UNIVERSITI PUTRA MALAYSIA

MEDIATING ROLE OF MOTIVATION ON COMPETENCIES AND JOB PERFORMANCE AMONG AGRICULTURE EXTENSION WORKERS IN PENINSULAR MALAYSIA

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By

SULAIMAN UMAR

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

March 2018

This thesis is dedicated to the memory of my late father

ALHAJI UMAR SULAIMAN MANI

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

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March 2018

Chairman : Associate Professor Norsida Man, PhD
Faculty : Agriculture

Climate change is threatening agriculture, a sector upon which humanity depends for survival. Efficient extension and advisory services are vital in disseminating appropriate climate-smart innovations. Hence, there is need to assess the predictors of job performance of extension workers. The purpose of this study is to determine the prediction and mediation effect of motivation in the relationships between job performance, competencies, and perceived organizational support among extension workers delivering climate-smart agriculture advisory services in Malaysia.

A review of theories revealed many overlapping constructs and relationships in the framework of factors affecting job performance. This study identified the most relevant of those, conceptualized them and designed a conceptual framework depicting the inter-relationships. The study employed the quantitative approach and descriptive correlational design. A sample of 350 extension workers in 11 states of Peninsular Malaysia was randomly selected. The data obtained using a self-administered questionnaire was analysed using descriptive statistics, Pearson product moment correlation, multiple linear regression and structural equation modelling.

Demographic profiling indicated that majority of the extension personnel are middle-aged men that were employed in the agricultural assistants' cadre. Significant correlation ($p < 0.001$) existed between each pair among the latent constructs except between motivation and core extension competency. The multi-model analysis conducted in this study revealed that the mediated model is better than the direct model in explaining the inter-relationships. It had an R2 of 0.45 against 0.22 of the direct model. This implies that the multivariate analysis involving intermediation is a better

representation of the antecedents of job performance. The final model achieved all categories of fit indices (Relative Chi-Sq. = 3.146; CFI = 0.908; RMSEA = 0.079; RMR = 0.047). It indicated that job performance is significantly affected by the workers' competence, motivation and perceived organizational support with direct positive relationships in all cases. Meanwhile, indirect relationship using motivation as a mediator showed full mediation of motivation on the relationship between POS and job performance and partial mediation on the relationship between CSA advisory competence and job performance.

It should be noted that both core and specialized competencies are vital to effective extension service delivery. In this study, not only do they correlate but aspects of both (in form of planning and evaluation competency and CSA competency respectively) combined to influence the performance of extension workers in the delivery of CSA technologies and practices. Conclusively, motivation has proven to be a significant determinant of performance. It also mediates the association between other antecedents and performance. To adapt to the menace of climate change affecting farmers' food security, productivity and livelihood, there is need for robust extension service delivered by competent, motivated and organizationally supported agents. The final model developed in this study could serve as a blueprint for achieving high performance in such service.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

PERANAN PENGANTARA MOTIVASI KE ATAS KOMPETENSI DAN PRESTASI KERJA DI KALANGAN PEKERJA PENGEMBANGAN DI SEMENANJUNG MALAYSIA

Oleh

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Perubahan iklim mengancam sektor pertanian, yang mana ramai manusia bergantung kepadanya. Kecekapan pengembangan dan khidmat nasihat pertanian adalah penting dalam menyebarkan inovasi iklim-pintar yang sesuai. Oleh itu, terdapat keperluan untuk menilai prestasi kerja pekerja pengembangan ini. Tujuan kajian ini adalah untuk menentukan ramalan dan peranan pengantara motivasi dalam hubungan diantara kompetensi, sokongan organisasi dan prestasi di kalangan pekerja pengembangan dalam memberikan khidmat nasihat iklim-pintar di Malaysia.

