DETERMINATS OF REINVESTMENT ALLOWANCE (RA) TAX INCENTIVE UTILIZATION IN EMBRACING INDUSTRY 4.0

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Abstract: In the era of automation, Malaysia is compelled to embrace Industry 4.0 in order to remain competitive. Thus, the nation needs to be better prepared to confront the challenges ahead. From the perspective of taxation, the government has crafted many tax incentives such as Reinvestment Allowance (RA) to stimulate business expansion, automation, modernization, and diversification. The aim of this paper is to determine the factors affecting the utilization of RA among incentivised firms in Malaysia. Confidential tax return data was analysed using binomial logistic regression and the results confirmed that there are connections between firm profitability, investment, sector, and effective tax rate with the utilization of RA. Thus, by focusing on the potential determinants in RA utilization, it will benefit both policy makers and industry players to enhance effective application of RA that was designed to support Industry 4.0.

Key words: Tax incentive; Reinvestment allowance (RA); Tax return data; Industry 4.0

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Introduction

Governements in both developed and developing countries offer tax incentives to attract foreign direct investment FDI (World Bank, 2017) as well as to stimulate firm growth (Harger and Ross, 2016). These objectives enable a country to secure profitable income, capture mobile capital, and serve as motivating factors for firms or investors to retain and expand their existing businesses. The government of Malaysia has offered various types of tax incentives to the corporate sector and one of the most prominent tax incentive is known as Reinvestment Allowance (Bank Negara Malaysia, 2017). Effective since year 1979, RA is offered to corporate firms within the context of tax policy to encourage capital reinvestment and to stimulate greater automation in the industry.

Nevertheless, the Malaysia Investment Development Authority (MIDA) points out that although the government has extended various tax incentive schemes, many firms especially from the manufacturing sector have made the least effort in fully adapting automated operation in order to enhance their value chain and productivity (The Edge Malaysia Weekly, 2016). Respectively, the Malaysia

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Institute of Economic Research (MIERA) states that even though all sector have move toward Industry 4.0, the sector being labour-intensive andreliant on low-skilled workers, are still lagging behind (The Edge Financial Daily, 2018). At this point, the impact of tax incentives in realizing its objective received inconsistent responses from numerous studies, suggesting a doubtful impact (Klemm, 2010). In the case of RA claim in Malaysia, 7,157 firms had claimed RA from year 2007 to 2016. Based on unpublished data of IRBM 2018, the total RA claimed in 2016 by those firms recorded a sum of RM7.9billion (USD1.89billion). Significantly, the unutilized amount of RA claimed recorded a substantial amount of RM34billion (USD 8.12billion) which is equivalent to RM8billion or USD1.91billion (authors' estimation by multiplying the Malaysian current corporate statutory tax rate of 24%) of revenue forgone to be anticipated by the government in the future. While, this might be admirable inputs among the claiming firms for the purpose of tax saving, there is a need to improve the effective use of tax incentives in striving toward its intended objective (IMF, OECD, UN, 2015). The examination on the determinants affecting the utilization of RA claim is the central focus of this study.The result of the study would enable policy makers to re-evaluate the relevance of tax incentive in term of their appropriateness in achieving the targeted objective and their effectiveness in promotingthe application of Industry 4.0 among the incentivised firms. Although RA offers attractive incentive schemes for capital investment to spur rapid industrialization in Malaysia, prior research found that industries in Malaysia especially the manufacturing sector is still lacking behind due to the lack of significant technological upgrading as compared to the other successful industrialized countries such as the United States, Germany, Japan, Korea and Taiwan (Rasiah et al., 2015). Hence, RA tax incentive is a key initiativeoffered by the governement to strengthen industrial capability for the high-tech strategy. Moreover, it is timely to assist firms in dealing with forthcoming challenges of Industry 4.0 and reducing the cost of doing competitive business globally.

