

Research Assessment Exercise 2020
Impact Case Study

University: The University of Hong Kong (HKU)

Unit of Assessment (UoA): 22. Business

Title of case study: Breakthrough Innovation as a Strategy to Excel in Competitive Markets

(1) Summary of the impact

This case study provides an example of how highly-cited, conceptual research on innovation strategies, competition and organizational culture can impact on national and international companies' practices and approach, including that of SMEs and start-ups. Professor **Tse's** concept of Breakthrough Innovation (BI) has spread from quality academic journals through citation, consultancy, active participation with both clinicians and patients and also by serving on senior management boards of start-up companies.

Professor **Tse's** work with *Time Medical* is credited as having led directly to development of prototypes of MRI machines for diagnosis of breast cancer (2017) and pediatric conditions (2017). These innovations have received world-wide acclaim and deliver competitive advantage to the start-up firm in a market previously dominated by major multinationals. His research impact has generated significant interest and purchases of breast MRI machines at centers in the USA, Hong Kong, Malaysia and Mainland China. The Pediatric MRI won the Geneva award and was voted the most favored product in Shanghai's Import Expo in 2018. The Breast MRI was featured in Shanghai's Import Expo in 2019 with positive media coverage.

(2) Underpinning research

Breakthrough Innovation (BI) has been theorized as an effective innovation strategy by Professor David **Tse**, Stelux Professor of Marketing and Director of the *Contemporary Marketing Centre*. BI supplements more traditional innovation approaches, which can involve internal resistance, being better suited to established firms and ignoring the benefits of underserved markets. The underpinning research led by **Tse** commenced in the early 2000s and its application and conceptual insights include (1) breakthrough innovation [3.1]; (2) innovation and organizational change [3.2]; and (3) core advantage, branding strategy and market performance in China [3.3]. Two of his PhD graduates (2014 and 2018) built their dissertation research upon BI. Their research papers include technology transfer, learning-by-exporting, customer and distributor co-creation for innovation. These three areas collectively established the importance and benefits of BI, the need for proper organization culture, and how foreign versus local brands manage their innovative capabilities to excel in today's competitive marketplace. In these studies, **Tse** and his colleagues conducted multi-informant firm surveys across product categories to ensure strong external validity and managerial reference.

2.1 Breakthrough innovation as an effective strategy for start-up firms

There is a rich literature on different types of innovation (low-cost, incremental, radical, disruptive and reverse innovation) analyzing how each type enhances firm competitiveness and performance. **Tse's** study focuses on breakthrough innovation, a novel strategy that emphasizes fulfilling new (and underserved) market demands through new technology. While most papers argue for radical (technology-driven) or incremental (market-driven) innovation, **Tse's** research shows that firms should *combine their technological and marketing competence to meet niche market demands*. In so doing, firms can excel in highly competitive markets becoming respected niche innovators. Using China as the study context, **Tse** and his co-authors validated the key propositions of breakthrough innovation and its impacts on firm performance. They point out that breakthrough innovation is highly relevant for start-up firms in established markets. The seminal study was published in the *Journal of Marketing* in 2005 [3.1]. It became the journal's third most-cited paper

of the year and by October 2019 it had 1,667 Google citations.

2.2 Innovation strategy and organizational change in an emerging economy

Tse's research on innovation and organizational change confirms the need to establish a proper organizational culture to nurture firm innovation. It argues that proper structure and process and a participative culture are necessary conditions as firms plan to excel in new product development. The study results show that organizational changes in technical versus administrative areas are differentially driven by firms' motivation to change (past performance), opportunity to change (firm location and market orientation), and capability to change (firm ownership, managers' attitude to change, and leader charisma). Furthermore, technical and administrative changes affect firm performance through distinct paths. Technical changes have a direct, positive impact on performance, whereas administrative changes enhance performance indirectly, via its impact on technological change. In addition, the effect of administrative changes on performance is strengthened by whether a firm has a participative culture. For the relevant paper see the *Journal of International Business Studies* in 2006 [3.2]. By October 2019, it had 184 citations.

2.3 Core Advantages, Branding Strategy and Market Performance

The third area of **Tse's** research on firms' innovative capabilities focuses on brand advantage and how this affects brand performance. It is represented here by Gao, Pan, **Tse** and Yim (2006: [3.3]). Market share performance of foreign and domestic brands in China are investigated. The study found that brands with access to local resources often have larger market shares. In China, a transition economy, consumers are less sophisticated than those in developed economies. Thus product quality and product innovations play a lesser role at the initial and development stages of brand competition. See *Journal of International Marketing* (2006: [3.3]).

