



Possible Effects of IR4.0 on Malaysia's TN50

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Abstract

Malaysia's development since 1970 has been guided by well formulated national development blueprints starting with the New Economic Policy followed by the National Vision Plan. The next stage of Malaysia's development will span year 2021-2050 and shall be charted by TN50. The latest blueprint is currently being formulated using the bottom-up approach. The period for TN50 is also the era of IR4.0 where disruptive technologies are driving major changes in business models and sustainability. Malaysia will be strongly affected by these changes. Malaysia has done well so far based on production factors tied to low cost of labour and high level of incentive and subsidies. The next level of Malaysia's development journey requires higher level factors that are tied to competitive advantages such innovation, entrepreneurship, speed and integrity. These factors are required to ensure continuous presence of manufacturing and trade activities in Malaysia and allow Malaysia to benefits from developments related to IR4.0.

Keywords: Malaysia; IR4.0; TN50 disruptive; technologies

1. Introduction

Malaysia's Transformasi Nasional 2050 (TN50) is the long-term development blueprint being formulated to take Malaysia from end of National Vision Plan, 2020 to year 2050. The development of this blueprint involves substantial consultation with Malaysia's citizen especially the youth [1]. This feature differentiates TN50 from earlier plans that were primarily formulated by the government and its administrations. The plan is meant to contain substantive input from the people. Unlike the National Vision Plan that has 9 challenges, the blueprint currently only has one substantive goal that is to position Malaysia to be among the top 20 economies in the world by 2050. The effort to enhance Malaysia's economic progress involves working on its determinants of national advantage [2] being i. Factor Conditions, ii. Demand Condition, iii. Firm Strategy, Structure and Rivalry, and iv. Related and Supporting Industries. Malaysia is dependent on the factor conditions especially on how efficiently and effectively the factors of production are created and deployed. To ensure a sustainable competitive advantage. The government of Malaysia has always given highest priority to education in its effort to develop the nation [3]. Effort to steer Malaysia through to 2050 will take place in the midst of Industrial Revolution 4.0 (IR4.0) where disruptive changes caused by new technologies are the order of the day. These disruptive technologies involve greater automation, integration and computer control of business, logistic and manufacturing activities [4]. Repetitive and menial activities together with that requiring relatively simple logical choices are now done by machine. The use of robotic technologies decreases the dependence on labour to the extent that most of such occupations will disappear. This development is also making it possible for companies to consider moving their manufacturing related activities back to the home countries. This move would certainly affect the countries currently hosting these activities.

Malaysia host many of such manufacturing activities and would certainly be affected by development related to IR4.0. How shall Malaysia integrate in its national development plan the response to IR4.0, not only to minimize the adverse impact but to benefit from the development? What would be the possible effect of IR4.0 on the effort to develop and then to implement TN50? This paper shall explore these questions by first looking at Malaysia's development since 1970. Malaysia's Gross Domestic Product (GDP) at different stages of development will be studied and compared with that of other countries. This paper shall also discuss Malaysia's performances in relevant indicators. Next the industrial revolution 4.0 will be introduced and its possible effect on TN50 will discussed.

2. Economic Progress Since 1970

2.1. Indicated by Gross Domestic Product (GDP)

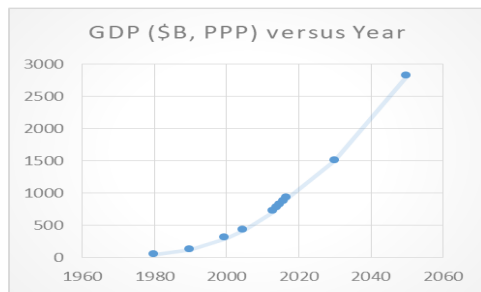
Malaysia's economy has been growing steadily since 1970. Based on Purchasing Power Parity (PPP), Malaysia's GDP increased from \$46B in 1980 to \$124B and \$300B in 1990 and 2000 respectively. In 2017 the GDP was \$926B with Malaysia ranked 26 I the world based on its GDP [5]. The projected size of Malaysia's GDP in year 2030 and 2050 have been determined to be \$1506B and \$2815B respectively [6]. The size of Malaysia's DGP in constant year 2000 \$ have also been estimated [7].

Table 1 present the list of countries ranked 15 to 27 in 2016 and expected to be ranked so in 2050. Malaysia was ranked 27 in 2016 and is expected to improve to number 24 in 2050. Vietnam is expected to be at rank 20 with GDP of \$3176B in 2050. To be ranked 20, Malaysia's expected GDP have to be better than \$3176B that is 13% higher than its projected GDP.

