companies and banks to adopt the software restructuring, as well as giving discounts for the transactions on platform. China Steel worked closely with UXB2B to encourage their trading counterparts and banks in line with such a system. The increase of participants, along with the technological progress, brought the growth of business.

Furthermore, a supply chain in general consisted of one or very few leaders and many small and medium enterprises (SMEs). The SMEs might have been lacking of sufficient manpower in information system, as well as a shortage of financial robustness for financing credits. It took the leader of such a supply to negotiate with the banks for the SMEs. Some banks gave credits loans favorable considerations for SMEs, which had long-term transactions with the China Steel Corporation. In order to manage the risks of Credit Sales without collaterals, China Steel paid the insurance premium to an insurer and invited a reinsurer to ensure the banks with acceptable security of repayments and financing provisions.

Corporate Milestones of UXB2B

UXB2B provided the corporate financing chain platform, which was a unique and import bridge between corporate and banks and was called B2B2B (Business to Business to Bank). For corporate, UXB2B provided the consulting and IT services to help them design the financing solutions to integrate their own systems with UXB2B's finance chain platform. For banks, UXB2B supported them to interchange the corporate financing chain with banks' information system. Many banks in Chinese Taipei were using trade financing software products delivered by UXB2B.

The value-added services included the cost and time-saving of labor work in dealing of procurements, sales and financing arrangements, as well as the competitive offerings of financing conditions and insurance coverage in the platform.

As the first mover in the market, as well as to fulfill the requirements of financial supply chain, UXB2B had accomplished several major tasks in the past. Among them, the internet security, trading and financial documents, such as the Certificate Authority (CA), the Letter of Credits, the eInvoice, etc., served as the vehicle to build up the system. Furthermore, patents of risk sharing and electronic seal were granted in 2003 and 2004, respectively.

The success of such a system attracted the attentions of corporate and government agencies. Not only several major players in steel and optoelectronic industries, such as Chung Hung Steel Corporation and Chi Mei Optoelectronics, joined the club, the product and service model of such a financial supply chain was also adopted by government to facilitate public procurement matters.

UXB2B launched new e-Standby Letter of Credits (L/C) service and provided service to Government e-Procurement system, which was owned by the commission of Public Construction Commission (PCC) of Executive Yuan. The users in Government e-Procurement system comprised government agencies, corporate, and banks, and the number of companies was estimated more than 30,000. With this service, users could apply for e-Standby L/C issued by banks, and used as a performance bond and/or bid bond to government agencies.

Another project was also earned by UXB2B that some participating banks were able to provide their financing services to Formosa Plastic Group, which was one of the largest enterprise groups in Chinese Taipei. Nevertheless, such a financial linkage was done within a one-to-one interaction (each bank to Formosa Plastic Group individually), instead of many-to-many among the companies and banks in UXB2B platform.

The capacity building and company growth of UXB2B was shown chronologically in Exhibit 1, where the milestones indicated that it had established the competence and business by introducing the new model to the market of Chinese Taipei.

As of 2009, more than 28 banks and 1,000 business clients, including domestics and overseas financial institutions, adopted the UXB2B platform. The monetary amount of transactions generated in the platform exceeded 34,000 M USD, as drawn in Exhibit 2. The revenue dropped in 2009 was caused by the global economic recession incurred in 2008.

Technological Competence of UXB2B

1. **Software engineering expertise in internet security and e-commerce syndication**

In order to deliver secured e-Commerce service for customers, UXB2B developed software systems in a high standard of internet security and abided by software engineering discipline. Engineers were well trained in internet security related technology, such as PKI (Public Key Infrastructure) and web application security.

UXB2B adopted the PKI technology and developed a security toolkit, called "uxca", to provide a secured and efficient e-commerce environment and complied with the digital signature law in Chinese Taipei. It was used for information exchanges between trading partners that the messages were enveloped with the security module to fulfill the requirements of identification, non-repudiation, confidentiality and integrity.

PKI was also used in UXB2B's proprietary seal mechanism for secure storage and portability with the seals of participants. Seal was a notary stamp in traditional Chinese transaction, as well as a must to comply with the commerce law in Chinese Taipei. UXB2B developed a database storing the seals of companies and banks, called "eSeal". The eSeal was seamlessly integrated during the transactions in the trade finance platform. This model was awarded a patent of Chinese Taipei.