(3) References to the research

Journal Publications relating to the Impact Case

- [3.1] Kevin Z. **Zhou**, Chi Kin (Bennett) **Yim** and David K. **Tse**, (2005). "The Effects of Strategic Orientations in Technology-based and Market-based Breakthrough Innovations," *Journal of Marketing* (April), 42-60. (Google citations:1,644).
- [3.2] Kevin Z. **Zhou**, David K. **Tse** and Julie Juan Li (2006). "Organizational Change and Innovations in a Transitional Economy: Antecedents and Consequences" *Journal of International Business Studies*, 37, 248-263. (Google citations:184).
- [3.3] Gerald Y. Gao, Yigang Pan, David K. **Tse**, and Chi Kin (Bennett) **Yim**, (2006). "Market share performance of foreign and domestic brands in China" *Journal of International Marketing*, 14(2), 32-51. (Google citations:53).

Supporting Research Grants

- [3.4] **Tse** (Principal Investigator) "Assessing Consumer Product Brand Performance in China: A Dynamic Capability Analysis," *Competitive General Research Fund*, Hong Kong SAR Government (HK\$434,000), 2010-2012.
- [3.5] **Tse** (Principal Investigator) "MNCs as Good Parents: Strategy Tenets and Nurturing Mechanisms," *Competitive General Research Fund*, Hong Kong SAR Government (HK\$435,163), 2017-2020.

(4) Details of the impact

Breakthrough Innovation has delivered impact with extensive reach: adoption by multiple organizations with business in several countries; and significant effects in terms of the values of start-up companies and the call to effectively develop user-oriented technology for underserved markets. The main pathway to impact was through interaction with senior management of two firms from two industries: one in medical equipment and the other in marketing consultancy and big data.

4.1 Time Medical Limited – an MRI (magnetic resonance imaging) equipment company

Some start-ups and SMEs have applied BI insights to their operations and succeeded in transformation of their firms. They include *Time Medical Limited* – an MRI (magnetic resonance imaging) equipment company (registered in the Cayman Islands) and *Xinsight* – an internet big-data provider company (registered in Beijing). Their senior management (Chairman and CEO of *Time Medical* and Managing Director of *Xinsight*) find **Tse**'s research on BI and organizational culture insightful, applicable and instrumental to their operation. They adopted the strategy themselves.

“You urged the Board to reconsider Pediatric MRI (which has been shelved for two years) and suggested that we develop the Breast MRI. Through your explanation and after some discussions, the Board adopted this new product strategy and devoted our R&D staff and depleting resources to the two projects. Without any overstatement, your thoughts on break-through innovation and your strong urge for us to develop specialty MRI machines were critical to our success today.”
(Dr. QY Ma, Chairman, Time Medical Ltd [5.1])

Time Medical is an MRI (magnetic resonance imaging) equipment firm with original patents from its founders (Dr. QY Ma, Dr. Eric Gao and Mr. Simon Yeung) and from relevant universities (*Columbia University* and *The University of Hong Kong*). The MRI equipment industry has been dominated by three firms – *General Electric*, *Siemens* and *Philips* – followed by *Canon* and *Toshiba* and several local Chinese firms. The three leading firms – *GE*, *Siemens* and *Philips* – take 80% of the global market by producing general-use MRI systems with different magnetic strengths and bore sizes.

Before taking the breakthrough innovation path, Dr. Ma concentrated on producing X-ray machines and MRI systems that offer better price-value for China's city and village markets. The value-pricing innovation strategy has also been adopted by three Chinese firms (*United Imaging*, *Anke* and *AllTech*). These three Chinese firms have been successful in raising support (over US\$500 million) from investment funds, yet by 2018 these firms were struggling to be profitable because of price competition and low-margins on their common-use products. In the medical equipment MRI industry, most start-up firms like *Time Medical* followed the low-cost innovation strategy and focused on making common-use MRI, selling them at lower prices. While the products were readily accepted by the market, they provided low margins (20%) so *Time Medical* suffered losses, continuously depleting its financial capital.

Dr. QY Ma became aware of **Tse**'s research and invited him to present his ideas to the Board of Directors and later to serve as a member and the consulting director of *Time Medical*. **Tse** has given several talks and discussion with the Board and the senior management team (CEO, COO, SVP and VPs). In 2016, *Time Medical* radically changed its innovation policy and adopted Breakthrough Innovation to explore niche markets with specially designed MRIs [5.1].

