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Hong Kong Society for Quality
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WorldPartner of American Society for Quality (ASQ)
Founding member of Asian Network for Quality (ANQ)

Hong Kong Society for Quality (HKSQ)
A Study on Transforming Quality Innovation in Hong Kong:
Recommendations to the Innovation and Technology Industry

Executive Summary

‘Innovation’ and ‘technology’ are crucial to enhancing Hong Kong's competitiveness and improving people's Quality of Living (QoL). In June 2015, Hong Kong Society for Quality (HKSQ) conducted a survey to elicit views and suggestions from members and quality professionals on the development of the Innovation and Technology (I&T) Industry in Hong Kong.

Respondents to the survey identified “Legal System”, “World-Class University” and “Tax Rate” are among the most important factors that will foster development of the City’s Innovation and Technology Industry, whereas some overseas quality professionals stressed the significance of “Talents in Innovation and Technology”. The survey findings also showed that “(high) Rental Costs” and “(high) R&D Costs” have been discouraging factors. Furthermore, the survey identified several areas for improvement (AFI) at the policy level. They are, in descending order of importance, “Land”, “Education”, “Capital” and then “Intellectual Property (IP)”. Most of the respondents (both local and overseas quality professionals) agreed that “Biotechnology (including Pharmaceutical, Human/Animal Vaccines)” and “Information and Communication Technology (ICT, including Big Data Analytics and Cloud Computing)” would be two key technology areas that we should focus on. When compared with Singapore, Korea and Chinese Taipei (known as the other three Little Asian Dragons in the Region), Hong Kong possesses key competitive edges in its “High Efficiency” and “Integrity”. The ‘China’ factor (such as “One Belt, One Road” strategy) would also play an important role, according to the respondents’ views.

Informed by the survey findings, HKSQ is in the position to put forward the following proposals and agendas for the Government and other stakeholders to consider:

- i) Leverage stakeholders of the local Innovation and Technology (I&T) sector and associated organizations, including universities, R&D Centres and Statutory Bodies; as well as establishing a platform that will facilitate collaboration amongst industry practitioners, business partners, scientists and researchers of State Key Laboratories (SKLs) in Hong Kong.
- ii) Foster the strategy of “Quality Innovation in One Belt One Road” through the Asian Network for Quality (ANQ) and the leading quality management authorities in Hong Kong (including HKSQ).
- iii) Establish the Cross-University Knowledge Transfer Platform (XUKTP) to enhance performances of R&D and commercialisation processes for the I&T sector in Hong Kong and a wider global context.
- iv) Develop a set of Key Performance Indicators (KPIs) and metrics to monitor the I&T process and accomplishments in quality innovation in Hong Kong
- v) Promote best practices with an Innovation and Technology Policy Implementation Model (ITPIM)



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1. Introducing HKSQ

The predecessor of the Hong Kong Society for Quality (HKSQ) was the Hong Kong Group of the American Society for Quality Control (ASQC) International Chapter which was formed in 1986. With the increasing local involvement, the Hong Kong Group was evolved as a local professional body, the Hong Kong Society for Quality Control (HKSQC) in 1989, and retained itself as an overseas affiliate of ASQC based in Hong Kong. In early 1997, ASQC had taken strategic re-positioning and renamed as the American Society for Quality (ASQ). Following the expanding path of ASQC, HKSQC had, at its AGM of July 1997, passed a resolution to become the Hong Kong Society for Quality (HKSQ). Its members are executives, managers, engineers, industry practitioners, academics, students and those who are interested in quality engineering and management and associated disciplines and practices in organizations of respective industries in Hong Kong and abroad

Being one of the leading quality management authorities in Hong Kong, HKSQ is a non-profit making organization with the objectives to promote greater awareness of quality evolution in Hong Kong and the Region for ensuring product and service excellence through continuous improvement of quality and customer satisfaction, and to provide continuing education to professionals involved in the quality, reliability and innovation disciplines. HKSQ has since 2002 been recognized as WorldPartner of the ASQ, and was one of the founding members of Asian Network for Quality (ANQ).

2. Background to the Study

The Innovation and Technology (I&T) industry has been evolving and contributing to the quality evolution in Hong Kong. The I&T sector comprises of a wide range of private enterprises and public organizations from manufacturing to servicing and then to technology domain industries (see **Figure 1**).

By reviewing the quality management practices in Hong Kong along with its industrial development in the past three decades, four (4) stages of quality evolution could be traced (Chin, *et al.*, 2000; Lai, *et al.*, 2007). These are:

- 1) Before the 1990s: Era of Poor Quality Consciousness
- 2) Early 1990s : Introduction of the ISO 9000 Series of quality management standards
- 3) Mid-1990s : Awareness of Continuous Quality Improvement
- 4) 2000 and Beyond: Adoption of Total Quality Management



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Figure 1. Evolution of Quality in Hong Kong* (Lotto Lai, et al., 2007; Updated by Lotto Lai in 2015c)

Year	Government & Industry	Societies	Quality Award
60s	1934 – CMA 1947 – HKIE 1960 – FHKI 1963 – HKSTC 1967 – HKPC	1960 – HKMA	
70s	1978 – Hong Kong Q-Mark Council 1979 – CMATCL		
80s	1981 – HKTIC (HKACL) 1985 – HOKLAS 1989 – HKQAA	1983 – HKQMA (HKQCA) 1986 – HKSQ (ASQ – HK)	1989 – Governor’s Award for Industry
90s	1998 – HKAS (HKCAS) 1999 – HKIAS	1991 – IQA (HK Branch)	1991 – HKMA-QA 1993 – HKQCA 1994 – HKAI 1997 – HKAI added Technology Achievement
2000	2001 – HKSTP & Cyberport 2001 – ASTRI 2001 to 2006 – HK R&D Centre 2009 – HKCTC	2003 – SSI 2004 – SSS	2005 – HKAI (Merge Productivity & Quality) & added Innovation and Creativity
2010	2010 – HKQF - TIC-ITAC 2015 – ITB (To be expected)	2011 – ISIHK	

*Remark: The Chinese Manufacturers' Association of Hong Kong (CMA); The Engineering Society of Hong Kong (HKIE); Federation of Hong Kong Industries (FHKI); Hong Kong Management Association (HKMA); Hong Kong Standards and Testing Centre (HKSTC); Hong Kong Productivity Council (HKPC); Hong Kong Q-Mark Council; CMA Testing and Certification Laboratories (CMATCL); Hong Kong Association of Certification Laboratories Limited (HKACL); Hong Kong Association for Testing, Inspection and Certification Limited (HKTIC); Hong Kong Quality Management Association Limited (HKQMA); Hong Kong Society for Quality (HKSQ); Hong Kong Laboratory Accreditation Scheme (HOKLAS); Hong Kong Quality Assurance Agency (HKQAA); Hong Kong Awards for Industry (HKAI); Chartered Quality Institute (CQI), Institute of Quality Assurance (IQA), Hong Kong Branch; HKMA - Quality Award; Hong Kong Quality Circle Award (HKQCA); Hong Kong Award for Services; Hong Kong Accreditation Service (HKAS); Hong Kong Science and Technology Parks Corporation (HKSTP); Hong Kong Cyberport Management Company Limited (Cyberport); Hong Kong Applied Science and Technology Research Institute Company Limited (ASTRI); Hong Kong R&D Centre; Six Sigma Institute Ltd. (SSI); Six Sigma Society of Hong Kong (SSS); Hong Kong Council for Testing and Certification (HKCTC); Hong Kong Qualifications Framework - Testing, Inspection & Certification Industry Training Advisory Committee (HKQF - TIC-ITAC); Institute of Systematic Innovation, Hong Kong (ISIHK); Innovation and Technology Bureau (ITB)



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While entering to the 21st Century, the quality evolution stresses the transformation to innovation in Hong Kong (Lai, 2013; 2015a). Innovation has become a new wave in the field of quality for sustainable development. For facilitating this quality innovation movement, the Hong Kong Government had since 2001 established several I&T-enabling organisations and institutes, including 1) The Hong Kong Science and Technology Parks Corporation (HKSTP), 2) the Hong Kong Applied Science and Technology Research Institute Company Limited (ASTRI), and 3) Hong Kong Research and Development (R&D) Centres. More importantly, the Hong Kong Innovation and Technology Bureau (ITB) is going to be established in 2015 (Legco, 2014, Lai, 2015b). In addition, the Hong Kong Council for Testing and Certification (HKCTC) was established, and the Hong Kong Qualifications Framework - Testing, Inspection and Certification Industry Training Advisory Committee (HKQF-TIC-ITAC) was established to provide guidance and advice on striding Hong Kong towards a leading Asia's Centre for Testing and Certification (Lai, 2015c).