Table 1: The GDP (\$B, PPP) of countries ranked 15 to 27 in the world

Rank	2016		2050	
	Country	GDP (\$B)	Country	GDP (\$B)
15	Saudi Arabia	1731	Egypt	4333
16	Spain	1690	Pakistan	4236
17	Canada	1674	Iran	3900
18	Iran	1459	South Korea	3539
19	Australia	1189	Philippines	3334
20	Thailand	1161	Vietnam	3176
21	Egypt	1105	Italy	3115
22	Nigeria	1089	Canada	3100
23	Poland	1052	Bangladesh	3064
24	Pakistan	988	Malaysia	2815
25	Argentina	879	Thailand	2782
26	Netherlands	866	Spain	2732
27	Malaysia	864	South Africa	2570

Malaysia's GDP in PPP values as reported [5] and that estimated [6] are plotted against Year in Figure 1. The plot suggests that a substantive shift in Malaysia's economy occurred at around 2005-2010, at about the mid-point of the National Vision Plan. The estimated progression from 2017 to 2050 also seems to be along a straight line. Based on this projection a slightly higher slope or rate of growth is required if Malaysia is to achieve at least rank 20.

**Fig.1:** Plot of reported and estimated GDP (\$B, PPP) versus year

2.2. Malaysia's Factor Conditions

Table 2 present Malaysia's 2016/17 ranks based on various index and indicators. Malaysia's score as summarized in the table indicate the nature of Malaysia's factor conditions. Malaysia's rank in the world ranges from 23 for Global Competitiveness 2017 and 62 for Corruption Perception 2017. Malaysia's best three performances are for Global Competitiveness, Ease of Doing Business and World Digital Competitiveness.

The third indicator relates to Malaysia's ability to thrive in IR4.0 environment. While the overall rank is 24, the score for sub-indicator Factors, Technology and Future Readiness is 17, 18 and 27 respectively. Within sub-indicators Factors, Malaysia ranked 3 for Training and Education, 26 for Scientific & Concentration and 27 for Talent. In the case of Technology, Malaysia ranked 9 for Capital, 19 for Technological Framework and 30 for Regulatory Framework. In Future Readiness, Malaysia ranked 12 for Business Agility, 28 for Adaptive Attitude and 34 for IT Integration [10]. These scores indicate that fine tuning of efforts is required to enhance Malaysia's digital competitiveness especially in relation to factors related to competitive advantage.

Table 2: Malaysia 2016/17 rank based on other indicators

No	Index	Rank	Ref.
1	Global Competitiveness 2017	23	[8]
2	Ease of Doing Business 2017	23	[9]
3	World Digital Competitiveness 2017	24	[10]
4	Global Talent Competitiveness 2017	28	[11]
5	Global Human Capital 2017	33	[12]
6	Global Youth Development 2016	34	[13]
7	The Global Innovation Index 2017	37	[14]
8	World Happiness Index 2017	42	[15]
9	Social Progress 2017	50	[16]
10	The Global Entrepreneurship 2017	54	[17]
11	Corruption Perception Index 2017	62	[18]

The next three indicators are for Talent and human development. Malaysia ranked 28 for Global Talent Competitiveness, 33 for Global Human Capital and 34 for Global Youth Development. These scores indicate talent and human capital development lagged behind business practices and competitiveness. The state of Malaysia's talent is further indicated by the lower performance in Global Innovation and Global Entrepreneurship with the rank of 37 and 54 respectively. Three factors point to Malaysia's overall factor conditions being its rank for World Happiness, Social Progress and Corruption Perception. Malaysia is ranked 42 for happiness, 50 for social progress and 62 for corruption perception. Malaysia's score in corruption perception index has remained low since 2002. The corruption perception index of many countries in Asia such as South Korea, China, Thailand, India, Philippines and Indonesia has improved over these years. Malaysia's score in 2017 is slightly lower than what it was in 2002 [19]. Effort to position Malaysia among the top 20 economies in the world requires that Malaysia is similarly ranked in the factor discussed above. Even though Malaysia is ranked highly on education related initiatives, the effort is not evidenced in the form of talent and human capital. In terms of business competitiveness and agility, Malaysia is positioned quite well to support TN50. Malaysia also lagged in IT integration, innovation and entrepreneurs. These three factors are important to create competitive advantage. Malaysia's rank pertaining to happiness and corruption perception certainly requires serious attention. Malaysia are able to create the relevant factors required for TN50 but the efficiency and effectiveness of their creation and utilization require serious attentions.

