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ENTREPRENEURIAL STRATEGIC INNOVATION MODEL FOR ATTAINING PREMIUM VALUE FOR THE SRI LANKAN GEM AND JEWELLERY INDUSTRY

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ABSTRACT

Entrepreneurial innovative action is a four-pronged strategic integration; it mitigates financial risk in knowledge transfer and technology transfer, it integrates manufacturing and business strategy, and it provides policy remedy to transform the assets and capabilities of the value system. The innovation process utilises market innovations to establish a competitive advantage, gathers intellectual assets, attains proprietary rights and fosters the ability to implement appropriate strategies and sustain a competitive advantage, thus generating premium value. The entrepreneur's commitment uncovers market opportunities and exploits the inventiveness of value-system technologies to result in market innovation. The integration of the above-mentioned four forces with changing market needs transforms the capabilities of the value system to allow it to sustain business value regeneration and thus generate premium value. The failure of either one or all four forces of entrepreneurs' innovative strategies will lead to a reduction in the market value of the products and disintegrate the industry value system. This phenomena was observed in the gem and jewellery industry in Sri Lanka, where the industry has been capable enough to develop a competitive product base but has been positioned to experience a reduction in market value. This reduction has resulted in the disintegration of the industry value system, forcing firms to work in isolation.

Keywords: competitive advantage, intellectual asset, proprietary rights, appropriate strategy, premium value

INTRODUCTION

The entrepreneur's role in the dynamic business environment is value creation. The complex business environment and knowledge-based economies are two

dimensions that the entrepreneur deals with in the pursuit of profitability. The intellectual capacity relegates survival in the competitive business environment, driving knowledge to seize opportunities and innovating manufacturing and business strategies to ultimately result in competitive advantage and its sustenance.

The basis for innovation is knowledge transfer in relation to the market orientation of competitive advantage. The *competitive advantage* is a unique market innovation and a value-creating strategy. The entrepreneur has the option of strengthening competitive advantage by obtaining exclusive rights to disallow duplication and create a monopoly. The application of an appropriate strategy will facilitate premium value in the market.

In an industrial setting, however, common ground is necessary for industrial stakeholders to reap the benefits of competitive advantage. An industrial policy promoting legal protection of competitive advantage will integrate industry stakeholders and achieve premium value for the industry. It is a strategic tactic combining entrepreneurship and industrial policy. Entrepreneurs will take on financial risk to strengthen the market innovation, while industrial policy would support entrepreneurs' endeavours to achieve premium value.

The gem and jewellery industry in Sri Lanka is an ancient business entity and is currently an export-driven industry. The industry's innovations — gems, gemstones and lapidary skills — have survived, leading the industry to possess a set of renowned products and an important place in the national economy.

The industry value system is handled by private-sector entrepreneurship without state interference. State intervention is conducted through the National Gem and Jewellery Authority (NGJA), which acts as a facilitator and a promoter for the industry. A free-market condition exists for price negotiations between buyers and sellers. This is an export-driven business; Sri Lanka is ranked among the world's five most important gem exporters, along with Brazil, South Africa, Myanmar, and Thailand. The industry's *core competencies* are in mineral resources and include gem mining, grading, lapidary, jewellery crafting and trading activities. The industry's "competitive capabilities" are the knowledge of the industry and expertise, skills and capabilities of human capital. The industry’s *competitive advantage* lies in "blue sapphires". The industry is the world’s largest supplier of high-quality blue sapphires of *natural* colour. The sapphires has gained a position of prestige, adorning the British crown and found in museum collections, such as the famous "star sapphire" in the Museum of Natural History in New York.

Industry Market Potential

KPMG and Indian Export Promotion Council released a report (2006) that states that the global gem and jewellery industry is estimated at USD146 billion in terms of retail prices in 2005 and has the potential to grow to USD280 billion by 2015. India and China are emerging centres of jewellery consumption and have increased their shares to 8.3% and 8.9% of global market sales, respectively.

The empirical evidence reveals that the potential for marketing demands the consideration of product attributes; an irregular supply of gemstones, possessing unique qualities such as *natural*, *unheated*, *coloured* and *durable* are needed for ornamentation or investment among wealth seekers and museum displays. The product has the ability to differentiate itself for high-end market users by being *fashionable* and *branded*, ultimately competing with rival products such as diamonds, other-coloured gems, synthetics, and treated gems. The intense rivalry in the gem and jewellery business trade requires true geographical provenance backed by certification to prove the product's quality and to distinguish Sri Lankan gems from competitors.

Industry Value

The industry value is important in terms of foreign exchange earnings. The earnings from gem and jewellery exports in 2007 amounted to USD469.1 and are projected to increase to USD1 billion in the future. The important markets are the US, Thailand, Switzerland, Hong Kong, and Japan. The major product exported is "blue sapphire", representing 39% of the export value in 2005. The diamond import/re-export business has overtaken the domestic industry's value. According to NGJA's official website, in 2007, the export value of domestic gems, jewellery and geuda stood at USD120 million against the import/re-export value of diamonds at USD348.9 million, indicating a weakening domestic industry value by 26% against the strengthening of the import/re-export value of diamonds and jewellery at 74%.