Kajian sorotan karya menunjukkan terdapat beberapa teori yang mendedahkan banyak pertindihan teori dan hubungan di dalam kerangka faktor-faktor yang mempengaruhi prestasi kerja. Oleh itu, kajian ini telah dijalankan untuk menentukan faktor yang paling berkaitan dengan itu, mengkonseptualisasikan mereka dan membuat kerangka konseptual yang menggambarkan hubungan diantaranya. Kajian ini menggunakan pendekatan kuantitatif dan reka bentuk korelasi deskriptif. Sampel sebanyak 350 pekerja pengembangan di 11 negeri dalam Semenanjung Malaysia dipilih menggunakan teknik pensampelan pelbagai peringkat. Data diperoleh dengan menggunakan soal selidik secara sendiri dan dianalisis menggunakan statistik deskriptif, korelasi momen produk Pearson, regresi linear berganda dan pemodelan persamaan struktur.

Profil demografik menunjukkan bahawa majoriti pekerja pengembangan pertanian adalah lelaki pertengahan umur yang bekerja sebagai pembantu pertanian. Korelasi yang ketara ($p < 0.001$) wujud di antara setiap pasangan di antara pembinaan laten kecuali di antara motivasi dan kecekapan asas pengembangan. Analisis multi-model

yang dijalankan dalam kajian ini mendedahkan bahawa model pengantaraan adalah lebih baik daripada model langsung dalam menjelaskan hubungan diantaranya. Ia mempunyai R2 0.45 berbanding 0.22 bagi model langsung. Ini menunjukkan bahawa analisis multivariat yang melibatkan pengantaraan adalah perwakilan yang lebih baik dari prestasi kerja terdahulu. Model terakhir mencapai semua kategori indeks yang sesuai (Relatif Chi-Sq = = 3.146; CFI = 0.908; RMSEA = 0.079; RMR = 0.047). Ini menunjukkan bahawa prestasi kerja terjejas dengan ketara oleh kompetensi pekerja, motivasi dan keperluan sokongan organisasi dengan hubungan positif secara lansung dalam semua kes. Sementara itu, hubungan tidak langsung menggunakan motivasi sebagai perantara menunjukkan pengantian penuh motivasi pada hubungan antara POS dan prestasi kerja dan pengantaraan separa pada hubungan antara kompetensi penasihat CSA dan prestasi kerja.

Harus diingat bahawa kedua-dua kompetensi asas dan khusus adalah penting untuk penyampaian perkhidmatan pengembangan pertanian yang berkesan. Dalam kajian ini, bukan sahaja mereka berkorelasi tetapi kedua-dua aspek (dalam perancangan dan penilaian kompetensi dan kompetensi CSA) masing-masing digabungkan untuk mempengaruhi prestasi pekerja pengembangan dalam penyampaian teknologi dan amalan CSA. Kesimpulannya, motivasi telah terbukti sebagai penentu prestasi yang signifikan. Ia juga adalah pengantara bagi pendahulu dan prestasi yang lain. Untuk menyesuaikan diri dengan ancaman perubahan iklim yang menjejaskan keselamatan, produktiviti dan kehidupan para petani, terdapat keperluan untuk perkhidmatan pengembangan pertanian yang mantap perlu diberikan oleh agen yang kompeten, bermotivasi dan disokong oleh organisasi mereka. Model akhir yang dibangunkan dalam kajian ini boleh menjadi pelan tindakan untuk mencapai prestasi tinggi dalam perkhidmatan tersebut.

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I certify that a Thesis Examination Committee has met on 12 March 2018 to conduct the final examination of Sulaiman Umar on his thesis entitled "Mediating Role of Motivation on Competencies and Job Performance among Agriculture Extension Workers in Peninsular Malaysia" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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TABLE OF CONTENTS