To date, this is the first study to determine the success of RA by using confidential tax return data.More importantly, this study in line with the current Malaysian Industry 4WRD Policy that is keen to successfully transform the manufacturing sector holistically. The outline of this paper is organized as follows. Section 2 discusses the literature review on RA utilization and Industry 4.0, while section 3 explains the research methodology in highlighting the approach on how this research was conducted. The empirical outcomes are discussed in section 4. Lastly, the conclusion of the study is found in section 5 of the paper.

Literature Review

This section begins with the discussion on the legislative provision and technical aspect of RA. These provisionare legislated under the section 133A under Schedule 7A of Income Tax Act, 1967 (ITA, 1967). This provision together with the Public Ruling of 6/2012 (IRBM, 2012), provide a special relief known as RA which

through a qualifying project, is to stimulate firm expansion for existing businesses. What makes RA particularly attractive is that it is applicable to qualifying capital expenditure (QCE) that has already received capital allowances. This means that a single amount of QCE invested yields two benefits for the qualifying firm (Josef and Singh, 2017). Presently, firms claiming this incentive are benefiting from the exemption rate of 60%, applicable on QCE invested in a plant, machinery and a factory. The utilization of RA for each assessment year is limited to 70% of the statutory income and the remaining balance on taxable income will be taxed at the prevailing tax rate. Any unabsorbed RA will be carried forward until it is fully utilized. The treatment of unabsorbed RA is found in para 4 under Schedule 7A of ITA (1967). Hence, any RA amount not utilized in a year of assessment by reason of insufficiency of statutory income can be carried forward in the following year of assessment and deducted against the statutory income of the business until the allowance is fully utilized (IRBM, 2012). This carry forward rule gives a huge added advantage as firms can properly plan their tax and profit position because the amount of unutilised RA can be carried forward indefinitely and available profit can also be used by the firm. Figure 1 shows how RA incentive is utilised. The RA unutilized balance of USD 50,000 (i.e. USD 540,000-490,000) was carried forward to be utilised against 70% of the following year's statutory income.

On 1st January 2016, XYZ firm incurred QCE on robotic equipment amounting to USD 900,000

The computation of RA of the firm as follows:	USD
Statutory income	700,000
The RA for Year assessment 2016 computed as follows:	USD
Statutory income of the business	700,000
Less: RA (60% of 900, 000) = 540,000	
Restricted to 70% of 700, 000	(490,000)
Chargeable income	210,000

Figure 1. RA computation, utilization and carry forward

Prior studies indicate that underutilization of incentives is largely due to firms' insufficient profitability level and consequently, failure to take advantage of the incentive granted by the government (Abd Hamid, 2015; Abd Hamid et al., 2010; Forsling, 1998). Hence, firms' level of profitability is a main criterion in ensuring that they are able to enjoy the benefits of incentives. This study used ROA ratio (Return on Asset = Net Profit scaled by total assets) as a proxy for firm profitability. As a firm progresses and generates more profit, the tendency to fully utilize RA incentive is higher. In case of an initial unprofitable investment, there may not be any benefit as deductions or utilization will only occur in the following years (Klemm, 2010). However, the unused incentive can also be interpreted as a

red flag for further losses in the future (Amir and Sougiannis, 1999). Therefore, a firm must consider this as an unfavourable indicator and make full use of RA by pushing its profitability level as high as possible in order to achieve better utilization of RA. Generating a desired profitability level and enhancing firm performance can be achieved by adapting the mechanism of Industry 4.0. In executing the mechanism of Industry 4.0, firms are expected to gain better performance by reducing of operating costs, improving operational effectiveness, increasing manufacturing productivity, and fostering industrial growth (Rüßmann et al., 2015; Ślusarczyk, 2018). Thus, this research expected RA designed for Industry 4.0 to be fully utilised when the firm generates profit. Hence, this postulation has led to the following hypothesis:

H1: Profitability has a positive influence on RA utilization.