RESEARCH PROBLEM, OBJECTIVE AND RATIONALE

In spite of the competitive nature of the industry, empirical evidence suggests that domestic demand, investment and consumer confidence target precious metals gold/silver/platinum rather than gemstones or gem-studded jewellery. Precious metals have a transparent valuation system in which market prices are published and known. The precious metals are recycled among generations. Because the valuation of gems is subjective, there is insecurity among consumers. Service sectors including banking, finance, and pawning support

precious metals but not coloured gems. Sourcing data on the establishment and expansion of the pawn industry in support of the research problem was difficult.

Amidst low domestic consumer confidence and evaluating industry potential, opportunities in export markets and the competitive business environment highlight a declining position in market value for the Sri Lankan gem and jewellery industry. Although the industry offers a competitive product capable of capturing premium value in the global market, it has only experienced reductions in market value. The trade indices on the exports of gems during the years 2006 and 2007 show a growth of export earnings by 3.5%; the export volume of gems experienced an increase of 5.3%, while the price indices of gems declined by 15.3%, revealing a reduction in the market prices (Central Bank of Sri Lanka Annual Report, 2007). Therefore, it is necessary to identify why the industry has been experiencing reductions in market value.

The objective of this study is the identification of the industry's potential and the evaluation of the industry's problems for the purpose of finding a feasible solution through entrepreneurship and the detection of possible innovative strategies to generate premium value. The need to strengthen market innovation was evident, as was identifying entrepreneurs' innovative strategies to strengthen the industry's market innovation to provide a competitive advantage and determining the best way to sustain competitive advantage, and thus achieve a premium value for the industry.

The value of the gem and jewellery industry is important because it is a prominent sector contributing foreign exchange to the economy. It also holds a prominent place in the mineral sector, and generates employment opportunities for groups such as miners, mining license holders, lapidarists, crafters, dealers, traders, and exporters. Industry value generation can reduce the deficiency of the "balance of payment account". The identification of the cause of the problem and remedial actions can lead to recommendations for corrective actions for the industry.

In order to address the rationale, the literature survey paved the way and provided guidance to identify knowledge gaps in the industry. It helped to bring out new concepts to develop an argument related to the industry problem. Based on a literature review and empirical investigation, the entrepreneur's innovation process was identified to enhance the performance of the value system and to strengthen competitive advantage. The identified innovation process was integrated into a conceptual framework to evolve value. The expansion of the value system elevates the prevailing market innovation process strategically to isolate competitive advantage and give its due recognition, promotion and strength to generate a premium value. Finally, the integration of entrepreneurship,

strategy and market innovation in the industry are discussed and defined to achieve the results.

LITERATURE REVIEW

The importance of the gem and jewellery industry for the economy is highlighted against other mainstream industrial export values. The export earnings in the year 2007 from precious and semi-precious stones stood at Rs. 10,447 Million, while rubber product export earnings were Rs. 53,501 Million, ceramic products export earnings were Rs. 5,188 Million and earnings on re-exported diamonds were Rs. 38,588 Million (Central Bank of Sri Lanka Annual report, 2007).

Because there is a dearth of research information in relation to this industry, it was decided to carry out an extensive literature review using academic databases to identify entrepreneurship and innovative strategies related to the industry's competitive advantage and superior industrial value. An important determinant is the necessity of a remedy for industrial strategy to generate the competitiveness of the industry. The importance of industrial strategy in fostering entrepreneurship is highlighted by Lee (2006), who argued that governing the market and fostering entrepreneurship are the keys to competitive advantage. The role of government is the delivery of "an active industrial policy". He further discusses recent shifts in public policy — a transition of industrial policy to a competitiveness policy to an enterprise policy. This shift in public policy is because the "comparative advantage of high-cost OECD countries is based on knowledge-driven innovative activity".

Innovation as a criterion of entrepreneurs, as discussed by Dobni (2006), emphasises that innovation must be created and sustained. Innovative environment is management-centric in supporting innovation, while behaviours are employee-centric, driving market orientation and out-competing rivals; they understand strategic convergence and the difference between competitive imitation and innovation.

Guan and Ma (2003) discuss seven entrepreneur innovative capabilities: learning, R&D, manufacturing, marketing, resource-exploiting ability, organisational capability, and strategic capability adaptable to competitive environments. Moller et al. (2005) emphasise entrepreneurs' capabilities as managing strategic relationships, business nets, efficient core-value production, delivery, process excellence and flexibility, vertical integration through partnerships, and radical innovation to open new business opportunities.

Brush (2008) discusses entrepreneurs' success factors, creating new markets, products and industries and pioneering innovation and changes to the economy, utilising three key strategies: developing a clear vision, managing cash creativity, or learn to "bootstrap" and persuading others to commit to the venture using social skills. Erikson (2002) argues that the relationship between entrepreneurial competence and commitment is a multiplicative one, as both components must be present to lay the foundation for enterprise generation.