		Page
ABSTRACT		i
ABSTRAK		iii
ACKNOWLEDGEMENTS		v
APPROVAL		vi
DECLARATION		viii
LIST OF TABLES		xiii
LIST OF FIGURES		xiv
LIST OF ABBREVIATIONS		v
CHAPTER		
1	**INTRODUCTION**	1
	1.1 Background of the Study	1
	1.2 Agricultural Extension in Malaysia	2
	1.2.1 Department of Agriculture (DOA)	4
	1.2.2 Department of Veterinary Services (DVS)	5
	1.2.3 Department of Fisheries (DOF)	5
	1.2.4 Integrated Agricultural Development Authorities (IADA)	5
	1.2.5 Muda Agricultural Development Authority (MADA)	6
	1.2.6 Kemubu Agricultural Development Authority (KADA)	6
	1.2.7 The Malaysian Palm Oil Board (MPOB)	6
	1.2.8 Rubber Industry Smallholders Development Authority (RISDA)	7
	1.3 Climate Change and Its Impact on Agriculture	7
	1.4 Problem Statement	9
	1.5 Research Question	10
	1.6 Study Objectives	11
	1.6.1 General Objective	11
	1.6.2 Specific Objectives	11
	1.7 Significance of the Study	11
	1.8 Definition of Terms	12
	1.9 Thesis Organization	14
2	**LITERATURE REVIEW**	15
	2.1 Job Performance	15
	2.1.1 The Concept of Job Performance	15
	2.1.2 Performance Theories	16
	2.1.3 Measuring Performance	18
	2.1.4 Models of Job Performance	19
	2.1.5 Levels of Job Performance	19
	2.1.6 Factors Influencing Job Performance	20
	2.2 Job Competency	20

2.2.1 The Concept of Competency 20
2.2.2 Modelling Competency Requirements 21
2.2.3 Competency Levels of Extension Workers 27
2.2.4 Relationships between Job Performance and Competencies 28
2.3 Perceived Organizational Support (POS) 29
2.3.1 The Concept of Perceived Organizational Support 29
2.3.2 Theory of Organizational Support 30
2.3.3 Levels of POS 30
2.3.4 Relationships between Job Performance and POS 31
2.4 Motivation 32
2.4.1 The Concept of Motivation 32
2.4.2 Motivation Theories 33
2.4.3 Measuring Motivation 35
2.4.4 Levels of Motivation 36
2.4.5 Relationships between Job Performance and Motivation 36
2.5 Other Factors that Could Affect Performance of Extension Work 37
2.5.1 Socio-demographic Characteristics of Extension Workers (EWs) 38
2.5.2 Relationships between JP and other Organizational Factors 39
2.6 Hypotheses of the Study 40
2.7 Application of Extension in Climate-Smart Agriculture 41
2.8 Theoretical Framework 42
2.9 Summary 43

3 METHODOLOGY 45
3.1 Research Design 45
3.2 Conceptual Framework 45
3.3 Sampling Procedure 47
3.4 Instruments and Measurements 48
3.4.1 Job Performance Scale 48
3.4.2 Competency Scales 49
3.4.3 Perceived Organizational Support Scale 55
3.4.4 Motivation Scale 55
3.4.5 Socio-demographic Variables 55
3.5 Pre-testing the Instrument 56
3.5.1 Core Competencies 57
3.5.2 Climate Smart Agriculture Advisory Competencies 58
3.5.3 Motivation 58
3.5.4 Perceived Organizational Support 59
3.5.5 Performance 59
3.6 Data Collection 59
3.7 Data Analysis Techniques 60
3.7.1 1 Descriptive Analysis 60
3.7.2 Correlation Analysis 60
3.7.3 Multiple Regression Analysis 61

3.7.4 Structural Equation Modelling 64
3.8 Assumptions 70

4 RESULTS AND DISCUSSION 71
4.1 Profile of the Respondents 71
4.2 Descriptive Statistics: Levels of CSA Advisory, Job Performance, Competences, Motivation and POS among the Extension Personnel in Malaysia 72
4.2.1 Levels of Job Performance 73
4.2.2 Levels of Core Extension Competencies 74
4.2.3 Levels of Climate-Smart Advisory Competencies 74
4.2.4 Levels of Perceived Organizational Support 74
4.2.5 Levels of Motivation 75
4.3 Relationships between Job Performance, Competencies, Perceived Organizational Support and Motivation among Extension Agents 75
4.4 Factors Influencing Job Performance 76
4.4.1 Model Fit 77
4.4.2 Interpreting the Coefficients 77
4.5 Structural Equation Modelling (SEM) Analysis 79
4.5.1 Direct Relationships 80
4.5.2 Mediating Effects of Motivation 82
4.5.3 Summary of Decisions on the Study Hypotheses 86