2.Proprietary risk sharing mechanism

The Credit Sale service operated by UXB2B was designed for corporate supply/sales chain, banks, and insurance company. It proposed a total solution to improve the uses of account receivables of the sales chain, as well as to diversify account payables of the supply chain, which were some of the most relevant financial issues for businesses.

This model was different from the traditional banking practices, in which not only the accounts of receivable and payable were operated individually without further being cycled for financing uses, but also the insurance-supported warranties were not included for sharing the risks of credit sales and loans.

This model offered the buyers and suppliers a highly interactive mode to operate their business accounts, as well a collaborative paradigm between banking service and their customers in procurements and sales. Moreover, this model was awarded a patent of Chinese Taipei.

Services and Products

The customers of UXB2B included banks, B2B communities and B2C communities (in planning). In addition to assist customers in developing and maintaining software, UXB2B provided hosting and customers services as well.

1. Planning, design and implementation for foreign exchange and internet banking.
2. Design and implementation of letter of credit for domestic and overseas companies, letter of credit for overseas companies and Enterprise Credit Sale for the financial industry.
3. Integrated services of eSales, eProcurement, and eFinance.
4. Design, implementation and Application Service Provider (ASP) services for eInvoice value-added service center (both seller- and buyer-side).
5. Planning, design, implementation and ASP services for digital certificate center.

UXB2B's service practices were illustrated with diagrams in *Exhibit 3*.

Measurement of Company Performance in Intellectual Asset Management

A survey of the intellectual assets of UXB2B was performed. The measurement of intellectual assets was made up of five prime aspects for corporate performance, i.e., the financial focus, the human focus, the customer focus, the process focus and the renewal and innovation focus. The detailed results were presented in *Exhibit 4*

Chrissy reviewed the performance that her company had achieved, and highlighted the key factors which she considered critical for running the company.

In the past few years, the financial performance was fairly satisfactory as the transactions were booming, except for that of 2009 when the global impact of economic tsunami occurred in 2008. The number of project was also growing steadily and the customers were maintained well.

UXB2B had maintained about 50 employees in the last three years and more than half were software engineers; the salary policy being set at the level of 75 percentile of the IT industry in Chinese Taipei. The turnover rate was about 5% in the past three years, which was contrast to the first five years when the turnover rate was about 10 to 20%. The internal management was fairly stable and staffs were productive, especially the middle-level managers became experienced group leaders, after a few years' training and struggles for better service. Most of the founding members remained in the company from the year 2000 onwards.

The core competence was gradually built up in the last few years, and so was the structural capital of the company. As for the relational capital, it was apparent that the service and projects offered for the clients remained stable.

Revenues Due to Service Charges of Web Transactions (70%) and IT Projects for Banks and Enterprises (30%)

In order to link with the platform equipped by UXB2B and allow the participating banks and companies to access the information and service, UXB2B provided the IT projects to meet such demands. The IT projects were mostly customized for the clients who were participating in the platform, and constituted a portion approximately 30% of the revenue. The projects served were dependent upon the needs of the clients that were primarily to network with the platform of UXB2B, and occasionally to restructure

the internal information system of a bank or a company, if required. The charges of such service projects were thus widely ranged from some tens of thousands to half-million US dollars.

The transactions on the service platform contributed approximately 70% of the revenues. Minor services were also delivered, such as a dispatch of manpower, to supply the in-sourcing needs of China Steel Corporation. The management team of UXB2B considered growing the revenues with a higher portion of service charges from the transactions in the financial service platform, and the one-time IT projects would be reduced merely to assist the participation of the new clients.

Chrissy was aware that, although the IT played an important role in its system and security, the initiatives to implement such a system and the trust to take part in such a trading platform, were the key to the business growth. To effectively deliver the concept and feasible solutions to potential clients was critical for the business development.