3. Effect of IR 4.0 on Malaysia's TN50

IR 4.0 relates to the paradigm that machines are now able to autonomously adapt and coordinate their tasks to meet human needs. This is achieved through the Cyber Physical System (CPS) also called Industry 4.0, Advance Management Program, Internet of Things (IoT) and Industrial Internet. This new paradigm marks the industrial era called Industrial Revolution 4.0 coined by Klaus Schwab in 2016 [3].

To appraise the effect of I.R 4.0 on Malaysia's TN50, we must clearly understand I.R 4.0. Central to I.R 4.0 is the highly automated and interconnected industrial production and logistic chains. The chains are configurable based on value creation requirements through the merging of virtual and real processes in the Cyber Physical System. This flexibility allows the manufacturing process to be highly efficient to cater for customer wishes in real time and cater for large product variations.

Flexibility, due to distributed and decentralised approaches, in getting things done, is the critical feature. This is made possible, firstly, by the individual production unit having the necessary capability and secondly, the formulation of a combined effort through system level optimisation rather than predetermined choices decided centrally. Three factors are of high importance. First technical capabilities, second workforce competencies and third the work system. IR 4.0 requires interdisciplinary and collaborative actions. The resources currently present in Malaysia need to be collectively deployed on common I.R 4.0 project. Universities must introduce I.R 4.0 core courses through multidisciplinary approaches. Industrial players must work together. The production of smart product through smart work system requires vertical networking, horizontal integration and end to end engineering. Malaysian institutions and industrial organisations must work collaboratively transcending the barriers of organisation and knowledge [20]. The factor that is workforce competencies involves human and social qualities. As machine need to be flexible, so is the workforce. In I.R 4.0 era, the nature of jobs are fluid and lesser workforce are required. The individual workforce must however have higher capabilities. This includes having higher level of IT skills, being more self-directed and equipped with good communication skills. Individual workforce must also have inten-

sive interdisciplinary thinking and action skills and are lifelong learners. In essence IR 4.0 requires individuals who can think on their feet and act independently and yet work in team. The challenge is to equip individuals with these abilities and to realign organisational values and norms to the new work content, process and environment. Diversity should be welcomed and individual strength should be celebrated. The third and most critical factor is the work system. The shift from focussing on production thinking to design thinking must take place. This factor requires ability to exhaustively identify the requirements, forecast the value generating scenarios and mapping the logical combination of activities that maximise values. This may involve visualisation, modelling and simulation. Following this, high discipline is required to implement the design and work plan and not to easily intervene or vary the planned design and work processes. Three attributes characterise the IR4.0 related factors that potentially strongly affecting TN50 being flexibility, integrity and speed. Flexibility arise from mastery of capabilities and technologies. Integrity arise from meeting all rules, standard, and plans while speed is made possibly by shorter and direct connection supported by clear protocols. Malaysia must thrive in IR4.0 for it to be successful in its TN50 journey. It must acquire IR4.0 compliant technologies together with IR4.0 compliant social and industrial practices. Based on the analysis of Malaysia's current state, it is important to:

- a. Intensify the level of innovation and entrepreneurship
- b. Enhance the integrity of rules and processes
- c. Increase inclusivity and empower individuals and groups in Malaysia

4. Conclusion

Malaysia has been blessed with good factor conditions and responsible governments. It is now considered one of the success stories among developing nation. The development of Malaysia was guided by clear development blueprint starting with the New Economic Policy followed by the National Vision Plan. The next stage of Malaysia's development will span year 2021-2050 and shall be charted by TN50. The latest national blueprint is currently being formulated using the bottom-up approach.

The period for TN50 is also the era of IR4.0 where disruptive technologies are driving major changes in business models and sustainability. As a trading nation with open economies, Malaysia will be strongly affected by these changes. Malaysia has done well so far based on production factors linked low cost of labour and high level of incentive and support. The next level of Malaysia's developmental journey requires advanced factors [3, pp.77] that are tied to competitive advantages such innovation, entrepreneurship, speed and integrity. These factors are required not only to ensure continuous presence of manufacturing and trade activities in Malaysia but also for Malaysia to be a truly sustainable developed country by 2050.

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