5 SUMMARY, RECOMMENDATIONS AND CONCLUSION 87
5.1 Summary 87
5.2 Implications 88
5.2.1 Theoretical Implications 88
5.2.2 Practical Implications 89
5.2.3 Policy Implications 89
5.3 Recommendations 89
5.3.1 For Practice 89
5.3.2 For Further Research 90
5.4 Limitations of the Study 90
5.5 Conclusion 91

REFERENCES 92
APPENDICES 108
BIODATA OF STUDENT 146
LIST OF PUBLICATIONS 147

LIST OF TABLES

Table		Page
1	Sample Selection	48
2	Eigenvalues from PCA and Parallel Analysis	54
3	Total Variance Explained by the Factors Extracted	55
4	Normality and Reliability of the Scales	57
5	The Statistical Tools for Each Objective of the Study	60
6	The variables and measurements in the regression analysis	61
7	Normality and Reliability statistics of the Variables	64
8	Fit Indices for the Measurement Model	65
9	Factor Loadings, AVE Values and CR Values of Scales	68
10	Construct Reliability and Validity of the Latent Variables	69
11	Levels of Job Performance, Competencies, POS and Motivation	73
12	Pearson Correlation Coefficients between the Variables	76
13	Result of Regression Showing Factors Influencing Performance	78
14	Regression Paths in the Direct Effect Model	82
15	Regression Weights in the Mediated Effect Model	84
16	Mediation Effect of Motivation on Relationship between PPEC and Job Performance	84
17	Mediation Effect of Motivation on Relationship between CSAAC and Job Performance	85
18	Mediation Effect of Motivation on the Relationship between POS and Job Performance	86
19	Decisions on the Hypotheses Tested	86
20	Model Fit Indices for the Job Performance Construct	139
21	Model Fit Indices for the Motivation Construct	140
22	Model Fit Indices for the Communication and IT Competency	141
23	Model Fit Indices for the PPEC	142
24	Model Fit indices for the POS	143
25	Model Fit Indices for the Prog. Implementation Competency	144
26	Model Fit Indices for CSA Advisory Competencies	145

LIST OF FIGURES

Figure		Page
1	Agricultural Extension Model of Technology Transfer in Malaysia	4
2	Flow of Climate Change Information in the Agricultural Sector	9
3	Theory of Effective Job Performance	17
4	The Kaplan and Norton's Balanced Scorecard	18
5	The Iceberg Competency Model	22
6	The Onion Model of Competency	23
7	A Double Matrix Format Instrument for Assessing Ideal Competence	25
8	Depicting Possible Responses to Different Competence Dimensions	26
9	Model of Antecedents and Outcomes of Autonomous Motivation	34
10	Relational Path in the SDT	35
11	The Theoretical Framework of the Study	43
12	Conceptual Framework of the Mediation Effect of Motivation in the Relationship between Competencies, POS and Performance	47
13	Scree Plot for the CSA Scale	53
14	Normal P-P Plot of Regression Standardized Residual	63
15	The Measurement Model of the Study	66
16	Demographic Profile of the Respondents	72
17	Standardized Paths of Direct Relationships	80
18	The Mediated Model	83
19	The Measurement Model for the Job Performance (PERF) Construct	139
20	The Measurement Model for Motivation (MOTV) Construct	140
21	The Measurement Model for the Communication and Informational Technology Competency (CITC) Construct	141
22	The CFA output for programme planning and evaluation competency (PPEC)	142
23	The CFA Output for Perceived Organizational Support (POS) Construct	143
24	The CFA Output for Programme Implementation (IMPL) Competency	144

25 The Measurement Model for the climate-smart agriculture advisory competency (CSAAC) Construct 145

LIST OF ABBREVIATIONS

AGFI	Adjusted Goodness-of-Fit Index
AMOS	Analysis of Moment Structures
AVE	Average Variance Extracted
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CITC	Communication and Information Technology Competency
CSA	Climate-Smart Agriculture
CSAAC	Climate-Smart Agriculture Advisory Competency
df	Degrees of Freedom
DOA	Department of Agriculture
EW	Extension Worker
GFI	Goodness-of-Fit Index
HRD	Human Resource Development
IFI	Incremental Fit Index
IT	Information Technology
JP	Job Performance
KADA	Kemubu Agricultural Development Authority
M	Sample Mean
MADA	Muda Agricultural Development Authority
N	Number of cases
NFI	Normed Fit Index
PGFI	Parsimony Goodness-of-Fit Index
POS	Perceived Organizational Support