Turning Point to Next-Level Strategy

Although the outcomes of intangible asset measurements seemed fine and gave positive signals to the company performance, Chrissy was concerned about the corporate strategy to move forward. This model had hurdles to overcome before the platform could be expanded for more users. Chrissy highlighted the success of such a model was primarily the initiative of a major player who was aware of the cluster efficiency of such a platform and willing to invest on the trading cluster. It was also feasible for industrial leaders, such as the Formosa Group, Chunghwa Telecommunications, etc., to create independent eFinancing platforms. Nevertheless, Chrissy was not particularly concerned about such possible competitions, as most clusters had their specific ecology and distinct requirements of transactions. The fundamental ideas of trading and financing remained the same, but each industry and every company had diversified needs of operation and process. One unified eService platform which offered the same service for several industries was not feasible in the near future. The cost of such a system was about a few tens of millions US dollars, but the lead time to operate the platform was about two to three years. It was not the competition, but how to duplicate the model and expand to other industries with UXB2B's success in the steel community, that worried Chrissy.

1. As the platform became profitable, it also indicated that the growth of this company might as well be limited. The system was established primarily for steel industry and that also gave a glass ceiling to impede the expansion of business transactions. Furthermore, the recruitment of each new participant required negotiation which was a very time-consuming process to earn the confidence of prospective clients, as the infrastructure relied very much on mutual trusts and long-term relationships. What would be the growth strategy for UXB2B?

2. The market leaders preferred to have their own platform in managing the transactions. UXB2B carried the brand, or under the umbrella, of China Steel Corporation to introduce their services, which also seemed to be an obstacle for other market leaders or business groups from collaborating with UXB2B and applying the same model. How could UXB2B duplicate their model for other

industries without having such a shadow on future exploration of business opportunities?

3. It took a vision and determination for the leader of a supply chain to initiate such a procurement, sale and financing cluster. It was the China Steel Corporation that foresaw the benefit of having such a system and was willing to offer incentives, including investing on platform construction, subsidizing the participating companies and banks to adopt the software restructuring, and giving discounts for the transactions on platform. All those were costs for those who might be interested in building such a platform. It was necessary for a market leader to have a mindset of sharing the profit and risk, and a dedication to bearing the costs of exploring the financial cluster. It was not easy to identify the target as the ecology of each industry varied. How could UXB2B find and access to such industrial leaders?

Exhibits

Exhibit 1. Major Activity and Milestones of UXB2B

Year	Major Activities and Milestones
2001	Launched the Enterprise Credit Sale service and inaugurated the CA (Certificate Authority) center.
2002	Announced the letter of credit and negotiation system for domestic companies, and built the eInvoice value-added service center for China Steel Corporation (seller side).
2003	Awarded ISO 9001:2000, and granted the first invention patent of Chinese Taipei (No. 207159, An E-Commerce System and Method for Transaction and Risk Sharing of Credit Sales).
2004	Bank of Taiwan issued the first electronic letter of credit in Asia to comply with the eUCP (electronic Uniform Customs and Practice) via UXB2B's e-ISSUED system; Built the foreign exchange and letter of credit system for domestic companies for Bank of Taiwan; and Granted the second patent of Chinese Taipei (No 234976, A System and Method of Remote Electronic Seal).
2005	Created the Enterprise Credit Sale Service for Chung Hung Steel Corporation; Commissioned to implement the foreign exchange and letter of credit system for domestic companies for Taiwan Corporate Bank; Selected to participate the national eInvoice project by Financial Data Center, Ministry of Finance, to provide the technical and compliance consultation services; and Implemented and introduced the eInvoice service center (buyer side) for China Steel Corporation and Chi Mei Optoelectronics.
2006	Introduced the Credit Sale-Firefly mode with China Steel Corporation, Small and Medium Enterprise Credit Guarantee Fund of Taiwan, and Banks for small- and medium-sized businesses; Announced the import letter of credit for overseas companies, expanding the online service to international market.
2007	Implemented the eInvoice value-added service center (seller side), the letter of credit and negotiation system, and the import letter of credit for five steel companies; Created the Integrated Finance System with grant from Industrial Development Bureau, Ministry of Economic Affairs and joined the Flagship project led by InfoChamp Systems Corporation with grant from Industrial Development Bureau, Ministry of Economic Affairs; and Marketed Integrated Finance System with ERP.
2008	Announced the Integrated Finance System platform, the next-generation enterprise finance solution