In this context, HKSQ had taken an initiative to acquire and collate views from key stakeholders who had involved and have been engaging in the process of quality transformation to quality innovation over the past decades in Hong Kong. Following discussions and sharing of views from the Executive committee of HKSQ, a questionnaire survey was instituted and undertaken to acquire views and suggestions from members and invited quality professionals in Hong Kong and abroad, on transforming quality innovation in Hong Kong.

3. Study Methodology

An on-line questionnaire survey was conducted with a targeted sample of all 420 current members of HKSQ, who are industry practitioners and quality professionals and/or holding senior positions in their respective organisations. Before the grand survey, a group of pilot respondents from the executive committee of HKSQ were invited to assess the basic intelligibility format and comprehensiveness of the questionnaire in line with the study objectives. The pilot survey was administrated in the same manner as that in the main survey. Eventually, some revisions and modifications of question content were made, and the number of questions was refined to 12. A set of the final questionnaire is given in **Appendix I**.

The grand survey was then conducted based on a targeted sample of all 420 current members of HKSQ, who are industry practitioners and quality professionals and/or holding senior positions in their respective organisations. In total, 43 valid replies were received, yielding a response rate of about 10%. The response rate was conventionally considered acceptable for industry survey of similar nature in Hong Kong. Of those valid responses, 16 were obtained from overseas professionals (Including China, India, and the USA). Each valid reply was treated as a unit of analysis, and two groups of respondents (namely local versus overseas professionals) were classified. Statistical and comparison analyses were then performed. Basic information of the respondents were collated and shown in **Figure 2**. Snapshots of the survey results are given in **Appendix II**.

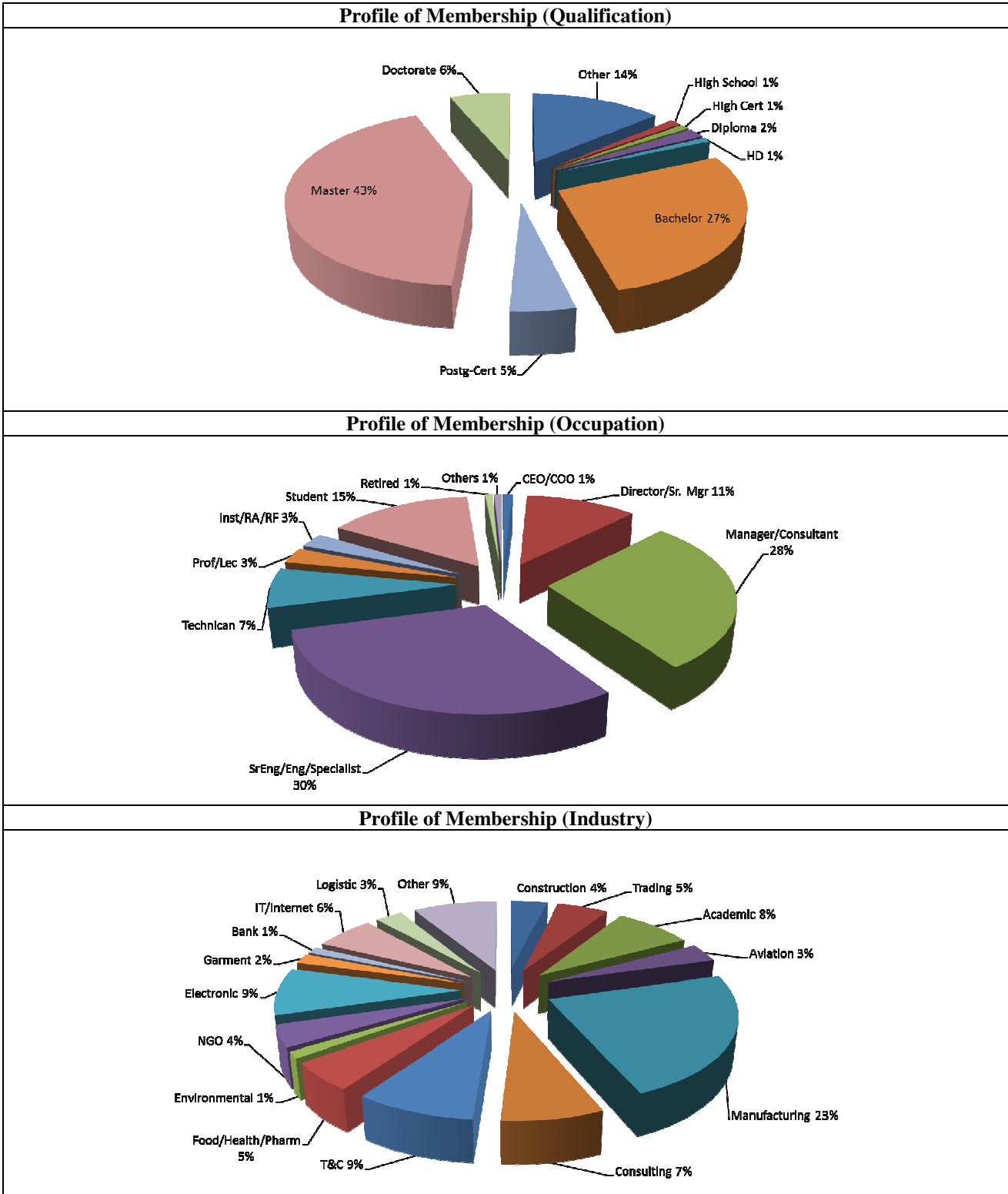


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Figure 2. HKSQ members' portfolio included Qualification, Occupation and Industries Distribution.





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4. Finding Analysis and Discussions

In the first two questions (i.e., Q1 and Q2), respondents were asked to compare the strengths and weaknesses with respect to the development the Innovation and Technology Industry in Hong Kong (i.e.). Most local respondents considered the top 3 strengths being “Legal System”, “World-Class University” and “Tax Rate”, whereas overseas respondents opted to “Talents in Innovation and Technology”, “World Class University” and “Infrastructure”. On the other hands, it was found that among the most weaknesses identified were “(high) Rental Costs” and “(high) R&D Costs”. Most local respondents would put “(high) Rental Cost” as the most weakness, followed by “(high) R&D Costs”, “(high) Capital Investment” and “(insufficient) Talents in Innovation and Technology”. Whereas many overseas respondents hold some diverted views, and considered “(high) R&D Costs” being the most weakness followed by problems associated with “Legal System”, “Talents in Innovation and Technology” and then “(high) Rental Costs”.

In Questions 3 and 4 (i.e., Q3 and Q4), respondents were used to identify areas for improvements (AFIs) at the policy level. Most local respondents considered in descending order of importance, being Land Policy, Education Policy, Capital Policy, and then Intellectual Property (IP) Policy. The findings were in coincidence with that of Q2 and realising the need to formulating sustainable policy on land and education to address high ‘Rental Costs’ and ‘R&D Costs’. On the other hands, the group of overseas respondents opted to stress the importance of Education Policy, followed by that of IP Policy, Land Policy and Capital Policy. They also shared that it would be crucial to educate people with good knowledge/understanding on IP, so as to foster I&T industry practices and protection of business investments.

In Questions 5 and 6 (i.e., Q5 and Q6), respondents were used to identify which areas of technology areas should be focused on enhancing the development of I&T industry in Hong Kong. Most local respondents put forward the top three areas, namely “Biotechnology”, “Pharmaceutical and Human/Animal Vaccines (PharmH/AV)” and “Information and Communication Technology (ICT)”. Whereas, most overseas respondents opted to both “ICT” and “Biotechnology” followed by “Financial Technology”, “PharmH/AV” and “Robotic / Automation”. As shared by many respondents, “Biotechnology” and its related industry was suggested because of the anticipated trend of ageing population and high profit margin with increasing healthcare needs. The selection of ICT was supported because of it having lesser intensive land occupation and good infrastructure support in Hong Kong.