Hitt et al. (2000) highlight the relationship between knowledge and technology in creating value. They define technology as a systematic body of knowledge and suggest that technological change can be understood by examining knowledge development. The dimensions of knowledge, which are tacit and codified, facilitate understanding the relationship between technological knowledge and the ability to create value in a dynamic landscape. Cameron et al. (2005) analyse innovation and technology transfer as two potential sources of productivity growth and highlight research and development (R&D), International trade and human capital as drivers of productivity growth. Menguc et al. (2007) argue that transformational leadership should lead to positional advantages in the marketplace through competitive strategies such as innovation differentiation, marketing differentiation and low cost, contributing to effectiveness and efficiency.

Guan and Ma (2003) describe competitive advantage as an asset that is valuable, rare and difficult to imitate and substitute. Innovation capability is a special asset, one that is tacit, non-modifiable, correlated with internal experiences, experimentally acquired and the foundation of competitive advantage. The ability to quickly introduce new products and processes has become an important facet of competition, and an industry that is competitive in the home market is pivotal to forming a competitive industry in the international market.

Edvinsson and Sullivan (1996) describe knowledge as a value determinant, defined by writing or inputting information into a computer, and qualifying as an intellectual asset that is able to be protected. Intellectual assets are sources of innovation that commercialise and are grouped into three areas: i) commercialisation as products, processes, and services; ii) infrastructure as plans, procedures, and processes and iii) customers and customer relations as relationships, agreements, and history. Intellectual assets receiving legal protection become intellectual property. The importance of protecting intellectual property rights is highlighted by Hurmelinna et al. (2007). Profiting from rapid innovations is a central role in the knowledge economy. The nature of knowledge (tacit vs. codified) and legal means (patents, copyrights, trademarks) increase the protection of intellectual capital and make the learning and utilisation of intangibles more challenging by decreasing the transferability of knowledge.

Therefore, a business strategy should contain suitable appropriability regimes, take on an intermediate position, enforce intellectual property rights if protection is important and relax enforcement if the profits from the exploitation of knowledge and innovations can be achieved by other means. This strategy provides more control and leads to more alternatives to react proactively to opportunities. It is essential for innovators to make intellectual assets less transferable, increase the costs of copying and generate market imperfections, which are the basis of a firm's competitive advantage.

CONCEPTUAL FRAMEWORK

The strategic innovation model for the Sri Lankan gem and jewellery industry begins with entrepreneurs' commitment for market innovation, as illustrated in Figure 1, the conceptual framework. The innovation process requires entrepreneurs' competitive action linked to knowledge connections to explore business opportunities, transform the value system to build competitive advantage and enhance its capability to face market pressures. It is a four-pronged strategic commitment, taking on financial risk towards market innovation. It combines suitable policy remedies to sustain a competitive advantage and engages in knowledge and technology transfer to build competitive advantage, strengthen its ability to withstand market pressure and thus facilitating premium value. Meanwhile, it integrates manufacturing and business strategies to support competitive advantage.

An active industrial policy fostering market governance and entrepreneurship represents a key competitive advantage. In line with industrial objectives, the industry's recognition, the promotion and monitoring of industry performance and value will follow market innovation and aid in sustaining competitive advantage. The industry's promotion of market innovation and published market information will bring awareness to industry stakeholders to create interest in becoming competitive in their dealings. The enforcement of proprietary rights will strengthen market innovation against competitive forces to sustain industrial value. Policy remedies on proprietary rights will advocate an appropriate strategy, enabling the enforcement of exclusive rights to provide control and reacting proactively to emerging opportunities and thus achieving premium value.