PPEC	Programme Planning and Evaluation Competency
r	Correlation Coefficient
r2	Squared Correlation
RMSEA	Root Mean Square Error of Approximation
SE	Standard Error
SEM	Structural Equation Modelling
SPSS	Statistical Package for the Social Sciences
TLI	Tucker-Lewis Coefficient Index
β	Standardize Regression Weights
δ	Error Variance
λ	Factor Loading
ρ	Rho (probability)

CHAPTER 1

INTRODUCTION

This chapter introduces the work. It serves as the brief overview and provides contextual background to the study. It is divided into sections including the background of the study, statement of problem, objectives, significance of the research, assumptions and definitions of concepts.

1.1 Background of the Study

The human race depends on agriculture which provides it with food, fuel and fibre necessary for survival. The agricultural sector is also vital as bedrock of economies, contributing household income, raw material for industries and means of foreign exchange. Over the years, agriculture has maintained its position as the mainstay of the economy of many countries (Bonye, Alfred, & Jasaw, 2012). In recent times, this important sector is being threatened by climate change, a serious environmental phenomenon affecting mankind globally (Ayanwuyi, 2013; Prokopy, Morton, Arbuckle, Mase, & Wilke, 2015)

The agricultural sector plays vital roles in Malaysia. It continues to be important in issues of poverty alleviation, food security, income distribution, and balanced and sustainable development issues (Mastoi, Rahman, & Dahlan, 2014; Siwar, Idris, Yasar, & Morshed, 2014; Tawang, Ahmad, & Abdullahi, 2001). It is also considered as the third engine of economic growth under the Third National Agriculture Policy (NAP3), while emphasis was given to New Agriculture in the Ninth Malaysia Plan (MOA, 2003; Samsudin, 2012).

Weather and climate play important roles in determining agricultural productivity including the seasonal variability and the spatial patterns of global agriculture (Prokopy, Morton, et al., 2015). Climate change can be defined as statistically significant variations in climate condition that persist for an extended period, typically for decades or longer. It is any change in climate, rainfall or productivity caused by natural variability and direct or indirect human activities that alter the composition of the atmosphere (IPCC, 2001, 2007; United Nations, 1998).

Extension and rural advisory services can be seen as comprising all the different activities that provide the information and services needed, requested and/or demanded by farmers and other actors in rural settings to help them in developing their own technical, socio-economic, organizational, and management skills and practices so as to improve their livelihoods and well-being (Chikaire, Ani, Atoma, & Tijjani, 2015). Effective and efficient extension and advisory services could play important role in tackling the negative effects of climate change on agricultural production and

rural livelihood. Agricultural extension can play an important role in bringing together important stakeholders including agricultural producers, researchers and policy makers to discuss climate-related issues and proffer solutions that would enhance adaptation and resilience among the smallholder farmers (Prokopy, Carlton, et al., 2015; Prokopy, Morton, et al., 2015).

However, the frontline extension workers responsible for delivering the appropriate climate-smart agriculture (CSA) advisory services need to effectively discharge such duties for the clientele to achieve increased agricultural productivity and incomes, adaptation and resilience to climate change, and reduced remove greenhouse gases emissions (FAO, 2010, 2013; GACSA, 2016). In Malaysia, due to the importance of agriculture, extension services could bring about the needed efficiency in production as well as adaptation to environmental threats. Moreover, extension programmes require continuous organizational support and competent personnel for boost in performance (Samsudin, 2012). Furthermore, studies have reported low job performance and effectiveness among extension agents in developing countries (Mcharo, 2013). This could be attributed to so many factors. Hence, this study assessed both the level of extension job performance in the Malaysian context and its predictors.