In Questions 7 and 8 (i.e., Q7 and Q8), respondents were asked to comment on the competitive edges of Hong Kong as compared to that of Singapore, Korea and Chinese Taipei (known as other three Little Asian Dragons in the Region). Most local respondents agreed that “Integrity”, “High efficiency”, “IP Protection” and “Open mindset” would be the four (4) leading components of Hong Kong’s competitive edges. While comparing with that of the other Little Asian Dragons, respondents adjusted the sequence of these components as “High efficiency” being the first, followed by “Integrity” and “Open mindset”. The agreement of “IP Protection” dropped dramatically to half of its previous score. The scores of two other components, “High Education” and “Proficiency in Foreign Language”, also dropped significantly. This was attributable to the fact that many respondents compared these components with that in Singapore. For the group of overseas respondents, they regarded “Integrity”, “Open mindset” and “IP Protection” being the most components of Hong



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Kong's competitive edges. However, the scores of these three components also dropped when compared with other Asian Dragons. Based on the adjustment of scores, results shown that "High Efficiency" and "Integrity" were both remaining as the two most significant components of Hong Kong's competitive edges

Question 9 (i.e., Q9) was used to acquire respondents' views on difficulties in coping with changes in regulation or requirement for the I&T industry in Hong Kong. Results shown that most respondents (both local and overseas groups) considered that local regulations would not impose negative impacts on the development of the I&T industry. Besides, only around 20% of respondents were aware of the barrier of legal requirement. Hence, there are restrictions on importing of advanced equipment and biological items (e.g. animal, virus, and living organism, etc.) to Hong Kong. (Note: the survey was conducted before the emergence of the Uber case in Hong Kong).

For Question 10 (i.e., Q10), it asked respondents' views on suggesting those I&T areas which the Hong Kong Government should focus on. Many respondents contended that 'Biotechnology' and 'ICT' were two main areas, alongside with their concerns on policy of Land, Education and Green Energy. Some overseas respondents pointed out that empowering local universities and integrating/strengthening collaborations among industries with academics would provide an enabling ground to the development of the I&T Industry. Besides, it would be important to have a global impact by fostering partnership with other countries in the Region and beyond.

For Question 11 (i.e., Q11), respondents were asked to suggest how Quality Professionals (serving as the 'Facilitator') who would coordinate the development of the I&T sector in Hong Kong. Among the various suggestions, many respondents (from both local and overseas group) considered the China factor (in particular, the "One Belt, One Road (一帶一路)" strategy) would play an important piloting role. Besides, it would be crucial for Hong Kong to maintain and reinforce its best practices with the independent legal system.

The last question, Q12, asked respondents to suggest ways and areas in fostering collaborations and efficiency among key stakeholders (including the Government, Industry, Academia and Research Sectors). Several suggestions from local respondents were collated, such as to form Advisory committees on respective I&T areas, identify and/or develop key performance indicators (KPIs) and stress result-oriented practices. On the other hands, some overseas respondents stressed the importance of supporting education in the policy level. The Hong Kong Government should have a leading role in providing and securing an enabling environment for the collaborations among stakeholders.

5. Consolidated Recommendations from HKSQ

By consolidating the recommendations made from survey respondents (both local and overseas groups), HKSQ would like to put forward the following proposals and action agendas.

i) Creation of a 'Quality R&D' Ecosystem and Identification of Key Partners

It is suggested to consolidate the available resources together for creating a 'Quality R&D' ecosystem. **Table 1** shows a list of Local Partners, comprising 16 Partner State Key Laboratories (SKLs) and the Hong Kong Branch of Chinese National Engineering Research Centre in Hong Kong (see **Figure 3**)



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Table 1. Local Partners Identified in the Quality R&D' Ecosystem

Universities	R&D Centres	Statutory Bodies
City University of Hong Kong (CityU)	Automotive Parts and Accessory Systems R&D Centre (APAS)	Hong Kong Applied Science and Technology Research Institute Company Limited (ASTRI)
Chinese University of Hong Kong (CUHK)	Hong Kong R&D Centre for Information and Communications Technologies under ASTRI	The Hong Kong Council for Testing and Certification (HKCTC)
Hong Kong Baptist University (HKBU)	Hong Kong Research Institute of Textiles and Apparel (HKRITA)	Hong Kong Productivity Council (HKPC)
University of Hong Kong (HKU)	Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies (LSCM)	The Hong Kong Qualifications Framework - Testing, Inspection and Certification Industry Training Advisory Committee (HKQF - TIC-ITAC)
Hong Kong University of Science and Technology (HKUST)		
Hong Kong Polytechnic University (PolyU)	Nano and Advanced Materials Institute (NAMI)	The Hong Kong Science and Technology Parks Corporation (HKSTP)

There is a need to build a collaboration platform for industry practitioners and business partners, exchanging and nurturing their innovation and technology ideas. Many SKLs are presently accommodated within their host university campuses (Legco 2011). The Hong Kong Government needs to cover the costs as an incentive. It is suggested that the 16 Partner SKLs be strategically (re-)located under the same roof, so as to foster collaborations of scientists and researchers in different fields/areas. A proposed “Hong Kong Partner State Key Laboratories Building” could be established inside the Science Park.

ii) Fostering the Strategy of “Quality Innovation in One Belt One Road”

For expanding the collaboration boundaries across the border to the Mainland China as well as other countries and regions, it would be strategically considered to cooperate with different societies and leading quality management authorities via the Asian Network for Quality (ANQ), in promoting “Quality Innovation in One Belt One Road” (品質創新于一帶一路) (see **Figure 4**)



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Figure 3. List of 16 Partner State Key Laboratories and One Hong Kong Branch of Chinese National Engineering Research Centre in Hong Kong
 (LC Paper No. CB(1)1050/10-11(05) (2011); Lotto Lai, 2015)

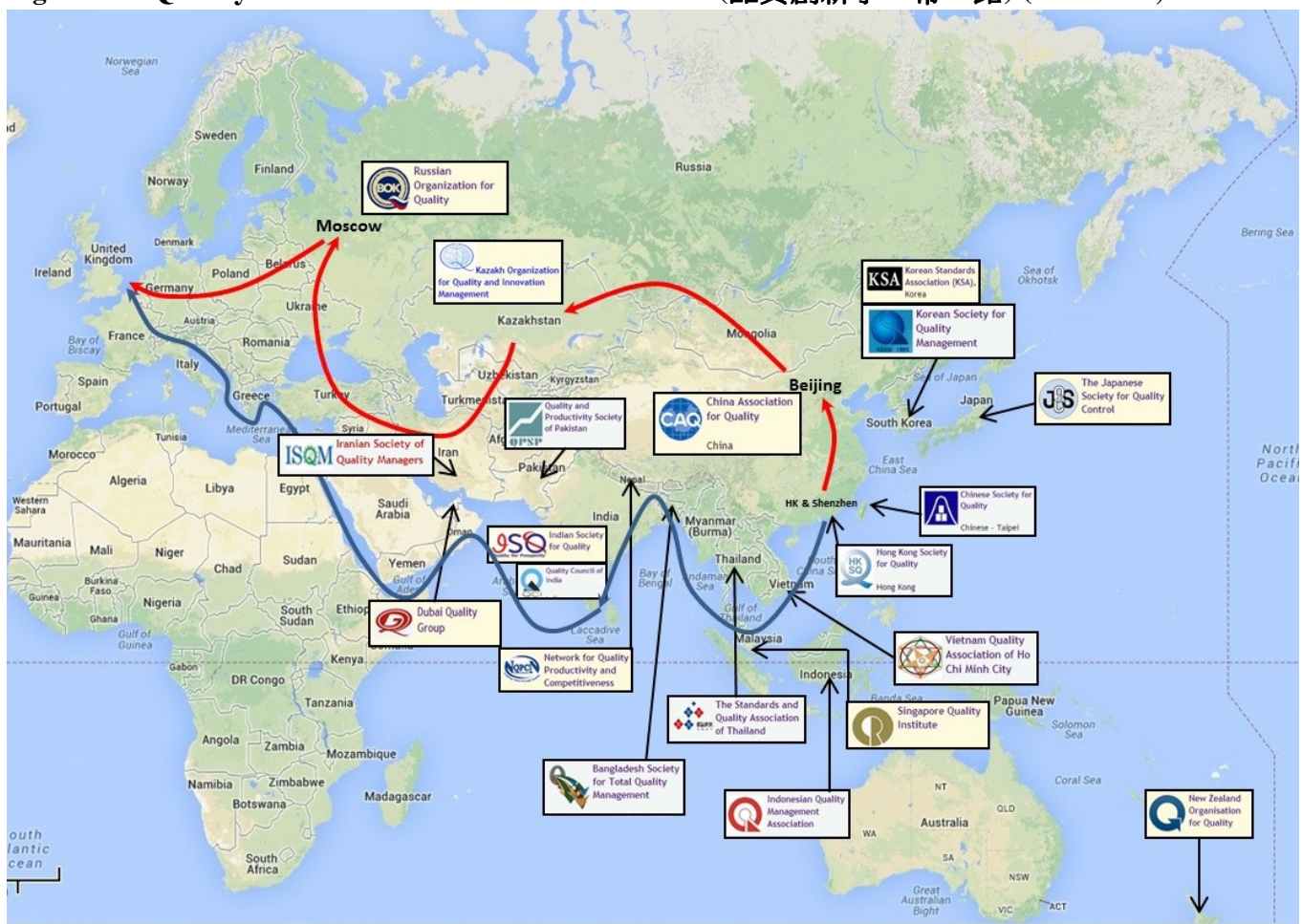
List of Partner SKL (University)	List of Partner SKL (University)
Partner SKL of Molecular Neuroscience (HKUST)	Partner SKL of Liver Research (HKU)
Partner SKL of Pharmaceutical Biotechnology (HKU)	Partner SKL of Chirosciences (PolyU)
Partner SKL of Brain and Cognitive Sciences (HKU)	Partner SKL of Millimeter Waves (CityU)
Partner SKL of Phytochemistry and Plant Resources in West China (CUHK)	Partner SKL of Advanced Displays and Optoelectronics Technologies (HKUST)
Partner SKL of Agrobiotechnology (CUHK)	Partner SKL of Synthetic Chemistry (HKU)
Partner SKL of Oncology in South China (CUHK)	Partner SKL of Ultraprecision Machining Technology (PolyU)
Partner SKL of Digestive Disease (CUHK)	Partner SKL of Marine Pollution (CityU)
Partner SKL of Emerging Infectious Diseases (HKU)	Partner SKL of Environmental and Biological Analysis (HKBU)
Chinese National Engineering Research Centre (CNERC) (Unit)	Hong Kong Branch of the National ASIC System Engineering Research Centre (ASTRI)