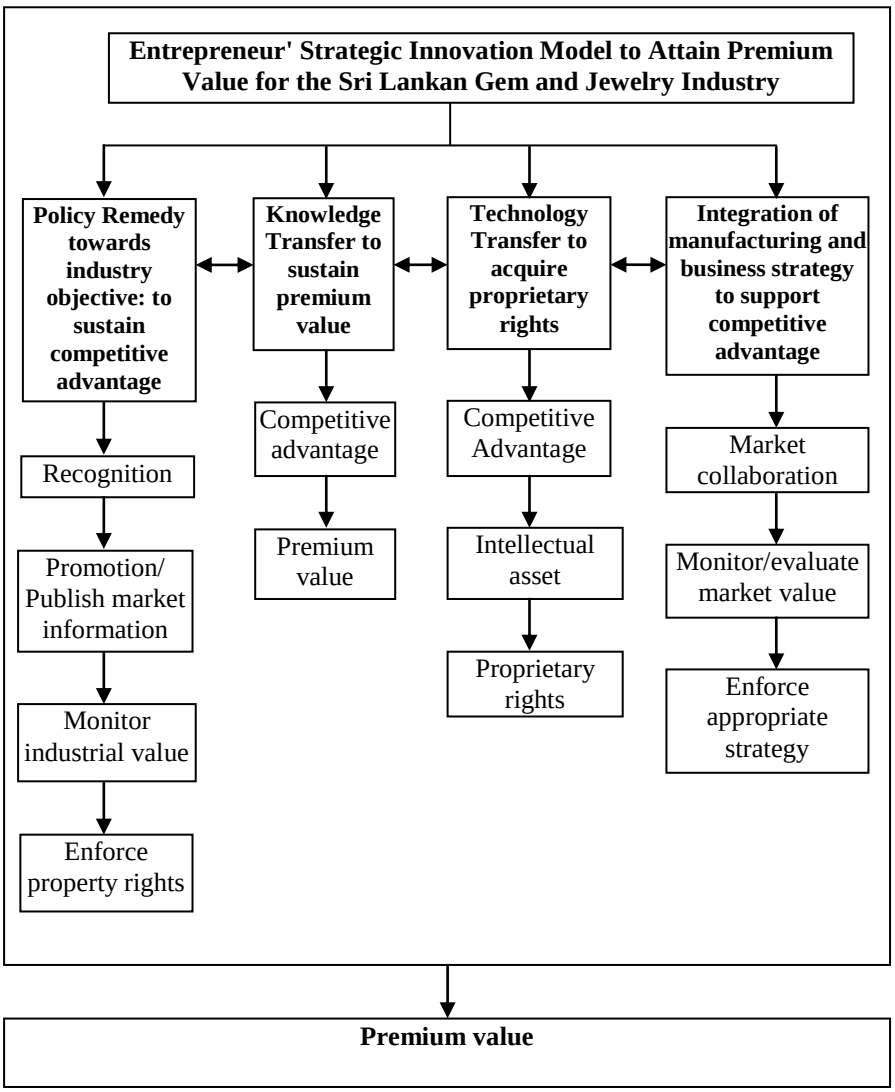

Figure 1: Entrepreneur strategic innovation model to attain premium value for the Sri Lankan gem and jewelry industry

The basis for entrepreneurial innovation is knowledge transfer; the intellectual capacity to comprehend business opportunities and the competence to turn these opportunities into market innovation is the initial move towards business process innovation. The positive response towards consumer needs will require communication and the application of tacit and codified knowledge to build an efficient and effective value system technology and thus to bring out market innovation and strengthen it for market positioning. Developing and transferring

new knowledge in the value system in relation to external opportunities will mould a competitive advantage capable of facing market pressures and sustaining the business value regeneration process. Further, market differentiation and the monitoring of market value will lead to successful competitive advantage and profitability. Knowledge transfer that aims to extract, define and codify the knowledge of invention and then transform it into an intellectual asset will be the next innovative move for commercialisation. An intellectual asset that acquires legal protection becomes an intellectual property. Thus it will be able to obtain exclusive rights and will benefit from an appropriate strategy to receive a premium value in the market. Knowledge transfer thus helps to overcome market challenges and maintain a firm's competitive position while converting competitive advantage to revenue.

The value system transformation needs to develop technology to maintain cost efficiency and high productivity levels of core value production, maintain market collaboration with customers/suppliers, maintain market differentiation to capture consumers' attention and to introduce the product to the consumer and monitor market value seeking competitive advantage to maintain profitability. The transformation of value system technology thus signifies the consolidation of the many competencies of business process innovation for the purpose of strengthening competitive advantage towards an intellectual asset to gain legal rights.

The next move of an entrepreneur's innovation strategy is to create a business environment that supports competitive advantage. Creating innovative strategies provides knowledge connectivity between the manufacturing process and consumer needs and results in an appealing and commercially valuable market innovation, such as the adoption of craftsmanship to design the latest trends in order to suit a discerning consumer. The other intention will be to converge entrepreneurs' commitment to inspire employee commitment/behaviours in support of competitive advantage with market orientation towards premium value. The penetration of market intelligence, including pricing, quality (imitations vs. duplication), and the effects of rivalry will integrate the value system's activities and stoke industry stakeholders' interest in remaining in the industry. Monitoring market innovation, verifying its success and implementing strategies to maximise potential value represent an ongoing business strategy. The implementation of proprietary rights will make intellectual assets less transferable, increase the costs of imitation, and generate market imperfections, all for the purpose of withstanding competitive pressures created by rival firms. Enforcing an appropriate strategy when necessary as opportunities emerge will pave the way for the competitive advantage and allow the firm to maintain its competitive position and earn a premium value.

RESEARCH METHOD

The research methodology used in this study placed importance on qualitative aspects to understand the socio-economic and environmental concerns. In addition, quantitative aspects were used as a measurement system for industrial value. Because our research focus is value, due consideration was given to the industry value system's activities. The primary research data were sourced by administering a questionnaire that had semi-structured but exploratory-type questions to seek both qualitative and quantitative ideas and data. In-depth interviews were carried out to gather insight into the current system and to look for the industry's core competencies, capabilities and appropriate management strategies. The questionnaire was used for personal interviews with industry practitioners representing 16 states, public and private institutions. These included senior policy makers at the premier government regulatory body, the NGJA, who are responsible for industrial value in the areas of exports, export promotion, gemmology, valuation, assaying, customs, statistics, administration and training. Other people interviewed were officials from the country's Export Development Board and the Census and Statistics Department, who are responsible for monitoring and compiling industrial value. A Deputy Director of Central Bank of Sri Lanka was consulted for a clarification of industry value. Individual entrepreneurs directly responsible for value-generating business ventures in the fields of mining, dealing, jewellery production, trading, exporting, lapidary, and software development were also interviewed to identify value-creating strategies. The qualitative dimensions based on semi-structured-exploratory-type and in-depth interviews helped the researcher to gather a realistic picture as well as a greater insight into the sample population. The Facet 2007 exhibition showcasing local gem and jewellery collection was also made the venue for data collection. The informant's responses are arranged in the following sections of the article. The secondary data were from published sources: internet-based research articles and government industry publications.