This present study uses effective tax rate (ETR) to assess the effectiveness of tax revenue contributed to the government when RA is utilized. ETR is a common measure to ascertain the extent to which activities are taxed in a favourable manner especially those related to corporate taxation and has long been used by governments and policy makers (Gupta and Newberry, 1997). ETR is calculated by dividing tax payable (liability) with profit before taxes. In ETR measurement, profit before tax represent the denominator which reflected by the element of revenue. Prior research done by Rüßmann et al., (2015) has predicted an additional contribution of revenue growth of €30billion a year generated by German manufacturing firm driven by Industry 4.0 as a result from the application of enhance high tech equipment. Hence, Industry 4.0 appears to be potential revenue (tax) resourcefor a nation.In another study, researchers discovered that ETRs for U.S firms have decreased significantly over a period of 25 years and this proved that some firms were able to reduce their ETR through tax planning strategies and by taking advantage of favourable tax provisions (Dyreng et al., 2017). In the Malaysian context, in a study conducted by Noor et al., (2010), profitable firms utilized tax incentives to reduce ETR. However, the association between ETR and RA utilization has yet to be tested. This study expects that firms would consume high ETR once RA is fully utilized. Thus, the second hypothesis is as follows:

H2: ETR have a positive influence on RA utilization among the incentivised firms.

Investment in capital is the fraction of fixed assets to total assets and is used in this research as the proxy to assess a firm investment in plant and equipment. Investment in plant and equipment (IVEST) is regarded as capital intensity or possession of capital asset by a firm which requires a long period of consistent use to produce an adequate return. With regards to IVEST among small size firms claiming the incentive proves to have an inverse association on firm performance (Abd Hamid, 2015). The study by Abd Hamid et al., (2010) indicates that capital invested during a profitable period enables firms to exploit tax saving derived from tax incentives. However, most capital-intensive investments do not yield a profit until several years later (James, 2013). In the next decade, Rüßmann et al., (2015) predicted that German manufacturing firms are expected to invest nearly €250

billion to incorporate Industry 4.0. Sanders et al., (2016) acknowledged that implementing Industry 4.0 requires intensive financial investment, while Ślusarczyk (2018) highlighted on the uncertain economic benefits from the investments in high end technology. Therefore, this study predicts that any additional investments in high-tech device made in relation to RA would give additional tax credit to a firm in terms of the amount of unutilized RA. Respectively, firms would have additional balance of unutilized RA to be carried forward to the next year. Based on the above findings, the hypothesis is as follows:

H3: Investments in plant and equipment has inverse associations to RA utilization.

RA is considered a targeted tax incentive as it principally provides preferential tax treatment focusing on various qualifying sectors (QS). A research conducted by Prillaman and Meier, (2014) has used sector as a predictor in determining the impact of tax incentives on the economy of the United States.Sector-level provide different expectation of firms toward Industry 4.0. For instance, Ślusarczyk (2018) asserted that wood, paper and packaging sector can expect a significant reduction of cost while transportation and logistics have the least reduction of cost when implementing digitization. Other researchers had argued that the electric and electronic sector stands a chance to reduce error rate while the automation and food and beverage industries are able to gain better productivity (Rüßmann et al., 2015). Hence, this study expected a positive association between QS and RA utilization. The next hypothesis derived from this finding is as follows:

H4: Qualifying sector positively influences RA utilization.

This research expected firms claiming RA to use available financial resources in the form of debt to finance their capital asset and consequently possess a high level of leverage (LEV). Shuid and Noor, (2012) claimed that leverage has a significant negative relationship with the performance of firm in Malaysia. Similarly, a firm that obtains fund through debt and invests in profitable operation will likely have a higher performance (Delen et al., 2013). However, the association between LEV and RA utilization has yet to be tested. Hence, this study anticipated that leverage has reverse association to fully utilised RA. Based on this, the alternate hypothesis is as follows:

H5: There is a negative (positive) association between leverage and RA utilization.