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Figure 4. Quality Innovation in One Belt One Road” (品質創新于一帶一路) (Lotto Lai, 2013 & 2015c)





iii) **Securing of Competitive Edges with a Proposed Cross-University Knowledge Transfer Platform (XUKTP)**

The survey findings had identified several strengths versus weak areas of the I&T sector in Hong Kong. In such context, there is a need for Hong Kong to maintain its “Legal System”, “World-Class University” and “Tax Rate” on one hand, and to remove/ reduce the problems associated with the weaknesses of (high) “Rental Costs” and (high) “R&D Costs” on the other. Moreover, with the existing advantage of “World-Class University”, there is a need to secure an enabling environment for engaging in quality R&D and patents creation, and equally importance, to nurture and enhance the Commercialization Ecosystem. A “Cross-University Knowledge Transfer Platform (XUKTP)” could thus be established to break the barrier among universities and enhance the effective and efficient of R&D commercialisation in Hong Kong. **Table 2** depicts a list of local universities and associated units/offices of knowledge transfer in Hong Kong.

Table 2. Local Universities and Associated Units/Offices of Knowledge Transfer in Hong Kong

University	Unit related to Commercialisation (website)
CityU	Knowledge Transfer Office (http://www6.cityu.edu.hk/kto/) CityU Apps Laboratory (CAL) (http://appslab.hk/)
CUHK	Hub for Advancing CUHK Entrepreneurship (ACE Hub) (http://entrepreneurship.bshool.cuhk.edu.hk/acehub) Center for Entrepreneurship ((http://entrepreneurship.bshool.cuhk.edu.hk/) Centre for Innovation and Technology (www.cintec.cuhk.edu.hk) Pre-Incubation Centre (http://acehub.hk/picentre) The Office of Research and Knowledge Transfer Services (http://www.orkts.cuhk.edu.hk)
HKBU	Knowledge Transfer Office (http://kto.hkbu.edu.hk)
HKU	Technology Transfer Office (http://tto.hku.hk)
HKUST	Technology Transfer Centre (http://ttc.ust.hk)
PolyU	Institute for Entrepreneurship (http://www.polyu.edu.hk/ife/)



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iv) Monitoring of the I&T Process and Accomplishments in Hong Kong

For facilitating quality innovation movement and monitoring the I&T process and accomplishments, a set of Key Performance Indicators (KPIs) and metrics needs to be developed for stakeholders and parties who have been engaging in the movement and the process. By diagnosis of the survey findings, a list of quantitative versus qualitative measures with corresponding KPIs are derived.

In terms of quantitative measures of the I&T process and accomplishments, KPIs would include, but not limited to:

- % GDP to be increased from I&T Industry – Government areas (from the Science Park, Industry Estates and Cyberport) and Private areas (from co-work space or industry buildings) within 5 years.
- % employment to be created from I&T Industry within 5 years.
- % Tax to be created from I&T Industry within 5 years.
- % of foreign talent attracted come to Hong Kong for I&T Industry within 5 years.
- % IP to be registered within 5 years.

For qualitative measures of the I&T process and accomplishments, some typical KPIs are suggested below:

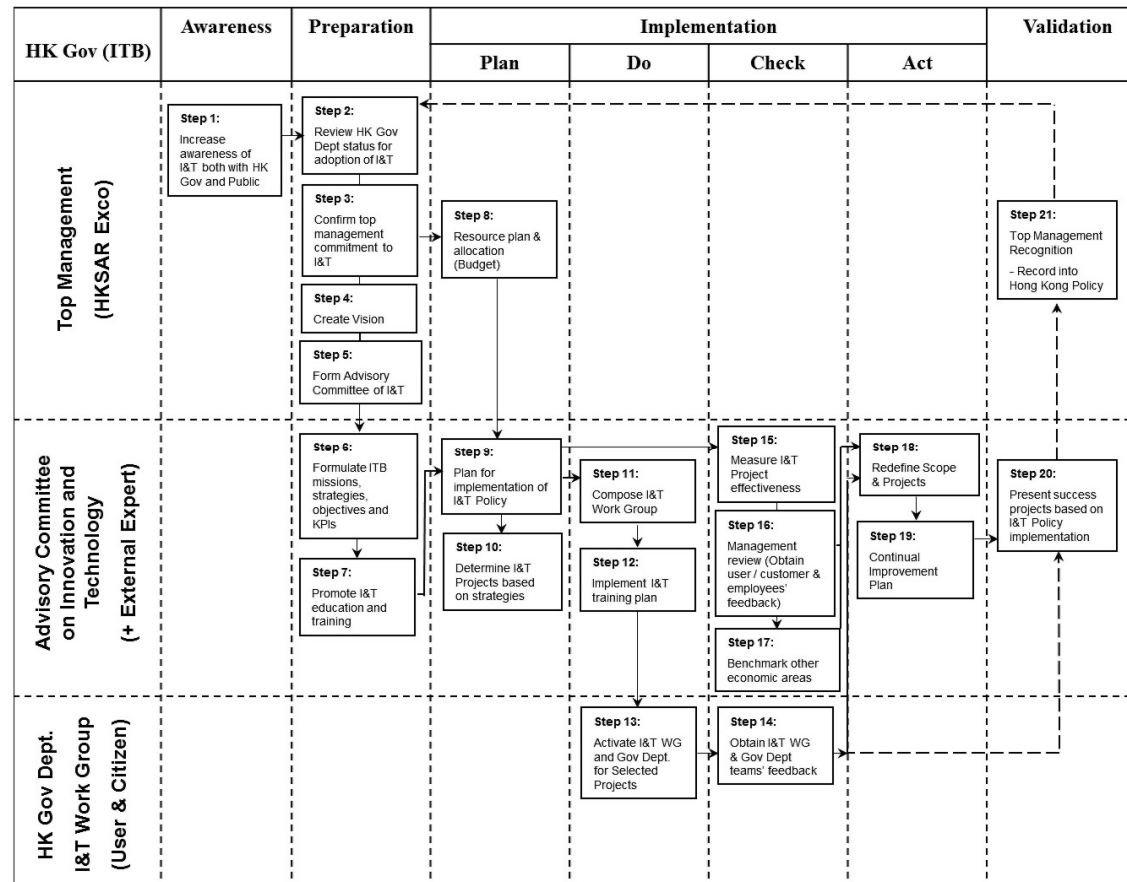
- % satisfaction rating from interested parties (i.e., public perception).
- New technology and startup culture in the public.
- Living standard in Hong Kong for attracting talent.
- To be Quality and Innovation City.