The qualitative approach adopted for data analysis used a "cyclical process" of data reduction, organisation and interpretation, seeking trends, relationships, intervening variables and building a logical framework for a meaningful conclusion. An internet-based literature review from academic databases was used for the strategic modelling of an innovative and capable industrial value system to enhance industrial value.

Issues of the validity and reliability of the questionnaire were initially dealt with by pretesting with a sample of experts in the field to get feedback on wording, understanding, applicability and timing. In-depth interviews with multiple experts made it possible to gather an accurate assessment of the industrial value system.

Repeated administration of questionnaire among the sample organisations ensured genuine responses.

The research data used in this paper are a part of a larger research area covered for the academic study in identifying core competencies for value: "human", "natural resources", "human capital", "knowledge", "capital", "intellectual capital", "GDP", "incentives" and "environment" as research variables. The research findings became the basis of knowledge to further develop and conceptualise a research problem on industrial value. The published research articles are the conference proceedings of the 12th Asia Pacific Management Conference 2006, Thailand; Research in Management and Technology 2007, India; the 16th International Conference on Management of Technology 2007, US; Managing Technology for Organisational Excellence 2009, India; the 6th International Conference on Business Management, 2009, Sri Lanka and University of Kelaniya, Journal of Science, Vol 4, 2008.

The pre-selection of the sample to access information and informants gave priority to their actions in the value system and made the sample unbiased. The exploratory-style interviews minimised the limitations of research by allowing other variables to surface that have potential influence on defined variables. However, it is not possible to entirely avoid the influence of other variables.

INDUSTRY VALUE SYSTEM AND MARKET INNOVATIONS

The research findings highlight the responsibility of entrepreneurship in creating industry value through value systems — mining, grading, lapidary, jewellery crafting, and trading. They are important determinants for value creation and are considered when making choices of dealing, retailing, manufacturing, and purchasing gemstones. Entrepreneurship is expected to highlight the depth of colour, sparkle and weight to enhance the potential value of gemstones. The competitive nature of the industry has led to more value chain activities such as gem testing, assaying, hallmarking, certification, designing, branding, promotion and marketing — consolidating diverse capabilities. For instance, Sri Lankan lapidary capabilities are known to be the most cost-effective and quality-enhancing skills among competing countries.

An analysis by Dharmaratne (2004) highlights the demographics of the gem and jewellery industry in Sri Lanka. Almost 63% of entrepreneurship belongs to the mining sector, 14% belongs to the jewellery manufacturing and the balance, 23%, belongs to industry service sectors — lapidarists, dealers, heat treaters, and gemmologists. The most notable factor is that trading takes place at every point of production, from rough, cut and polished gems to gem-studded jewellery. As

the stones move downstream along the value chain, value is enhanced: an expert's view is that an over 100% value addition takes place in the normal value chain activities from rough gemstones to jewellery crafting stage. This percentage is increased to more than 300% in the geuda heat treatment process, where technological interventions add value to gemstones.