Currently the manufacturing sector is being pushed forward toward the fourth stage of industrialization that aims for sustainable manufacturing. According to Rüßmann et al., (2015) firm in Europe, the U.S., and Asia have raced forward to embrace this revolution.This fourth wave of industrial revolution pioneered by a German manufacturing firm follows the third industrial revolution and relies on electronics and information technology to achieve a higher level of automation in manufacturing. Most of the present research have reported the potential technical and economic benefits based on the nine pillars of Industry 4.0 as improvement in production quality, greater range of capabilities, reduced machine setup times and increase quality, cohesive networking platform, cybersecurity protection on industrial lines and manufacturing system, enhanced data sharing across firm

boundaries, customized products, real time information and improvement in decision making (Rüßmann et al.,2015; Saucedo‐Martínez et al., 2017; Ślusarczyk, 2018). Eventually less concern put on how to deal with the massive cost of capital to be incurred in acquiring those related technologies. With regards to RA, this incentive provides an essential fiscal assistance in the form of tax deduction. Hence, the association of RA with Industry 4.0 relies on the provision and their application on technologies related to this industry.

What makes RA particularly relevant to Industry 4.0 is that it gives specific relief (tax deduction) in term of a firm's wish to invest in the QCE. Table 1 shows the integration between RA and Industry 4.0. Theoretically, the nine pillars of technologies related to Industry 4.0 are embedded and applicable under the provision of RA.

Table 1. Integration of RA and Industry 4.0 *(ITA, 1967 Schedule 7A para 9; Rüßmann et al., 2015; Bahrin et al., 2016; Saucedo‐Martínez et al., 2017)*

Four pillars of RA/definition (base on QCE)	Nine pillars of Industry 4.0 (base on technologies related)
Automation- refers to a process whereby manual operations are substituted by mechanical operations with minimal or reduced human intervention.	Autonomous robot The internet of things Big data analytics Horizontal and vertical system integration Cybersecurity The cloud Augmented reality Simulation Additive manufacturing
Modernization- means an upgrading of manufacturing equipment and process.	
Expansion- refers to an increase of product capacity or expansion of factory area	
Diversification-means to enlarge or vary the range of products of a company related to the same industry.	

Research Methodology

This research employed secondary panel tax return data which consisted of firms claiming RA from 2007 to 2016. On the selection of the sample, a multiple filtration procedure was employed where firms without adequate financial and taxation information as well as reported negative net profit were excluded (Noor et al., 2010) to avoid computational difficulties (Lambert et al., 2015). Finally, this study selected 101 samples within the prescribed period (1,010 firm years observation).

The binomial logistic regression statistical analysis (Tabachnick and Fidell, 2013) transacted with discrete outcome (binary response variable) was used in this research to determine the factors that affect RA utilization. The dependent variable in this regression has two discrete outcomes which are "firm fully utilized RA" assigned as one (1) and "firm with unutilized RA" assigned as zero (0). A firm that fully utilizes RA is a potential success in Industry 4.0. If the logit values are

positive, the odds indicate that the occurrence of an outcome for firm fully utilized or firm unutilized RA and vice versa for the negative logit values. The logit model for the multiple logistic regressions is stated as follows:

$$\text{Logit } [P(Y=1)] = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 \quad (1)$$

Where Y (dependant variable) RACF= 1 indicates that the firm fully utilizes RA; β_0 = constant coefficient (intercept); B_i = the effect of x_i on log odds of Y=1; X_1 is Return on Assets (ROA); X_2 is the ETR; X_3 is Investment in Plant and Equipment (IVEST); X_4 is Leverage (LEV); X_5 is the Qualifying Sectors (QS) (1= electricals and electronics, 2 = metals and minerals, 3 = food and beverages, 4 = textile, garment and leather, 5 = wood, paper products and printing, 6 = petroleum, chemical, rubber and plastics, 7= automobile, equipment and other manufacturing, Indicator: agricultural and livestock).