Exhibit 2. Transactions in UXB2B-developed platform (2001-2009)

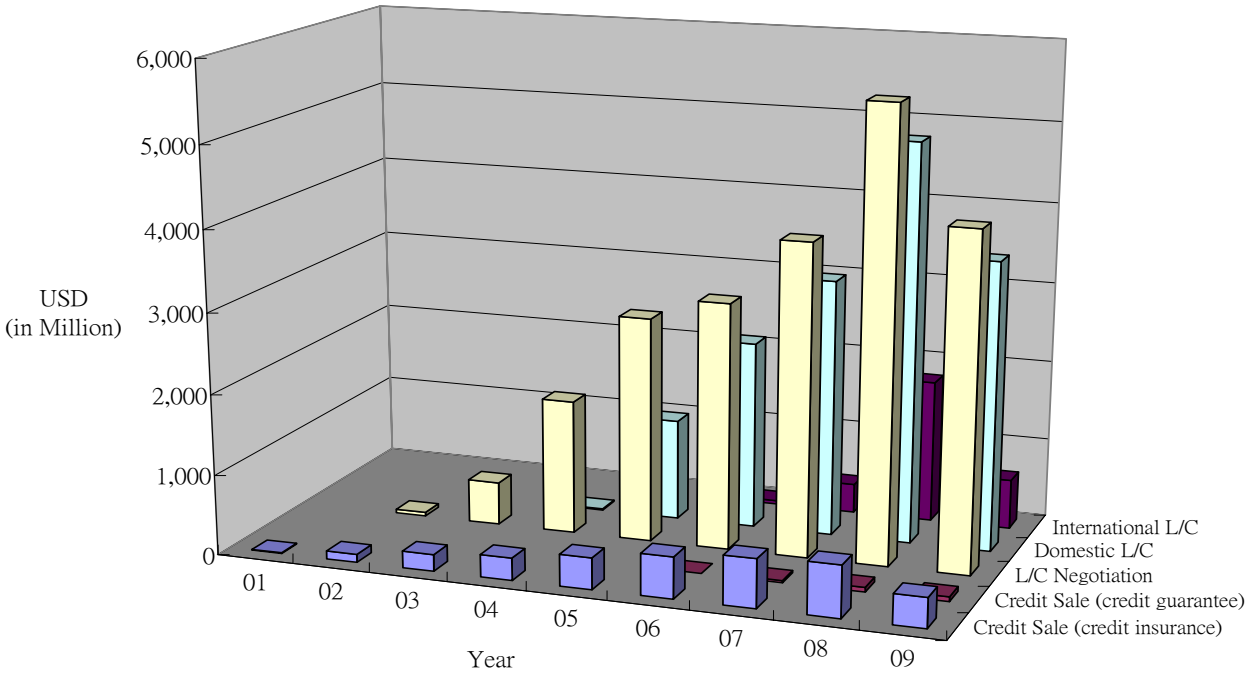
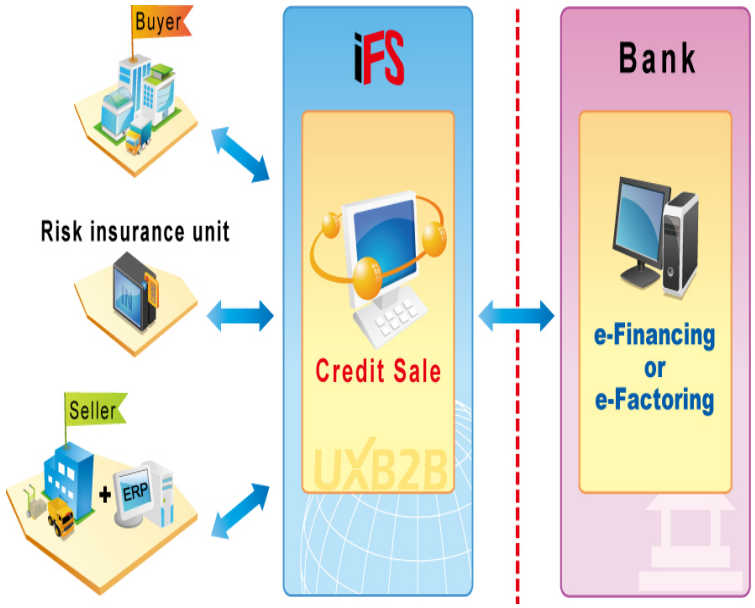