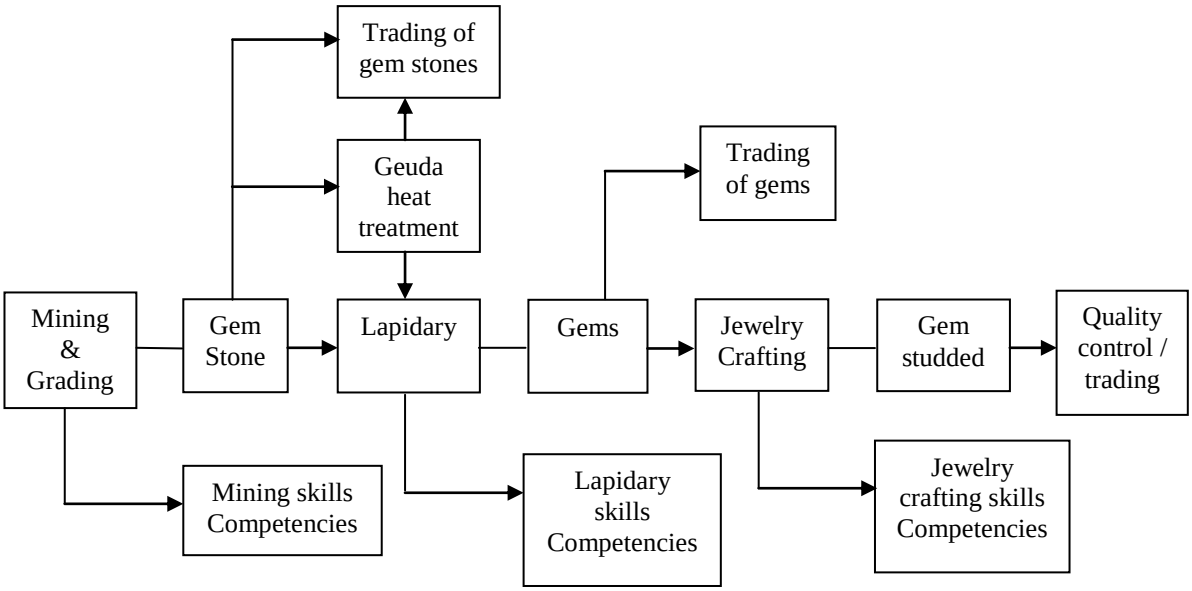

Figure 2. Gem and Jewelry Industry Value System

GEM AND JEWELRY INDUSTRY ENTREPRENEURSHIP, STRATEGY, AND MARKET INNOVATIONS

Industrial entrepreneurship and industrial strategy have led to competitive valuable core competencies and have consolidated expertise in the value system. Innovations in the market are gems and jewellery and have commercialised lapidary competencies. The industry has developed competitive advantage in "blue sapphires", a renowned, rare, useful and commercially valuable product. At the same time, weaknesses have evolved in terms of the "knowledge transfer" of critical success factors to pursue market opportunities and defend against external threats to the industry.

Industry knowledge is a culmination of gemmology, mineralogy, geology, technology, fashion trends, designing, trading and marketing, among others, representing a wide scientific field where technology plays a major role. Both

codified and tacit knowledge are important, and the consolidation of knowledge is found among different industry workers: miners, graders, lapidarists, jewel crafters, quality controllers, and traders, among others. The industry value's enhancement is solely dependent upon the integration of knowledge, skills, capabilities and experiences in the value system.

Mining

In the mining industry, investors and miners are fortune seekers, willing to take a risk both in terms of money and in terms of physical wellbeing. Traditional methods of mining, such as building a cooperative system for the sharing of labour, expenses and profits, maintains an uncertain business environment. The mining group consists of land-owners, investors, miners, and suppliers of water pumps, timber and logs. Investors finance the project from mining to sorting, and miners carry out orders of the investor. The selection of land, excavation, the collection of gravel, washing, sorting and examination are part of the mining process. Mining is a tiresome and risky effort, and miners are not rewarded adequately for their work. They share poor living conditions and have begun to leave the industry for economic reasons.

The miners are not qualified gemmologists, nor have they received formal classroom education on the subject, but they have acquired mining capabilities through their ancestors, passed over to them by word of mouth and hands-on experience in the mining field. They are capable of identifying mine sites, making gem pits, performing operational activities in the mine, sourcing gemstones, and identifying different varieties of gem minerals and determining their quality. It was revealed that when classroom-style training sessions are conducted by the NGJA, they seldom take part. The theory and scientific knowledge that forms the basis for industry activities is especially lacking among miners. Due to a knowledge gap, the required value chain integration does not take place, and value chain activities happen in isolation. Mining activities produce various degrees of environmental degradation, disrupting ecological systems. Although the careful management of mineral extraction is possible, visible environmental degradation is seen in mining areas.

Grading and Valuation

The minerals are valued as gemstones due to their abundance, colour, combined transparent effect, crystalline allure and hardness with optical properties, allowing them to be fashioned as glittering gems. Although gems are classified as precious stones, they do not receive the level of recognition given to precious metals, that is, gold, silver, platinum or diamonds. Precious metals and diamonds follow a uniform pricing system, making it easy to buy them as an investment.

However, people are not confident in investing in coloured gems, as gems have a subjective pricing system. The banking and finance sector does not accept them for collateral, nor does it have expertise to carry out gem valuation practices. The absence of recognition for local gems in the domestic market has made consumers tentative with regard to investing.

The popular factors of used for valuation are the 4 C's: *Colour*, *Carat*, *Clarity* and *Cut*. However, with coloured gemstones, the degree of "rarity" is a value determinant. Unlike diamonds, coloured gemstones do not have a standard scale used to determine value; there value is based on the opinion of the valuer and is expressed in numerical terms based on the prevailing market price at the time of valuation. The grading and valuation of gemstones are handled by miners, dealers, traders, and expert gemmologists of the industry. Colour is an important factor for grading, and colour saturation is carried in their memory, where estimation is based on tacit knowledge. Expert opinions on the valuation of gemstones require the use of a microscope for the evaluation of colour and an electronic balance for weighing. Although contradictory opinions are held by the experts and gem dealers, the industry consensus is that there is a need for an acceptable colour scale for the valuation of coloured gems in the market.

The lack of an acceptable standard or codified knowledge to measure coloured gems prevents the achievement of premium value in the market. At Facets Sri Lanka 2007, the 17th International Gem and Jewellery Show in Colombo, a dealer's estimation of a top-quality corn flower blue sapphire weighing 1 carat was about Rs.15,000, and another dealer's estimation was about Rs.30,000 for the same-quality sapphire. (USD1 approximately equals Rs.110)

Lapidary

The potential value of precious stones does not surface until they are cut and polished by lapidary artists. The current lapidary service is a result of traditional gem-cutting and polishing skills, has been adaptable to new technology and has helped the diamond-cutting industry. Lapidary expertise is a success story of the industry and has been positioned as a gem-cutting centre and supplier of cut and polished, free-size and calibrated stones to the market.

