UNIVERSITI PUTRA MALAYSIA

# CAREER ASPIRATIONS OF R&D PROFESSIONALS IN MALAYSIAN GOVERNMENT RESEARCH INSTITUTES

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**EFIZAH SOFIAH BINTI RAMLY MASTER OF SCIENCE 2009**

# CAREER ASPIRATIONS OF R&D PROFESSIONALS IN MALAYSIAN GOVERNMENT RESEARCH INSTITUTES

**By**

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**Thesis submitted to the School of Graduate Studies,
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**CAREER ASPIRATIONS OF R&D PROFESSIONALS IN MALAYSIAN GOVERNMENT RESEARCH INSTITUTES**

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**EFIZAH SOFIAH BINTI RAMLY**

**February 2009**

**Chairman:** **Professor Maimunah Ismail, PhD**

**Faculty:** **Educational Studies**

One of the strategic mechanisms for human resource development (HRD) practitioners in developing career development program for research and development (R&D) professionals is by managing their career aspirations (Petroni, 2000). It is believed that career aspiration is one of the internal needs for motivating R&D professionals to succeed in their careers. This study therefore would contribute insights into the management of R&D professionals' careers, where their internal needs could be fulfilled through their aspirations.

There are three factors that had been recognized to have influenced the R&D professionals' career aspirations in Malaysian Government Research Institutes (GRI), namely, self-efficacy, organizational socialization and continuous improvement (CI) practices. These factors were selected based on the components of Social Cognitive Career Theory (SCCT) developed by Lent, Brown and Hackett (1994). The objectives of this study were to determine the levels of career aspiration, self-efficacy, organizational

socialization and CI practices of R&D professionals in GRI, to determine the relationship between each factor and their career aspirations, and to determine the contribution of each factor to their career aspirations.

The design of this study was a descriptive correlational research where it was conducted through a quantitative research method on 158 R&D professionals. The respondents were gathered through a purposive sampling procedure and the response rate was 69.30%. The data for this study were collected using a set of questionnaire which consists of simplified version of Schein's Career Anchor Inventory (Igbaria, Kassicieh, & Silver, 1999), the General Self-efficacy scales (Schwarzer & Jerusalem, 1995), the Organizational Socialization Inventory (Taormina, 1994), and the CI Cpabilities Survey (Jorgensen, Boer, & Laugen (2006).

The data were then analyzed using descriptive statistics to see the distributions of the respondents based on age, gender, marital status, educational attainment, and working experience. Pearson Product-Moment correlation analysis was also conducted to explain the relationship among the variables and multiple linear regressions analysis was conducted to predict the contribution of self-efficacy, organizational socialization, CI practices to the R&D professionals' career aspirations.

The findings of this study revealed that the level of R&D professionals' self-efficacy, organizational socialization, continuous improvement (CI) practices, and career aspirations were high. The results indicated that the three selected factors showed significant positive relationships with the R&D professionals' career aspirations.

Nevertheless, only self-efficacy and CI practices were found to be significant in explaining the variation of career aspiration. The predictor variables explained 15.5% of the variance in the R&D professionals' career aspiration.

The study concluded that R&D professionals' self-efficacy, organizational socialization, and CI practices are important factors that determined their career aspirations. This study implied that R&D professionals must equip themselves with high level of self-efficacy, organizational socialization and CI practices to enhance their career aspirations. It is recommended that the HRD system of the GRIs need to formulate a career development programs that considers R&D professionals' self-efficacy, promotes more learning experiences through organizational socialization and strengthens the quality improvement work-procedures. Although it had been identified that the career aspirations held by the R&D professionals are high, however, this study did not explore their career aspirations with different career stages. Therefore, additional study is necessary to delve into the stability of their career aspirations over different career stages.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains

**ASPIRASI KERJAYA PEGAWAI PENYELIDIKAN DAN PEMBANGUNAN DI INSTITUT PENYELIDIKAN KERAJAAN MALAYSIA**

Oleh

**EFIZAH SOFIAH BINTI RAMLY**

**Februari 2009**

**Pengerusi:** **Profesor Maimunah Ismail, PhD**

**Fakulti:** **Pengajian Pendidikan**

Salah satu daripada mekanisma yang strategik untuk pengamal pembangunan sumber manusia dalam membangunkan program pembangunan kerjaya untuk pegawai penyelidikan dan pembangunan adalah dengan menguruskan aspirasi kerjaya mereka (Petroni, 2000). Adalah dipercayai aspirasi kerjaya merupakan satu keperluan dalaman untuk memotivasikan pegawai penyelidikan dan pembangunan untuk berjaya dalam kerjaya mereka. Oleh yang demikian, kajian ini boleh menyumbang pengetahuan tentang pengurusan kerjaya pegawai penyelidikan dan pembangunan, yang mana keperluan dalaman mareka boleh dipenuhi melalui aspirasi kerjaya.

Terdapat tiga faktor yang telah dikenal pasti mempengaruhi kerjaya pegawai penyelidikan dan pembangunan di Institut Penyelidikan Kerajaan Malaysia, iaitu, efikasi kendiri, sosialisasi dalam organisasi dan amalan penambahbaikan berterusan. Faktor-faktor ini telah dikenal pasti berdasarkan kepada komponen Teori Kognitif Sosial Kerjaya yang telah dibangunkan oleh Lent, Brown dan Hackett (1994). Objektif kajian

ini adalah untuk mengenal pasti tahap efikasi kendiri, sosialisasi dalam organisasi dan amalan penambahbaikan berterusan dalam kalangan pegawai penyelidikan dan pembangunan, mengenal pasti hubungan antara setiap faktor dan aspirasi kerjaya, serta mengenal pasti sumbangan setiap faktor terhadap aspirasi kerjaya mereka.

Kajian ini berbentuk penyelidikan perkaitan deskriptif yang mana telah dijalankan melalui kaedah penyelidikan kuantitatif ke atas 158 orang pegawai penyelidikan dan pembangunan di Institut Penyelidikan Kerajaan. Responden telah dikumpulkan melalui kaedah persampelan bertujuan. Kadar pulangan daripada responden adalah 69.30 %. Data kajian telah dikumpul menggunakan satu set borang soalselidik yang mengandungi Inventori Sauh Kerjaya Schein yang telah dipermudahkan (Igbaria, Kassicieh, & Silver, 1999), Skala Umum Efikasi Kendiri (Schwarzer & Jerusalem, 1995), Inventori Sosialisasi dalam Organisasi (Taormina, 1994), dan Soalselidik Keupayaan Amalan Penambahbaikan Berterusan (Jorgensen, Boer, & Laugen (2006).

Data kajian dianalisis menggunakan statistik deskriptif untuk melihat taburan responden berdasarkan umur, gender, status perkahwinan, kelulusan akademik, dan pengalaman kerja. Analisis korelasi Pearson Product-Moment telah dijalankan untuk menerangkan hubungan antara setiap pembolehubah manakala analisis regresi berganda telah dijalankan untuk meramal sumbangan efikasi kendiri, sosialisasi dalam organisasi dan amalan penambahbaikan berterusan terhadap aspirasi kerjaya pegawai pembangunan dan penyelidikan.

Hasil kajian ini telah memaparkan bahawa tahap efikasi kendiri, sosialisasi dalam organisasi dan amalan penambahbaikan berterusan bagi pegawai pembangunan dan penyelidikan adalah tinggi. Keputusan kajian menyatakan bahawa ketiga-tiga faktor yang terpilih menunjukan hubugan positif yang signifikan terhadap aspirasi kerjaya pegawai pembangunan dan penyelidikan. Walau bagaimanapun, hanya dua pembolehubah peramal iaitu efikasi kendiri dan amalan penambahbaikan berterusan didapati signifikan dalam menerangkan variasi aspirasi kerjaya. Pembolehubah peramal ini menerangkan sebanyak 15.5% variasi aspirasi kerjaya pegawai tersebut.