Exhibit 3. Services and Products of UXB2B

Enterprise Credit Sale Service-Sales/Supply Chain



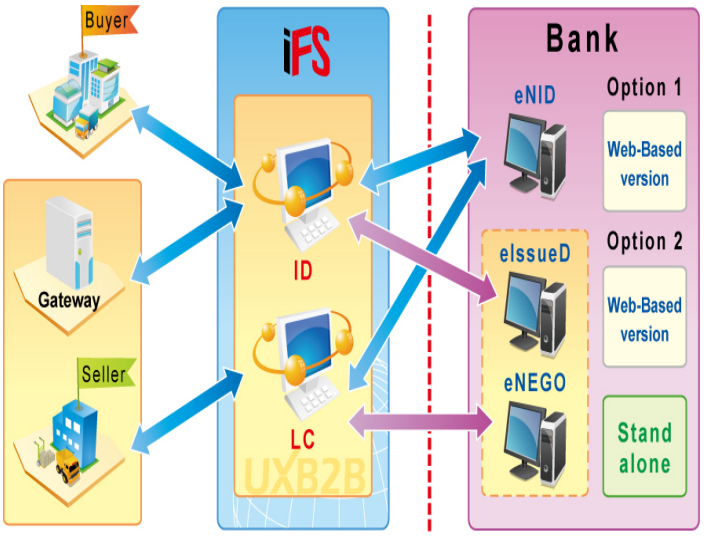
Features

- Automatic Processing
- Cross-check data to enhance risk control
- Rigorous transfer of creditor's right
- Comply with international banking practice
- Sharing risk and information

Benefits

- Reduce A/R (Account Receivable) time
- Increase enterprise credit volume
- Reduce financial management risk
- Reduce financial management cost

Letter of Credit for Domestic Companies



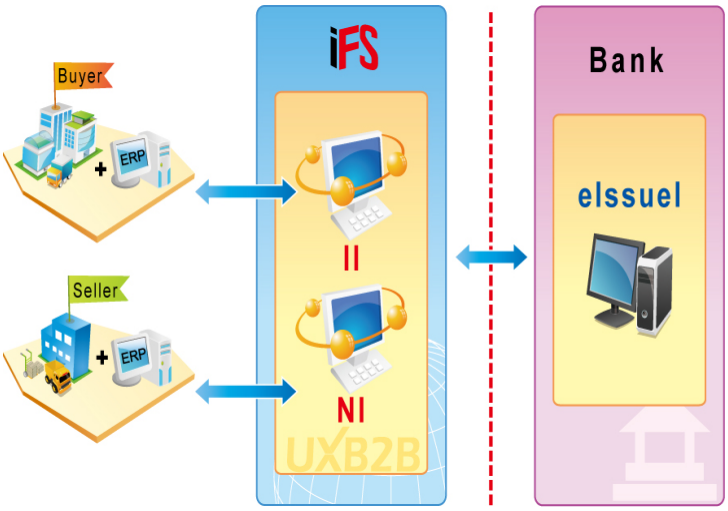
Features

- Unified J2EE platform
- Friendly GUI (Graphical User Interface)
- Access control and PKI framework designed for compliance regulations
- Component-based design
- Compliant with eUCP

Benefits

- One stop service
- Save processing time and cost
- Maximize cost savings
- Minimize errors
- Proactive alerts
- Easy report generation