v) Promoting best practices with an Innovation and Technology Policy Implementation Model

Recent literature has identified various principles and attributes in connection with quality transformation and innovation (Chin *et al.*, 2000; Lai *et al.*, 2009, 2014). Many practitioners and researchers have also postulated different models, frameworks and approaches pertinent to performance measurement and strategy/policy formulation (Pun and White, 2005). Although most of these models stand by themselves empirically and/or theoretically, they have constraints borne with their own application domains. By collating the respondents' views and inputs, an Innovation and Technology Policy Implementation Model (ITPIM) is proposed for facilitating quality innovation in Hong Kong. Modified from a TQM Implementation framework advocated by Chin *et al.*, (2000) with features borrowed from the QISM implementation model and TRIZ implementation model (Lai, *et al.*, 2009, 2014; Lai, 2015b), the ITPIM model comprises of 21 steps/elements in four (4) phases from awareness, preparation via implementation (i.e., 'Plan-Do-Check-Act' cycle) to validation. **Figure 5** shows a diagrammatic representation of the model.



Figure 5. 21-Step Innovation & Technology Policy Implementation Model (ITPIM)





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The Hong Kong Government would take main responsibilities as the “Top Management” in various phases of “Awareness”, “Preparation”, “Implementation-Plan” and “Validation”. With the governance of top management, Step 1 is to increase public awareness on I&T Industry. For instance, ITC had already been performed for the public (such as Innovation Carnival). Besides, internal awareness of quality innovation needs to be enhanced within the Government. During the Preparation Phase, Step 2 is to review the Government’s status of I&T adaptation and develop the Procurement Policy. Step 3 is to gather top management commitment and to budget/plan for resource allocation in relation to Step 8 of the ‘Implementation-Plan’ Phase. Besides, Step 4 is to establish I&T vision (e.g. to stride for the sustainable development). Step 5 is to form the Advisory Committee and Sub-committees focusing on different I&T disciplines and respective areas.

The I&T Advisory Committee would take the key role through the Implementation (‘Plan-Do-Check-Act’) phase. Step 6 is to formulate the ITB mission, strategies, objectives and KPIs. It is proposed to use Open Innovation and Crowdsourcing approach. Step 7 is to promote I&T education and training based on the review results from Step 2. Following Step 8 of resource planning and allocation, Step 9 is to plan for implementation of I&T Policy, and Step 10 is to determine I&T projects based on strategies. In the “Implementation-Do” Phase, Step 11 is to compose different I&T Work Groups for execution of projects. Step 12 is to implement I&T training plan. Moreover, for the “Implementation-Check” Phase, Step 15 is for Advisory Committee to measure I&T project effectiveness. Step 16 is to perform Management Review of the public, industry and staff feedback. Step 17 is to research and benchmark with other economic areas. In the “Implementation-Act” Phase, Step 18 is to redefine scope and projects based on previous review. Step 19 is then to develop continual improvement plan.

In the final “Validation” Phase, Step 20 is to recognise top management commitment and record policy results. Step 21 is to present success projects and KPIs based on I&T Policy implementation.

The Hong Kong Government, various Departments and I&T Work Group are the key players involved in the “Implementation-Do” Phase. Step 13 is to activate the key players for implementing different selected I&T projects, and Step 14 is to gather the results’ feedback from different stakeholders of the sector.

The ITPIM adopts the guiding principles embodied with the TQM Implementation framework and stresses the process-oriented assessments on respective phases (Chin *et al.*, 2000; Lai *et al.*, 2009, 2014). The 21 steps provide practical guidance for the Hong Kong Innovation and Technology Bureau to consider. It is anticipated that adapting the model could help the Government, advisory committee, various departments/ministries, industry practitioners, and other stakeholders to enhance their I&T capabilities for attaining quality innovation goals. The model would facilitate best I&T practices and create conditions conducive to quality innovation and sustainable development.



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APPENDIX I (HKSQ questionnaires for collecting views on Innovation & Technology Industry Development)

The survey organized by HKSQ aims to seek Quality Professional point of views on developing Innovation and Technology Industry in Hong Kong for the future Innovation and Technology Bureau's consideration.

Those questions will survey our members' views on the strength and weakness on developing Innovation and Technology in Hong Kong. Moreover, we would appreciate your input for any new suggestions so as to continually improve on the new Innovation and Technology Policy.

Section 1

1. What do you think are the strengths of Hong Kong in developing the Innovation and Technology Industry? (Please tick the top 3 factors)
 - a. Legal System (One Country, Two System, IPR Protection)
 - b. World Class Universities
 - c. Infrastructure (in Workplace (HKSTP/Cyberport), Communication, Transportation)
 - d. Talents in Innovation & Technology
 - e. Capital Investment (VC / Angel fund)
 - f. Tax Rate
 - g. R&D Cost
 - h. Rental Cost
 - i. Share Laboratory Facilities (e.g. HKSTP-TSC, HKPC and Universities Lab)
 - j. Proximity to the Mainland
 - k. Others (Pls. specific: _____)
2. What do you think are the weakness of Hong Kong in developing the Innovation and Technology Industry? (Please tick the top 3 factors)
 - a. Legal System (One Country, Two System, IPR Protection)
 - b. World Class Universities
 - c. Infrastructure (in Workplace (HKSTP/Cyberport), Communication, Transportation)
 - d. Talents in Innovation & Technology
 - e. Capital Investment (VC / Angel fund)
 - f. Tax Rate
 - g. R&D Cost
 - h. Rental Cost
 - i. Share Laboratory Facilities (e.g. HKSTP-TSC, HKPC and Universities Lab)



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- j. Proximity to the Mainland
k. Others (Pls. specific: _____)
3. What do you think should be the Area for Improvements (AFIs) in policy so as to enhance and develop Innovation and Technology Industry in Hong Kong? (Could select more than one you think more important, then answer No. 4)
- a. IP policy (e.g. Fight for Patent Prosecution Highway (PPH) of PRC)
b. Land policy
c. Capital policy
d. Education policy
e. Others: _____
4. Why and How such policies you selected could be help for Innovation and Technology development in Hong Kong?
5. Which are areas you think the Innovation and Technology industry should provide more support? (Could select more than one and then answer No.6)
- a. Information and Communication Technology
b. Cloud Computing & Big Data Analytics
c. Artificial Intelligence – Decrypting the Brain
d. Advance Material (e.g. Nano)
e. Robotic / Automation
f. Biotechnology
g. Pharmaceutical and Human / Animal Vaccine
h. Financial Technology (FinTech)
i. Electronic / Semiconductor
j. Others: _____
6. Why and How such technology area(s) you selected should be assisted for enhancing Innovation and Technology development in Hong Kong?
7. What do you think are the competitive edges of Hong Kong's Innovation and Technology? (Could select more than one)
- a. Integrity
b. IP Protection
c. Research Competence
d. High efficiency
e. High Education
f. Talent Pool
g. Government Support



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- h. Proficiency in Foreign Language
 - i. Open mindset
 - j. Others: _____
8. What do you think are the competitive edges of Hong Kong's Innovation and Technology when compared to the other Three Asian Tigers (including Singapore, Korea and Chinese Taipei)?
(Could select more than one)
- a. Integrity
 - b. IP Protection
 - c. Research Competence
 - d. High efficiency
 - e. High Education
 - f. Talent Pool
 - g. Government Support
 - h. Proficiency in Foreign Language
 - i. Open mindset
 - j. Others: _____
9. Have you / your members encountered any difficulties in coping with change in regulation or requirement for Innovation and Technology in Hong Kong?
- a. Yes
 - b. No
- Pls. specific: _____
10. Do you have any other suggestions which Innovation and Technology area Hong Kong Government should focus on?
11. Do you have any other suggestions how Hong Kong coordinates the Innovation and Technology areas as a facilitator (Quality Professional)?
12. Do you have any other suggestions in collaboration of Government, Industry, Academia and Research Sectors so as to enhance their efficiency?