The firm strategy also calls for a strong participative culture and co-creates its MRI systems with top experts in the field. In two years, the firm successfully developed the prototypes of the world's first pediatric MRI in 2016 and the breast MRI in 2017. The pediatric MRI was developed through co-operation with Dr. William Bradley of the *University of California*, San Diego. The pediatric MRI won an international award in Geneva in 2016 and was rated a favored system in the *Shanghai Import Expo* in 2018 [5.2]. As for breast MRI, Professor **Tse** led the R&D team. His role included soliciting user insights from top radiologists (such as Comstock at *Memorial Sloan Kettering* and Prof Hui at *Johns Hopkins University*) and from patients (who report that MRI is scary, noisy and of long-duration). This led to *Time Medical*'s user/patient-oriented Breast MRI (using a feminine name EMMA; with counter-noise system and fast-scan time). In 2018 *Galen MRI Systems* debuted its EMMA machine, designed for quicker scans using a technology tailored for Asian women (who tend to have denser breasts) at Hong Kong Science Park. Professor **Tse** is co-founder and director of this Hong Kong start-up, which offers lower cost mammograms and clearer and more reliable images [5.4]. In 2019 **Tse** also initiated a machine-learning feature and two AI systems (in scanning

and in report drafting) in the breast MRI. The breast MRI was well received in global breast MRI conferences in Washington DC (2018) and Las Vegas (2019); in the *Shanghai Import Expo* in 2019, the breast MRI received extensive mass media coverage.

These two MRIs fulfilled the firm's niche market needs and were well received by the market. The pediatric MRI machine received 50 purchase interests from different children's hospitals in its first debut. The breast MRI also received good publicity and registered purchase interests from seven hospitals and imaging centers in Hong Kong, Singapore, Malaysia, Mainland China and USA. *Time Medical* plans to list in the Hong Kong Stock Exchange. The two successful products (pediatric and breast MRI) contribute significantly (40%) to its corporate evaluation. An international i-Banker (www.Jefferies.com) has an MOU with *Time Medical* to list at US\$1.33 billion by 2020 [5.5].

4.2 Xinsight – an internet marketing consultancy and big-data service provider in Beijing

Xinsight's managing director, Mr. Peking Tan, has also heavily drawn on Professor **Tse's** team's collective research and knowledge. He has consulted Professor **Tse** since 2015, when Tan started *Xinsight*, an internet big-data service provider in Beijing. Tan was formerly research director at *Millward Brown* (a global branding research firm) and thus the firm has strong expertise in branding research, yet Tan realized the challenges to survival and prosperity in the competitive consumer big-data market in China. Tan and **Tse** held productive consultations about new product offerings and the firm's marketing and innovation strategy.

“You pointed out potential fallacy and risks in other innovation strategies (incremental and disruptive).... These two new products helped secure Xinsights in the highly competitive consultancy business in the big-data era. We were able to meet some of our corporate client needs much stronger than our counterparts. In 2018, we were rated as among the top 50 start-up enterprises in Beijing.” (Mr. Peking Tan, Managing Director, *Xinsight Ltd.* [5.6])

With limited resources, Tan chose to follow the BI path, putting 30% of his resources into developing new products that fill niche market needs. They include *GazeLab* – (an eye-tracking system on cloud computing) and *X-Path* (monitoring consumer on-line behavior in multiple ways including cognitive, emotional and social domains).

Through these new products, *Xinsight* was able to fulfil unmet niche market needs while many other start-ups failed. By July 2018, *Xinsight* was recognized as one of the top 50 internet big-data companies in Beijing. At this point, *Xinsight* is being acquired by *Miaozhen* (www.miaozhen.com). *Miaozhen* is in the C-round of pre-IPO listing. Mr. Tan has made use of the insights available through the breakthrough innovation and has created the organizational culture to ensure his firm's success. This again evidences the reach and significance of the commercial impact from **Tse's** research program at HKU.

(5) Sources to corroborate the impact

- [5.1] Letter from Dr. QY Ma (Board Chairman and CEO), *Time Medical Limited*.
- [5.2] World's first Pediatric MRI system (in Chinese)
<https://www.ciie.org/zbh/zsdh/20180920/6993.html>
- [5.3] Newspaper coverage on Breast MRI (SCMP) <https://www.scmp.com/lifestyle/health-wellness/article/2135489/faster-cheaper-mris-new-breast-screening-option-hong-kong>
- [5.4] Professional Medical Magazine covering Galen's Breast MRI (DOTmed)
https://www.dotmed.com/news/story/47658?p_begin
- [5.5] Time Medical plans to IPO in Hong Kong driven by its Pediatric and Breast MRI
<http://hk.eastmoney.com/a/201904131095938883.html> (in Chinese);
http://www.southmoney.com/zhishi/jbmf/3125284_2.html (in Chinese);
http://cs.com.cn/ssgs/gsxw/201904/t20190413_5938941.html (in Chinese)
- [5.6] Letter from Mr. Peking Tan (Managing Director), *Xinsight (Beijing) Limited*.