International Letter of Credit for Overseas Companies



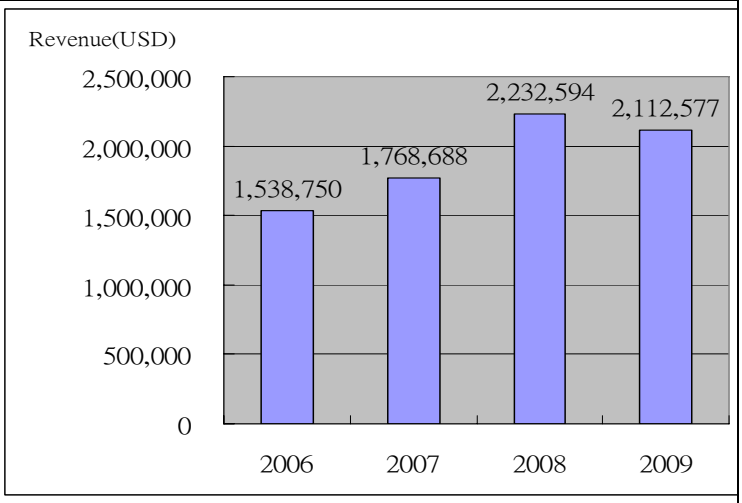
Features

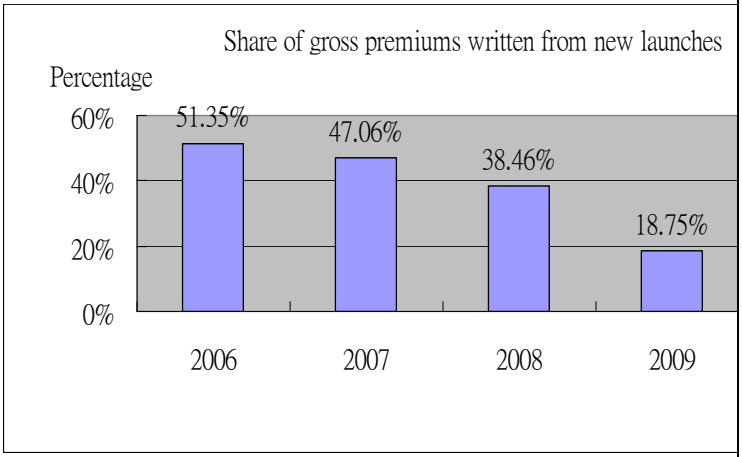
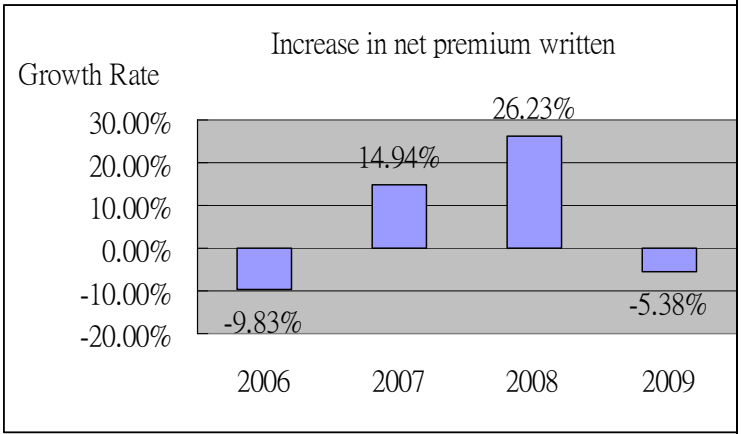
- Unified application form
- Compliant with eUCP
- Multi-tiered security mechanism
- Non-repudiation
- Leverage information

Benefits

- Paperless application
- Efficient
- Quick, accurate documents
- Apply anytime, anywhere
- Easy to manage

Exhibit 4. Intellectual Asset Measurement of UXB2B (2006-2009)
(USD: US Dollar)

Capital: 6 Million USD (186,000,000 Taiwan Dollar) Major Shareholders: China Steel Corporation Group (65%) and Far Eastern Group (35%)		
Financial Focus		
	Annual Revenues	
	Return on Investment (%)	2.6%
	Added Value/Employee	USD41,423
Customer Focus		
	Contract Number	64
	Sale/Contract	USD33,000
	Revenue	USD2,112,577
Human Focus		
	No of Employees	51
	Managers	5
	Female Managers	3
	Training Expense/ No. of Employees	USD2,000/employee
Process Focus		
	No of Contract/ No. of Employees	120%
	Overhead/gross premiums written (%)	15.5%
	IT Expenses/ Overhead (%)	20%

Renewal and Innovation Focus		
	Share of gross premiums written from new launches (%)	
	Increase in net premium written (%)	
	Development Expense/ Overhead (%)	54%
	Employees aged below 40 (%)	63%

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