Thanks for your response!

The final report will be posted into HKSQ website.



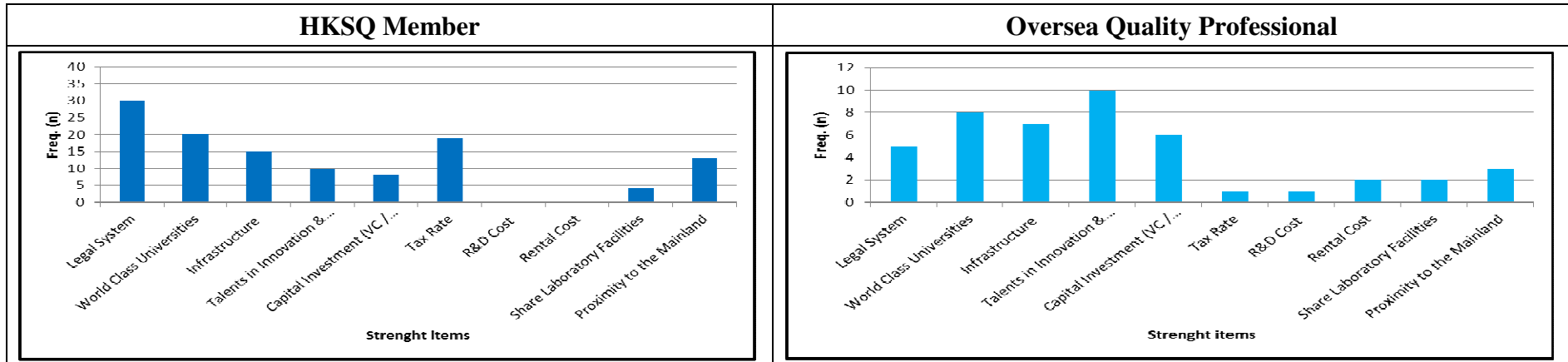
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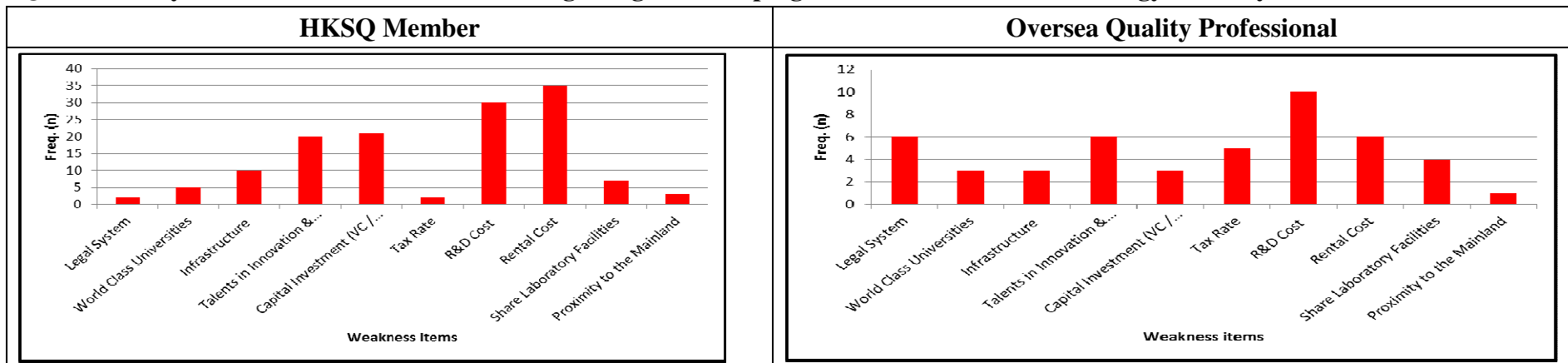
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APPENDIX II (Summary of the results obtained from HKSQ members via questionnaires)

Q1. What do you think are the strengths of Hong Kong in developing the Innovation and Technology Industry?

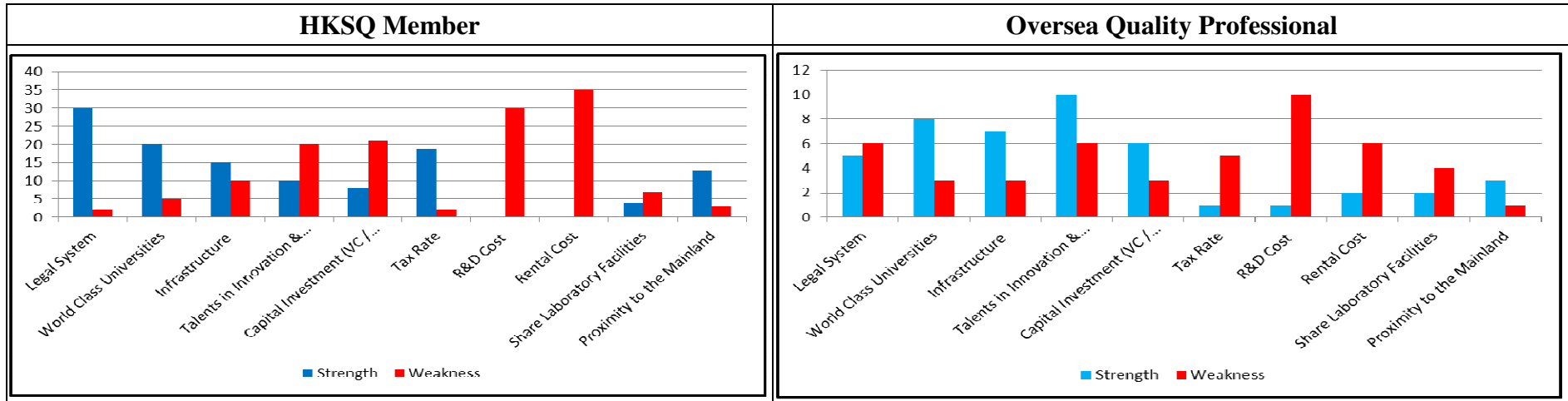


Q2. What do you think are the weakness of Hong Kong in developing the Innovation and Technology Industry?

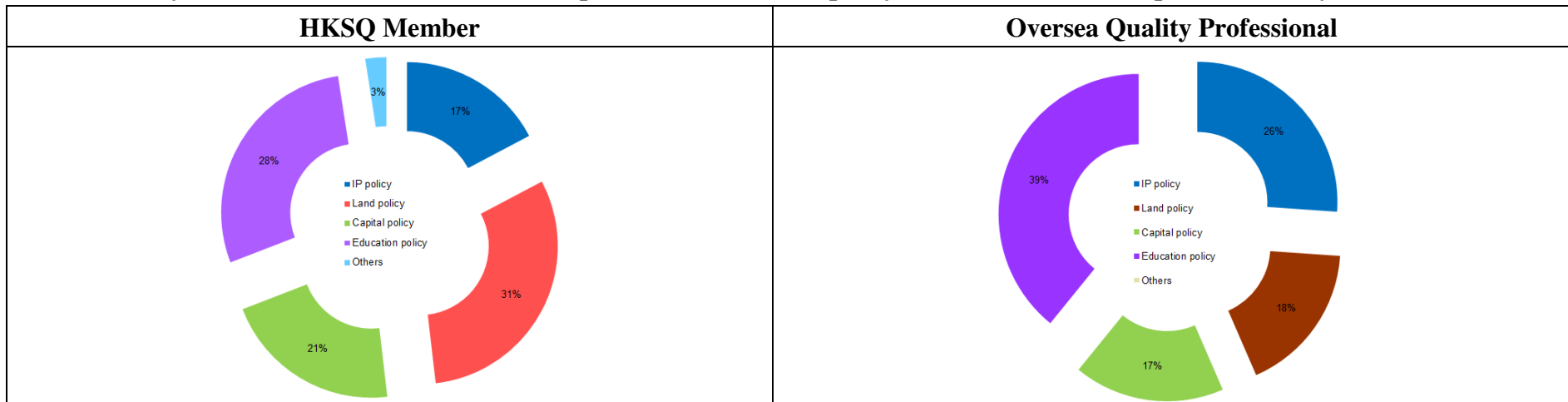




Q1 & Q2 Comparison: The Strength & Weakness of Hong Kong in developing the Innovation and Technology Industry



Q3. What do you think should be the Area for Improvements (AFIs) in policy to enhance and develop I&T Industry?