Geuda Heat Treatment

Geuda is a light-coloured corundum that has inclusions and thus a cloudy appearance, due to incomplete formation under natural circumstances. Heating it at high temperatures improves the gem's clarity and intensifies its blue colour, making the enhancement of its value possible. A large number of geudas are bought by Thai gem dealers, who treat, cut and polish stones for resale as blue

sapphires, reaping high profits. A price variation exists between natural and treated blue sapphires in the market.

Jewellery Crafting and Designing

Jewellery manufacturing is a traditional industry that began as a cottage industry in village communities. It was a specialised economic activity held by traditional clans of craftsmen, who had expertise in the production of jewellery for domestic niche markets in recognition of their cultural heritage. The expertise of the traditional jewellery craft has been preserved up to now, but more modern technology is being used by jewellers.

Quality Control

Quality-control measures for gems and jewellery, such as testing, assaying and hallmarking services, are available under the NGJA. All exports are channelled through NGJA; they are tested for authenticity by a panel of expert gemmologists of NGJA and Sri Lanka Customs, where export declarations are verified for value and quality. The industry had drawn plans to establish a gemstone-testing laboratory for certification and research purposes.

Industry Monitoring and Evaluation

The responsibility of the industry's monitoring and evaluation is held by NGJA. They are also responsible for promoting industry and retaining the miners in the field. The industry export value includes the domestic industry export value, the import and re-export value of diamonds and the export value of diamond jewellery.

Industry statistics show a reducing output in precious stone exports. In 1997, the export quantity of precious stones was 16,055,000 carats, and in 2006, it was 11,221,000 carats, a marked reduction of output of about 30%. (Central Bank Annual Report, 2007).

According to NGJA, an uncut, unpolished "blue sapphire" gemstone weighing around 1 carat will cost approximately Rs.5,000. The current market price of a good-quality unmounted, cut and polished "blue sapphire" weighting 1 carat is approximately Rs.15,000 to Rs.20,000.

Sotheby's Auction House in Vienna records the sold prices of jewels; lot 144, a sapphire and diamond ring, was sold for CHF 76,900; lot 246, a sapphire and diamond ring, was sold for CHF 62,500 and lot 256, a sapphire and diamond bracelet, was sold for CHF 56,250 on May 12, 2009.

(www.sotheby's.com). 1 Swiss Frank = approximately Rs.104.

ANALYSIS OF RESEARCH FINDINGS

The industry competitive advantage is "blue sapphires". The industry has also unearthed a wide array of unique, rare gems such as alexandrite — among the most precious of gems — cat's eye, garnet, zircons, tourmalines, spinels and many more that have less market value. According to McIntyre and Sorrell (1994), Sri Lanka is among the lowest commercialised lapidary labour cost destinations in the region. This situation calls for strategic action to build a competitive condition to the industry through the capitalisation of available competencies and capabilities to strengthen industry market innovations and thereby introduce a distinctive competence to the industry.

The industry relies on tacit knowledge to carry out value chain activities; codified knowledge is not available to carry out important value chain activities, such as mining, grading, valuation, and jewel crafting, which are the result of tacit knowledge application. Therefore, the industry's knowledge transfer process is interrupted at various stages of the value chain as follows.

Table 1
Proposed Entrepreneur Strategic Innovation Model for the Sri Lankan Gem and Jewelry Industry to Enhance Industry Premium Value.

Knowledge Transfer	**Technology Transfer**	**Integrate Manufacturing and Business Strategy**	**Policy Remedy**
Strategy 1 Transfer both codified & tacit knowledge to expand industry value system, develop competitive advantage and sustain it.	**Strategy 1** Technology transfer to develop competitive advantage and sustain industrial value.	**Strategy 1** Integrate manufacturing and business strategy to support competitive advantage.	**Strategy 1** To sustain competitive advantage.

(*continued*)

Table 1 (*continued*)

Knowledge Transfer	**Technology Transfer**	**Integrate Manufacturing and Business Strategy**	**Policy Remedy**
Industry Strength Industry value system is consolidated with diverse competencies; accrual of tacit knowledge on value system activities.	**Industry Strength** Industry value system technology developed competitive advantage is "blue sapphires" a rare product difficult to duplicate.	**Industry Strength** Industry has developed an acceptable product for market collaboration.	**Industry Strength** Market recognition of industry competitive advantage.
Knowledge gaps • Industry relies on tacit knowledge to carry out value chain activities. • Codified knowledge on industry success factors not available i.e. a valuation system, a "color scale" to measure color saturation. • Mining sector short of scientific theory. • Environmental degradation in mining areas.	**Technology gaps** • Widely used traditional methods, disallow technology innovation in mining fields. • Unavailability of technology to explore secondary deposits.	**Gaps in business strategy** • Disintegrated value system and activities take place in isolation. • Unavailability of published market information, competitive strategy for market collaboration, craftsmanship for market differentiation, valid valuation system, and banking and finance sector expertise on valuation methodology.	**Policy gaps** • Industry strategy do not recognize and promote precious stones in the domestic market. • Do not publish industry market information.