Kesimpulan kajian ini ialah efikasi kendiri, sosialisasi dalam organisasi dan amalan penambahbaikan berterusan adalah antara faktor yang penting dalam menentukan aspirasi kerjaya pegawai penyelidikan dan pembangunan yang terlibat. Kajian ini memberi implikasi supaya mereka perlu melengkapkan diri dengan tahap efikasi kendiri, sosialisasi dalam organisasi serta amalan penambahbaikan berterusan yang tinggi untuk meningkatkan aspirasi kerjaya. Adalah disarankan supaya sistem pembangunan sumber manusia Institusi Penyelidikan Kerajaan tersebut mempunyai program pembangunan kerjaya yang mengambil kira aspirasi kerjaya, menggalakkan pengalaman pembelajaran melalui sosialisasi dalam organuisasi dan menguatkan prosedur kerja berdasarkan penambahbaikan kualiti. Walaupun aspirasi kerjaya pegawai penyelidikan dan pembanguan dikenal pasti tinggi, tetapi kajian ini tidak mengkaji aspirasi kerjaya mereka berdasarkan pelbagai tahap kerjaya mereka. Oleh yang demikian, kajian pada masa hadapan dicadangkan untuk melihat kestabilan aspirasi kerjaya berdasarkan tahap kerjaya yang berbeza.

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An appreciation should go to Malaysian Science and Technology Information Centre, MASTIC for helping me tracing and looking for the respondents. I would also like to thank the Human Resource personnel in Government Research Institutes who have granted and helped me in the data collection for my research.

I would like to express my deepest gratitude to my beloved family for supporting me throughout the completion of my Master. To my parents and my husband who always pray for my success, thank you very much.

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knowledge and experience. The success of this thesis is also attributed to those who has involved in developing and improving the contents as well as to those who have encouraged and supported me throughout my studies. Thank you very much.

I certify that a Thesis Examination Committee has met on 26 February 2009 to conduct the final examination of Efizah Sofiah Binti Ramly on her thesis entitled "Career Aspirations of R&D Professionals in Malaysian Government Research Institutes" in accordance with the Universities and University Colleges Act 1971 and the Constitutions of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the degree of Master of Science.

Members of the Thesis Examination Committee were as follows:

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Date: 21 MAY 2009

The thesis submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee are as follows:

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Date: 8 June 2009

## DECLARATION

I declare that the 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 UPM or other institutions.

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**EFIZAH SOFIAH BINTI RAMLY**

Date: 27 April 2009

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| | |
|---|---|
| CA | Career Aspiration |
| CI | Continuous Improvement |
| GDP | Growth Domestic Product |
| GRIs | Government Research Institutes |
| HRD | Human Resource Development |
| MASTIC | Malaysian Science and Technology Information Centre |
| MOSTI | Ministry of Science, Technology and Innovation |
| OECD | Organization of Economic Cooperation and Development |
| R&D | Research and Development |
| SCCT | Social Cognitive Career Theory |
| STEM | Science, technical, engineering, and mathematic subjects |
| UNDP | United Nation Development Program |

# CHAPTER 1

# INTRODUCTION

## Background of the Problem

This section of this chapter provides an overview of research and development (R&D) definitions and its importance in today's living, indicators of the economic growth based on the R&D activities, overview of R&D activities in Malaysian development**,** professionals' career in the R&D Sectors, and R&D Professionals' Career Aspirations.

### Research and Development (R&D)

In the era of emerging economy, organizations become more dependent upon technology and innovation. This has been resulted in the increasing importance of research and development (R&D) where it has been recognized as a means of creating and sustaining competitive advantage in the global marketplace (Petroni, 2000). It is a strategic challenge for high-tech organizations and justifies large investment in R&D. According to the Organization of Economic Cooperation and Development (OECD, 2008) standards, R&D is defined as creative work that is carried out on a systematic basis to increase the reserve knowledge in devising the new applications for wealth creations.

R&D is a future-oriented and longer-term activity in science and technology which uses R&D techniques to scientific investigation that explores the development of new goods and services, new inputs into production, new methods and formula of producing goods and services, or new procedures of operating and managing organizations. It is also

crucial for improving future performance and being conducted by specialized units or centres belonging to companies, universities and government research institutes.