Results

Table 2 shows the binomial logistic regression model applied in this study. To determine which variable can contribute to the model, five independent variables Return on Assets (ROA), ETR, Investment (IVEST), Leverage (LEV), Sectors (QS) were analysed. Based on Table 1, the strongest predictor of RA utilization is ROA, indicating that profitable firms were over 256 times more likely to fully utilize RA. Thus, this outcome strongly supported H1 and aligned with the research outcome conducted by Abd Hamid, (2015). An increase in ETR is associated with a firm successfully utilizing RA, an evidence of growth in revenue (Rüßmann et al., 2015) which would enable the firm to pay taxes to the government. As such, H2 hypothesis is supported. IVEST is associated with the decreased in likelihood of firm fully utilized RA. The result supports H3 hypothesis, however Ślusarczyk, (2018) clarifies that there are plenty of circumstances determining investments in advanced technologies. Although the relationship between LEV and RA utilization is supported, this attribute is the least significant in the model. The result of binomial logistics regression exhibits that there is a significant and positive association between QS and RA utilization: QS (2) of Metals and Minerals is 7.2 times more likely to utilized RA followed by QS (6) Petroleum, Chemical, Rubber, and Plastics Industry. QS (1) scored the highest p-value (0.244) which indicates that Electricals and Electronics is the sector that would utilise RA the least. Thus, the outcome tested varies widely according to the SEC (Ślusarczyk, 2018). Hence, RA utilization is only substantial to those two sectors and not all the sectors tested in the study.The results show that the model coefficients for the binomial regression results for ROA, ETR, IVEST as well as QS are significant to the dependent variable since the p-values < α (0.05).

When the test function is applied to the model fitting, the value of R-squared in the model suggests that variability in the dependent variable (Y= Firm fully utilized RA) is between 35.7% (Cox and Snell R^2) and 48.5% (Nagelkerke R^2). The model coefficient is significant since the p-value (0.000) is less than alpha (0.05). This

statistical analysis is tested at significance level of α = 0.05 (p-value) with 95% confidence interval.

The sensitivity value of 69% with the classification of firm fully utilized RA is correctly identified. Meanwhile, the specificity value of 90.7% is correctly predicted firm with unutilized RA. Overall, results consistently suggests that ROA, ETR, IVEST and SEC can accurately predict 82% of firm utilized incentive related to Industry 4.0.

Table 2. Model Coefficients for Binomial Logistic Regression

Dependent Variable (Y)	Independent Variables (X_i)	β	Exp (β)	(P-Values) Sig.
RACF (Firm with unutilized RA balance or Firm fully utilized RA)	Constant	-2.642	0.071	0.000
	x_1 ROA	5.548	256.749	**0.000**
	x_2 ETR	12.520	2.738	**0.000**
	x_3 CAPIN	-1.612	0.199	**0.000**
	x_4 LEV	-0.694	0.500	0.079
	x_4 QS			0.000
	x_4 QS (1)	0.708	2.029	0.244
	x_4 QS (2)	1.987	7.294	**0.001**
	x_4 QS (3)	1.151	3.162	0.053
	x_4 QS (4)	0.911	2.487	0.114
	x_4 QS (5)	0.769	2.157	0.191
	x_4 QS (6)	1.904	6.712	**0.001**

Conclusion

This research has proven that when a firm successfully utilizes the incentives related to Industry 4.0, the determinants are profitability, effective tax rate, investment, and sector. Consistent with previous research, firm performance (profitability) is the key determinant in utilizing RA successfully. Profitable firms not only benefit from tax saving through tax incentives but also gain in capitalizing technical and economic benefits derive from industry 4.0 (Rüßmann et al., 2015). Furthermore, this research has shown that ETR has a positive relationship with RA utilization. ETR indicates on the contribution of taxes and revenue growth resulted from the utilization of incentive related to Industry 4.0. Therefore, governments and policy makers should build a conducive mechanism in Industry 4.0 to encourage high utilization of these incentives. In term of sectors, the result demonstrates thatRA utilization is not likely to occur across all the sectors. Consistent with survey conducted by Ślusarczyk, (2018), the outcome varies widely depending on sector. Therefore, not all sectors involved in RA utilization have a potential to succeed in Industry 4.0. Interestingly, Metal and Mineral as well as Petroleum, Chemical, Rubber and Plastics have shown readiness to pursue success in the autonomous technologies. The binomial logistic regressions also demonstrated that there is a significant and negative association between