(continued)

Table 1 (*continued*)

Knowledge Transfer	**Technology Transfer**	**Integrate Manufacturing and Business Strategy**	**Policy Remedy**
Strategy 2 Knowledge transfer to define competitive advantage to develop an intellectual asset. **Knowledge gaps** In codified knowledge to develop an intellectual asset. **Corrective strategy 1** • Build codified knowledge on industry invention to extract an intellectual asset. Knowledge transfer of industry critical success factors among service industry.	**Strategy 2** Technology transfer to develop an intellectual asset. **Corrective strategy 1** • Implement technology to develop an intellectual asset.	**Strategy 2** Promote competitive advantage, benefits of exclusive rights and IPR. **Corrective strategy 1** • Promote industry market information and industry competitive advantage to develop an intellectual asset and acquire IPR. • Integrate industry with banking, finance, pawning and other services.	**Strategy 2** Enforce industry to develop an intellectual asset to acquire IPR. **Corrective strategy 1** • Recognition and promotion industry as a mainstream value activity. • Publish market information • Integrate industry with service sector, • Enforce IPR for competitive advantage.
Strategy 3 Knowledge transfer to acquire intellectual property rights (IPR). **Corrective strategy 2** Knowledge transfer to acquire legal ownership of intellectual asset to have exclusive rights.	**Strategy 3** Technology transfer to acquire IPR. **Corrective strategy 2** Develop technology to acquire legal ownership for the intellectual asset.	**Strategy 3** Enforce appropriate strategy **Corrective strategy 2** Enforce appropriate strategy when necessary.	**Strategy 3** Enforce IPR for the competitive advantage. **Corrective strategy 2** Acquire IPR for competitive advantage. Result! Attain Premium Value.

The knowledge gaps in terms of the codified knowledge of industry-critical success factors are market intelligence, including that of gem prices not transmitted in the value chain; the unavailability of a "colour scale" for gem valuation; and the absence of legal protection for competitive advantage. The knowledge connections between manufacturing and business strategy are not available. Market innovation in the industry is not strong enough to capture premium value.

It is thus evident that entrepreneurs' actions have introduced a competitive product to the market. Due to a lack of a competitive strategy, the industry's competitive advantage was not defined as an intellectual asset to build exclusive rights to compete in the market. As a result, the industry receives little value. The industry's next strategic step would be to extract the invention, define the knowledge and transform it into an intellectual asset to qualify to attach to it a legal status. Upon receiving legal protection, the intellectual asset of particular value becomes intellectual property. Legal protection extends exclusive rights to the product to compete with imitators and withstand rivalry. Once legal protection is obtained, the product is suitable for commercialisation.

As illustrated in the conceptual framework, the extension of entrepreneurial innovation and industrial strategy to recognise and define the industry's competitive advantage will introduce a competitive product to the market, ultimately giving the industry power to attain optimum value. The gem and jewellery industry's research findings and market innovation process are evaluated under the conceptual framework in Table 1.

CONCLUSION

The results of the research highlight an important facet of entrepreneurship: the innovative capability of entrepreneurship is a strategic managerial attempt to disperse a four-pronged driver of premium value in the industry. These drivers are as follows:

(i) transferring both tacit and codified knowledge in the value system to transform the industry's competitive advantage into an intellectual asset;
(ii) making simultaneous technological transfers along with knowledge transfer to acquire the legal ownership of intellectual assets and thus gain exclusive rights;
(iii) integrating manufacturing and business strategies to support the industry's competitive advantage, highlighting market intelligence to attract service sector and enforcing an appropriate strategy to gain exclusive rights to the competitive advantage and thus extract premium value; and
(iv) enacting a needed policy remedy to promote the industry as a mainstream economic activity.

Legislature to enforce intellectual property rights for competitive advantage as a protectionism measure for sustaining industry value is a part of the policy remedy. The remedial actions discussed will promote both entrepreneurship and competitive advantage to initiate a positive attitude among industry stakeholders

to create a momentum and commitment for investment. Due to the recognition and promotion of industrial and related market information, consumer confidence towards coloured gemstones will increase, fostering domestic market demand and building the service sector's interest in investing, finally enabling the industry to be competitive.

The industry's potential is reached through entrepreneurs' competitive action based on knowledge and the application of knowledge in the value system to seize market opportunities, seek and strengthen their competitive advantage against market pressures, and ultimately command a premium value. Exclusive rights to this knowledge will give them the authority to enforce appropriate strategies to become price makers rather than price takers. Understanding the unique nature of competitive advantage and the complexity of duplication is a worthwhile lesson, as a unique competitive advantage can be imitated, but duplication is difficult. This opens a new area for future research work.

The results of this study have interesting implications under the strategic management perspective for sustained industrial value that are useful for both academics and managers, who have both encountered limited research findings. The industrial policy remedies should uphold both entrepreneurship and the industry's competitive advantage in the context of market governance to enhance the industry's value.

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