Mairesse and Mohnen (2005) assert that R&D plays an important role in two different ways. Firstly, R&D is seen as a strategic variable that will reduce the cost of process or through product differentiation, which in turn, reducing the price of the product. Although the purpose of R&D is to increase high quality products but it must also provides reasonable price for the end users. It does not make any difference if these high-tech products are so expensive that everyone could not afford to utilize them. Secondly, R&D is seen as an investment in knowledge or in absorptive capacity of a firm and hence indirectly as contributor to economic growth of a country. It is through R&D that the production of high-quality, up-to-date, and relevant products can be promoted. These highly valued benefits have allowed a country to remain competitive in global marketplace.

**R&D Indicators for the Economic Growth**

R&D is one of the most important issues in global world when it is looked from the perspective of science and technology. It is one of the key drivers of economic growth, which it represents the degree of competition or the lure of progress of an industry. Malaysian Government has also recognized innovation through R&D as an important factor of a prosperous economy for a long time (MASTIC, 2006). This has led Malaysia to undertake knowledge-based economy initiatives where the generating and sustaining the growth of Malaysian economy will be based on knowledge, creativity and innovation.

There are several R&D indicators that are believed to contribute to the growth of the economy of a country. The most common indicators are the numbers of researchers per million people, the percentage of R&D expenditure to GDP, and the numbers of patent granted to residents (MASTIC, 2006). This justification has been showed in Table 1 where it shows the different of R&D indicators by developed and developing countries.

**Table 1: Researchers in R&D, Expenditures and Patents Granted to Residents in Selected Countries**

| No | Country | Researchers in R&D (per million people) 1990-2005 | R&D expenditures (% of GDP) 1997-2002 | Patents granted to residents (per million people) 2002 |
|---|---|---|---|---|
| 1 | Australia | 3,759 | 1.7 | 31 |
| 2 | Japan | 5, 287 | 3.1 | 857 |
| 3 | Finland | 7, 832 | 3.5 | 214 |
| 4 | United States | 4, 605 | 2.7 | 244 |
| 5 | United Kingdom | 2, 706 | 1.9 | 62 |
| 6 | Germany | 3, 261 | 2.5 | 158 |
| 7 | Singapore | 4, 999 | 2.3 | 96 |
| 8 | Korea, Rep. of | 3, 187 | 2.6 | 1, 113 |
| 9 | Malaysia | 299 | 0.7 | Na |
| 10 | Thailand | 287 | 0.3 | 1 |
| 11 | China | 708 | 1.4 | 16 |

(Source: Human Resource Development Report, UNDP (2007/2008), pp. 276)

As depicted in Table 1, it can be seen that the number of researchers in R&D (per million people) are high in some of European and Asian countries. The highest numbers of researchers are found in Finland with 7,832 per million people, followed by Japan and Singapore with 5,287 and 4, 999 per million people, respectively. Finland also has the highest expenditure in R&D with 3.5% of GDP followed by Japan 3.1%. The table also shows figures of patents granted to residents. Republic of Korea leads other countries in the world with 1,113 patents granted per one million populations. Therefore, from this table we can see that developed countries have more researchers, high innovations that had been patented and they spend more in R&D compared to the developing countries. This shows that nowadays the the current prosperity and future achivements can be indicated by its R&D activities (Sıdıka Başçı, 2007).

**R&D in Malaysia**

R&D is the way forward for Malaysia since it is a major driver of Malaysian future economy (MASTIC, 2008). Malaysia recognized the potentials and benefits of R&D since it moved towards industrialization since the 1980s. Today, Malaysia has successfully transformed its economy from one that relied primarily on agriculture to manufacturing-based economy. It is now moving into the phase of high-technology and knowledge-based society in order to be a developed nations. This change will certainly direct successful exploitation of new ideas to the creation of new dimension of performance.

The robust changes of businesses where success depends on the ability of establishing genuine new products, make the investments on R&D activities rapidly increase.