investments and RA utilization. This is due to the fact that most of the capital-intensive investments do not yield a profit until several years later (James, 2013). In the case where firm produce inadequate profit during the investment period, it will likely reduce RA utilization. As RA offers tax relief and encourages firms to invest in modernization and automation equipment, these could ease their tax burden. This outcome should be an eye-opener for industry players to invest and make full use of this incentive in order to overcome the high cost associated with capital investment. Furthermore, this study proved that the utilization of RA assist intransitioning firms from labour intensive work force to fully automated operation.

There are several managerial implications derive form this study. At governmental level, Malaysia foresees potential benefits of Industry 4.0 and is aware on the growing need to retain investment. Correspondingly, the government goes all out to create business climate (i.e RA incentive) that investors and industry players will view as favorable. As a business model, Industry 4.0 is expected to transform firm performance (profitability, productivity etc.) systematically. Governments or policy makers should look at this industry as alternative sources of revenue contribution to the nation. In the presence of incentives related to Industry 4.0, the practice of prudent investment is particularly essential to ensure new technology that is acquired is profitable as well as adaptable to what firms have already own. Finally, future research should include other attributes such as monitoring incentives as to encourage firms to take these incentives and make full use of them inIndustry 4.0.

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CZYNNIKI WYKORZYSTANIA INICJATYWY INWESTYCYJNEJ ULGI PODATKOWEJ (RA) W ADOPCJI PRZEMYSŁU 4.0.

Streszczenie: W dobie automatyzacji, Malezja jest zmuszona zaadoptować Przemysł 4.0, aby pozostać konkurencyjnym. W związku z tym naród musi być lepiej przygotowany do stawienia czoła stojącym przed nim wyzwaniom. Z punktu widzenia opodatkowania, rząd opracował wiele zachęt podatkowych, takich jak zasiłek reinwestycyjny (RA), aby stymulować ekspansję biznesu, automatyzację, modernizację i dywersyfikację. Celem tego artykułu jest określenie czynników wpływających na wykorzystanie RA wśród zmotywowanych firm w Malezji. Poufne dane dotyczące zwrotu podatku analizowano za pomocą dwumianowej regresji logistycznej, a wyniki potwierdziły, że istnieją powiązania między rentownością, inwestycją, sektorem i efektywną stopą podatkową a wykorzystaniem RA. W związku z tym, skupiając się na potencjalnych determinantach wykorzystania RA, przyniesie to korzyści zarówno decydentom, jak i graczom z branży, w celu zwiększenia skuteczności stosowania RA, który został zaprojektowany w celu wspierania Przemysłu 4.0.

Słowa kluczowe: zachęta podatkowa; zasiłek reinwestycyjny (RA); dane dotyczące zwrotu podatku; Przemysł 4.0.

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摘要:在自动化时代，马来西亚不得不采用工业4.0来保持竞争力。因此，国家需要更好地准备好应对未来的挑战。从税收的角度来看，政府制定了许多税收激励措施，如再投资补贴(RA)，以促进业务扩张，自动化，现代化和多样化。本文的目的是确定影响马来西亚激励公司RA使用的因素。使用二项逻辑回归分析机密纳税申报数据，结果证实，企业盈利能力，投资，部门和有效税率与利用RA之间存在联系。因此，通过关注RA利用的潜在决定因素，它将有利于政策制定者和行业参与者增强旨在支持工业4.0的RA的有效应用。

关键词:税收激励;再投资津贴(RA);纳税申报数据;工业4.0。