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Q4. Why and How such policies you selected could be help for Innovation and Technology development in Hong Kong?

HKSQ Member	Oversea Quality Professional
<ul style="list-style-type: none"> ● Land: Cost and Area; Rent Cost ● Housing: Professional housing estate ● Talent: Retain IT professionals; Operating cost ● Education: Develop / cultivate talents; enhance results of researches; IT development; Creativity Methodology ● Finance: R&D Cost is high; Enhance Funding to encourage for innovative projects (Incentives); Open funding apart from HK applicants; Attract foreign investors; Tax ● IP Protection: encourage creative mind; secure the reward of R&D ● Environment: Stable & Sustainable; Infrastructure 	<ul style="list-style-type: none"> ● Education: Education and people is important; not much incentive attracting them to get involved in science and technology; Education is most effective way for innovation; re-engineering the social systems learning the scientific methodologies. ● IP Protection: To protect business investment better than China and to win international trust for more investments

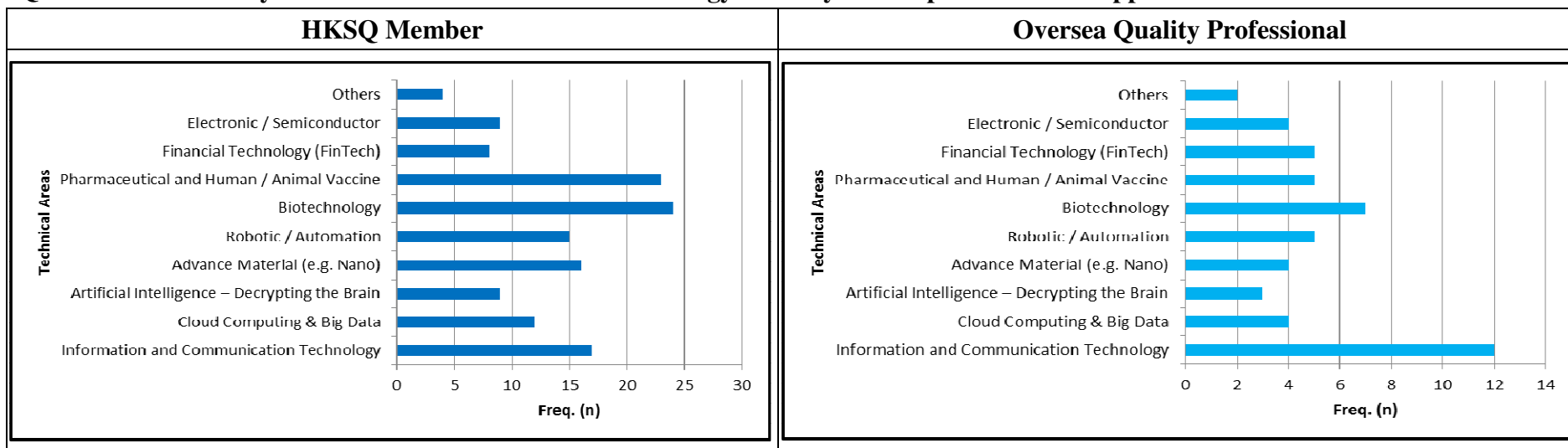


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Q5. Which are areas you think the Innovation and Technology industry should provide more support?

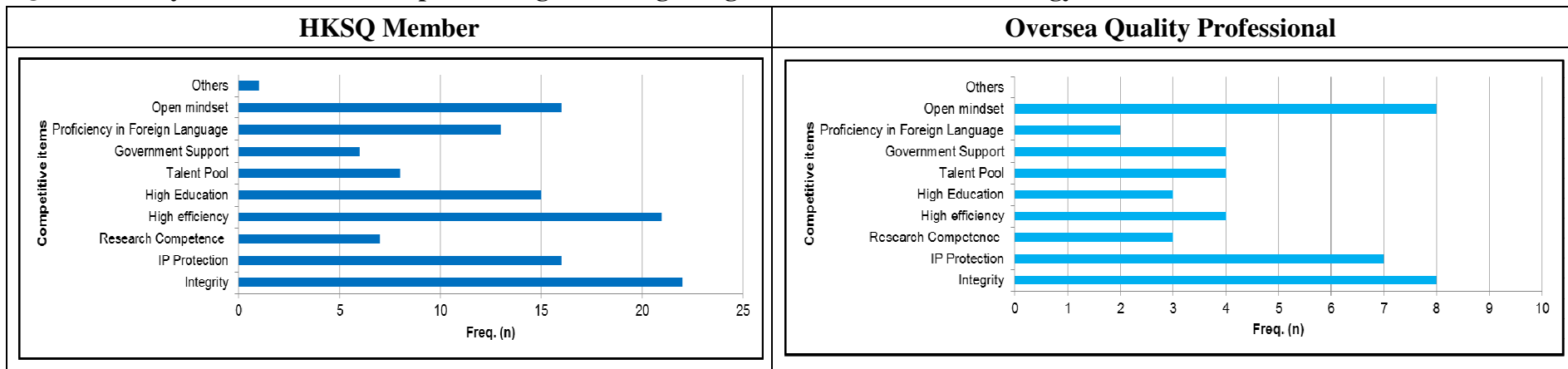


Q6. Why and How such technology area(s) you selected should be assisted for enhancing I&T development in Hong Kong?

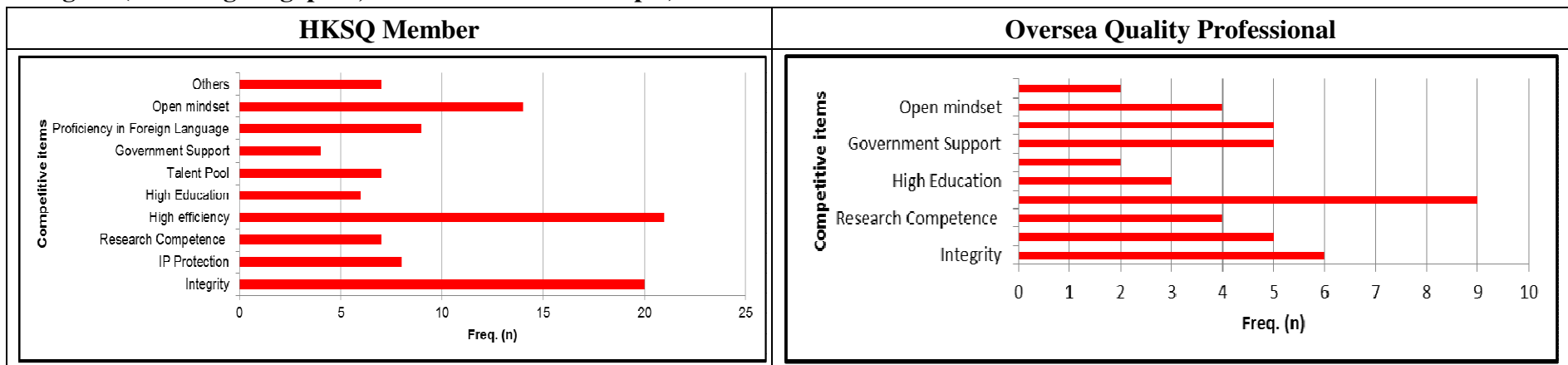
HKSQ Member	Oversea Quality Professional
<ul style="list-style-type: none"> ● ICT: Less intensive land occupation; future trend; Provide innovation training for business parties; Gov Funding support; Higher international exposure in HK; Security & Speed ● Cloud & Big Data: Large potential & Less investment ● Robotic/Automation: Close to manufacturing location of China; ● Material: World class U; Lack of talent ● Biotech: Healthcare support human life (ageing); World class U ● Pharmaceutical: Required international horizons & advanced knowledge; Proximity to China; High profit margin ● Electronic/Semi: Hardware support to IT & Pharm Industry ● Others: Aviation 3D Technology; Alternative Energy; Market Oriented 	<ul style="list-style-type: none"> ● ICT, Cloud & Big Data : Information and communication technology as well as financial technology are examples of 'soft' resources. (Hardly any solid 'hard' resources abundantly found in Hong Kong.); HK has enough infrastructure to start developing ICT area ● Biotech & Pharm: That is to follow with the world; Trend in the future ● Others: Research funding & Education



