

INTENSIFYING UNIVERSITY INDUSTRY
COLLABORATION THROUGH
TECHNOLOGY SHARING WITHIN THE
MALAYSIAN PERSPECTIVE

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Doctor of Philosophy

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We hereby declare that we have checked this thesis and, in our opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Doctor of Philosophy.



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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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*“Live as if you were to die tomorrow.
Learn as if you were to live forever”.*

Mahatma Gandhi

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ABSTRAK

Inovasi adalah asas kejayaan pertumbuhan ekonomi terutamanya bagi negara membangun. Malaysia adalah antara negara yang berusaha melibatkan universiti dan industri melalui kolaborasi yang lebih tulus dan tertumpu bagi mempercepat pertumbuhan inovasi. Walaupun terdapat banyak inisiatif kolaborasi Universiti Industri, didapati pulangan pelaburan inisiatif tersebut adalah marginal. Ini menunjukkan wujudnya ketidaksesuaian antara tuntutan universiti dan industri. Sehubungan itu, jurang penyelidikan ini harus diatasi. Sumbangan signifikan kajian ini adalah kerangka konseptual teoretikal yang membuktikan bahawa perlunya landskap ekonomi difahami dan perkongsian teknologi sebagai faktor pengganda untuk memperhebatkan kolaborasi Universiti Industri. Tujuan kajian ini adalah untuk mengenal pasti pemboleh ubah yang memupuk kolaborasi Universiti Industri serta mengukur hasil daripada Perkongsian Teknologi terhadap peningkatan pengetahuan, prestasi dan daya saing dalam kolaborasi Industri Universiti. Secara substansial kajian ini menilai model untuk memperhebatkan landskap kolaborasi Industri Universiti. Kerangka teori konseptual diuji dengan menggunakan data empirikal yang dikumpulkan dari 80 syarikat pembuatan berstatus Perusahaan Kecil dan Sederhana (PKS), 20 Universiti Awam dan 41 Syarikat Pembuatan Utama, melalui soal selidik tinjauan dan kemudian dianalisis lebih lanjut menggunakan statistik inferensi dan pemodelan matematik. Faktor pemupukan dan penggandaan dianalisis dengan menggunakan analisis frekuensi dan analisis pemberat untuk menggambarkan intensiti sumbangan syarikat responden terhadap rangkaian nilai ekonomi. Statistik inferensi pula digunakan untuk mendapatkan bukti statistik daripada hasil pemerhatian berpasangan. Pemodelan matematik juga digunakan untuk mewakili dan menilai kerangka kerja secara saintifik. Hasil kajian menunjukkan bahawa infrastruktur penyelidikan yang sesuai, insentif untuk berkolaborasi dan kepentingan untuk memahami landskap ekonomi adalah faktor asas bagi industri, sementara itu, bagi universiti keperluan modal insan untuk melakukan penyelidikan dan kesediaan industri adalah faktor utama dalam memupuk kolaborasi. Perkongsian Teknologi juga meningkatkan pengetahuan dan prestasi untuk syarikat awam, dan daya saing untuk perusahaan pembuatan Kecil dan Sederhana. Yang penting, melalui model matematik, hasil menunjukkan Perkongsian Teknologi sebagai faktor penggandaan penting yang memperhebatkan kolaborasi Industri Universiti. Adalah amat penting bagi kolaborasi Universiti Industri berpandukan permintaan dan diperkasakan dengan pemahaman tentang faktor pemupukan kolaborasi yang signifikan. Dalam usaha memperhebatkan kolaborasi Universiti Industri, Perkongsian Teknologi bertindak sebagai epilog. Perkongsian Teknologi adalah bukti untuk mendorong pelaburan swasta dan membolehkan peningkatan pengetahuan, prestasi dan daya saing industri seterusnya menjana inovasi secara berterusan berdasarkan lanskap ekonomi.

ABSTRACT

Innovation is the cornerstone of success for economic advancement primarily in emerging countries. Malaysia resorts to both universities and industries to collaborate in a more engaging, coherent and concentrated mode to accelerate innovation growth. Despite the myriad of collaborations, the return of investments has been marginal. This illustrates a mismatch between the demands of both the university and industry. On that grounds, it is important to address this research gap, for it will provide insights to improve universities' and industries' understanding in intensifying University Industry Collaborations to spur innovation. The significant contribution of this study is the emerged framework that establishes vital insights on the need to understand the economic landscape and placing technology sharing as a multiplying factor for the intensification of UIC. The purpose of this study is to identify variables which foster University Industry Collaborations. This study further measures the outcome from Technology Sharing efforts on knowledge, performance, and competitiveness improvements in a University Industry Collaboration. Substantially this study develops and evaluates the framework on intensifying the University Industry Collaboration landscape. The conceptual theoretical framework was tested using empirical data gathered from 80 Small and Medium manufacturing companies, 20 Public Universities, and 41 Anchor manufacturing companies, through survey questionnaires. The fostering and multiplying factors were analysed using frequency analysis to reorient and capsule variables associated to research objectives, and weightages to illustrate the intensity of the respondent companies' contribution to the economic value chain. Further inferential statistics were applied to determine statistical evidence on the outcomes of technology sharing on knowledge, performance and competitiveness improvement. Mathematical modelling was also used to scientifically represent and evaluate the framework. The results revealed that appropriate research infrastructure, incentives to collaborate, and the need to understand the economic landscape were fundamental variables to industries meanwhile, universities pointed out the importance of human capital to do research and industry willingness as the primary factors in fostering collaboration. The results further revealed that Technology Sharing improved knowledge and performance for Anchor companies meanwhile, competitiveness also improved for Small and Medium manufacturing companies. Importantly, through the mathematical model, results revealed Technology Sharing as an important multiplying factor that intensifies University Industry Collaboration. It is paramount for University Industry Collaborations to be demand-driven and augmented with an understanding of significant fostering factors. With the purpose of intensifying University Industry Collaborations, Technology Sharing acts as an epilogue. The multiplying factor magnifies the collaboration to create a robust outcome. Technology Sharing proves to drive private investments and allow knowledge, performance, and competitiveness improvement of industries in view of continuous innovation development within the economic landscape.

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LIST OF ABBREVIATIONS

BERD	Business Expenditure on Research and Development
CI	Competitiveness Improvement
DDI	Domestic Direct Investment
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GERD	Gross Expenditure on Research and Development
GNI	Gross National Income
GRI	Government Research Institutes
IHL	Institutes of Higher Learning
IMF	International Monetary Fund
IMP	Industrial Master Plan
KI	Knowledge Improvement
MIDA	Malaysia Investment Development Authority
MTUN	Malaysian Technical University Network
NEP	National Economic Policy
PI	Performance Improvement
PPI	Producer Price Index
PSMB	<i>Pembangunan Sumber Manusia Berhad</i>
R&D	Research and Development
RU	Research University
SME	Small and Medium Enterprise
STI	Science, Technology and Innovation
TS	Technology Sharing
UIC	University Industry Collaboration
UNI	University

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