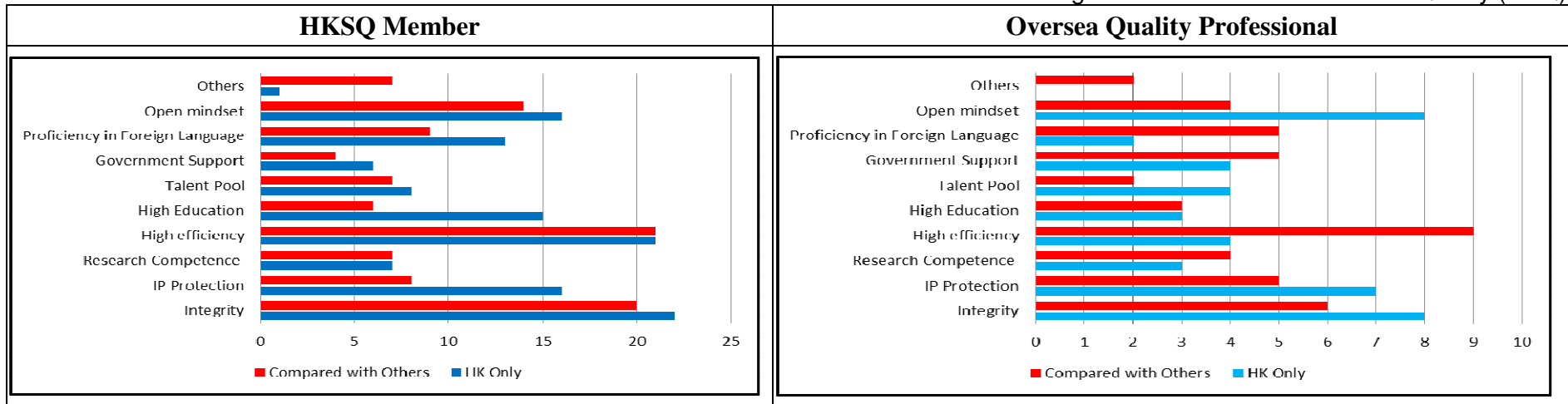
Q7. What do you think are the competitive edges of Hong Kong's Innovation and Technology?



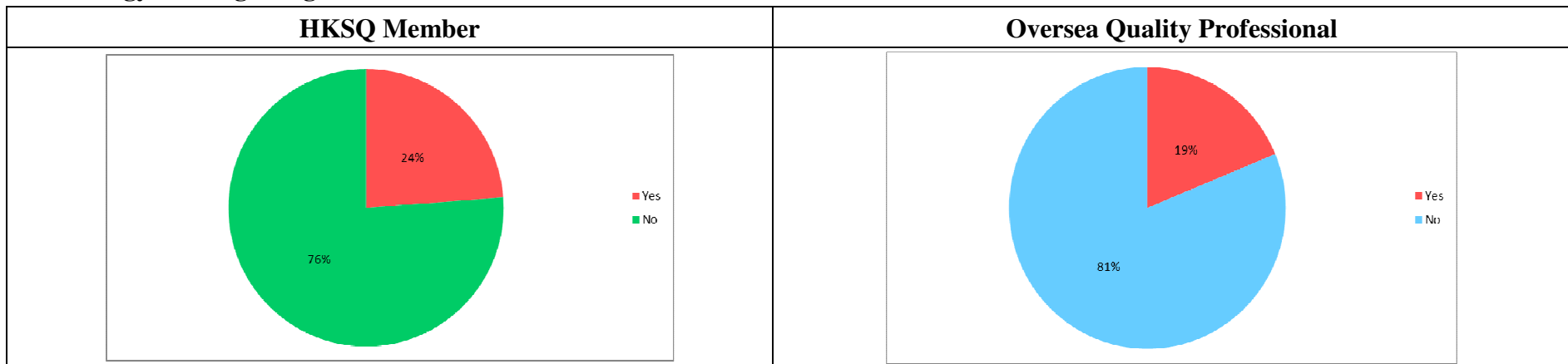
Q8. What do you think are the competitive edges of Hong Kong's Innovation and Technology when compared to the other Three Asian Dragons (including Singapore, Korea and Chinese Taipei)?



The Difference of the Competitive Edges of Hong Kong's Innovation and Technology when compared to the other Three Asian Dragons



Q9. Have you / your members encountered any difficulties in coping with change in regulation or requirement for Innovation and Technology in Hong Kong?



Q10. Do you have any other suggestions which Innovation and Technology area Hong Kong Government should focus on??



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HKSQ Member	Oversea Quality Professional
<ul style="list-style-type: none"> ● Internet+: Cooling system in building; Energy saving ● Energy: e-car charging stations, ● Talent: Technical Professionals with practical experience; Training ● Land: FREE lands to foreign manufacturing enterprise to establish their Far East office/ manufacturing plant in HK ● Industry: Provide more opportunities to the students, especially in Product Design & Development ● Education: To develop the nature of the children's creativity, open mind setting and curiosity ● Technology: Bio-technology and Health Care Technology and Technology for the Aged <p>Other comments</p> <ul style="list-style-type: none"> ● Review Innovation Technology Commission existing infrastructure, evaluate the value and project whether provided the value to the industries ● Grant for young people to develop the new business ● More publication of the results ● HK Government should study the areas worth to be developed firstly, and invest more capitals to support its growth in long term like 5-10 years. ● Support the project with IP application and will have good outcomes within three years. ● Traditional Chinese Medicine 	<ul style="list-style-type: none"> ● Partnership with other countries to have a global impact ● Education and Government support ● Invest in Education. ● Get rid of political ● Empowering Universities integrating Industries and Academies as its two wings is the need of the time for empowering the people of the locality industrially, academically and culturally



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Q11. Do you have any other suggestions how Hong Kong coordinates the Innovation and Technology areas as a facilitator (Quality Professional)?

HKSQ Member	Oversea Quality Professional
<ul style="list-style-type: none"> ● Promotion: Join and hold more exhibitions and trade/academic committees with some countries or states, who may want investment in HK ● China Factor: Treat HK as a stepping stone to China ● Methodology: To maintain a high quality and high standard service/product to the public; Process Improvement; Systematic Technology Transfer Approach ● Education: Putting Quality concept into our early and middle educational system; Qualification framework for innovation and technology ● Talent: The current salary level is not attractive enough to maintain talents/professionals in HK <p>Other comments</p> <ul style="list-style-type: none"> ● Different advisory committees in different fields should be formed to get specialized opinions. ● Link up with Chinese related high end technology authorizes, and enhance with Chinese government “One Belt, One Road (一帶一路)”. 	<ul style="list-style-type: none"> ● Maintain and reinforce the best practices with the independent legal system apart from the mainland ● A Research Academy for empowering people with natural cognitive principles of education is suggested.



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Q12. Do you have any other suggestions in collaboration of Government, Industry, Academia and Research Sectors so as to enhance their efficiency?

HKSQ Member	Oversea Quality Professional
<ul style="list-style-type: none"> ● Platform: Government should have a board to drive an I&T platform for doing so. Hong Kong tourism board is a good example. Establish cross-sector platforms ; Led by HKSTP & backed by HKBAN on research result exchange platform ● Committees: Form different sector committees and report their progress to CE monthly; Invite the Industrial Giants/ Entrepreneurs to join and catalyze their ideas; Assist in Commercialization; ● Results: Set up Performance Indicators of each sectors as result-oriented to create competitive advantages environment; Arrange a reward scheme for good performance participant to enhance the efficiency ● Academic: Fully support INDIGENOUS researcher; To enhance collaboration of organizations and universities to apply government funding in Innovation & technology ● Promotion: More emphasis on engineering / science need in the industry ● Role of Gov: Take the lead and collaborate other sections to develop the defined areas ● Example: WeChat (China) coordinate with Government, Hospital and other public sectors (微信, 連接), they aren't only show their efficiency, but can let people feel their '貼心' attitude. 	<ul style="list-style-type: none"> ● Government policy Support for education Matching national development to be able to compete globally. ● Government should take a leading role in providing and securing an enabling environment for the collaboration. ● The proposed research academy could be developed as a collaborated unit of Government of China and Professional bodies (e.g. HKSQ).