It was found that to improve the performance of Malaysian extension agents there is need to understand their competencies, motivation and organizational support (Shah, Asmuni, & Ismail, 2013; Tiraieyari, Idris, Uli, & Hamzah, 2010). A research in Muda Agricultural Development Area (MADA) showed that part of the inefficiency in paddy production could be attributed to low extension performance (Taraka, 2012). Moreover, a reconnaissance survey involving a focus group of farmers and extension agents (EAs) conducted as part of this study indicated that the farmers were not satisfied with the performance of extension agents. Even the EAs believed that performance could be enhanced by improving competence organizational support and motivation. Motivation was found to be both affected by the endogenous variables and affecting the endogenous variables. Hence, it fits the role of mediator. This study tested how well it fits such a role in the context of Malaysian extension agents. This is important as the issue of climate change is complex and there is need for highly motivated agents to deliver the appropriate adaptation and mitigation strategies in the form of climate-smart agriculture (Prokopy, Carlton, et al., 2015; Prokopy, Morton, et al., 2015).

1.2 Agricultural Extension in Malaysia

Malaysian agriculture used to consist mainly of rubber which was cultivated on some 1.5 million hectares in the 1950s. Food crops consisted majorly of paddy grown for domestic consumption and fruits and vegetables. That was when agriculture contributed more than half of the GDP. Due to reasons including the introduction of synthetic rubber resulting in decline in global prices of natural rubber the government embarked upon diversification initiatives. More than five decades after independence,

the agricultural sector is highly diversified with export commodity subsector made majorly of palm oil (contributing more than 30% of agricultural exports), rubber, cocoa and forestry products; a flourishing food subsector led by paddy, livestock and fisheries; and horticulture (fruits, vegetables, flowers and herbs) (MOA, 2003, 2011; Tawang et al., 2001).

The multiple roles of agriculture in national development prompted the Malaysian government to formulate various policy frameworks at different times and the prominence of agriculture and food sector in the various national development plans to facilitate the social, economic and financial dividends derivable from the sector. The policies were designed not just for economic growth but to ensure other national needs such as provision of food security; social security and alleviation of poverty; provision of buffer during unfavourable economic times and provision of rural employment (MOA, 2015; Tawang et al., 2001; Tiraieyari, Hamzah, & Samah, 2014b).

Almost 90% of Malaysian farmers in the food sector are operating on small-scale from small-sized farms, battling high cost of production inputs and experiencing low yield with low produce quality. Hence, the government's policy towards agriculture stresses increasing production to achieve food self-sufficiency through interventions such as fertilizer subsidies to increase production and improve income. These efforts for producing sufficient food and fibre for self-sufficiency resulted into an intensive agricultural system resulting into environmental damage (Tiraieyari et al., 2014b).

Various attempts have been made over time to conceptualize agricultural extension. Extension and rural advisory services can be seen as comprising all the different activities that provide the information and services needed, requested and/or demanded by farmers and other actors in rural settings to help them in developing their own technical, socio-economic, organizational, and management skills and practices so as to improve their livelihoods and well-being (Chikaire et al., 2015).

Agricultural extension is also seen as a system that facilitates the access of farmers, farmer groups and other actors to knowledge, information and technologies; link them with partners in research, education, agribusiness, markets and other relevant institutions; and assist them to develop their own technical, organizational and management skills and practices. It is defined as all the different activities that provide the information and advisory services that are needed and demanded by farmers and other actors in agri-food systems and rural development (Christoplos, 2010).

Institutional framework is crucial in engendering the required support and policy implementation for development. Reckoning with these functions the government in the 1960s and 1970s established various agencies to facilitate and implement agricultural and rural development programmes. The model operated in Malaysia is shown inFigure 1. The technology producing agencies such as research institutes – for

instance, the Malaysian Agricultural Research and Development Institute (MARDI) – and research universities like Universiti Putra Malaysia (UPM), are responsible for creating innovations and improving existing technologies and practices. These are transmitted to the technology transfer (an aspect of extension) agencies. These extension agencies are discussed in the following subsections. They serve as the bridge that links the technology producers and its users which are the farmers and/or farmers' groups.

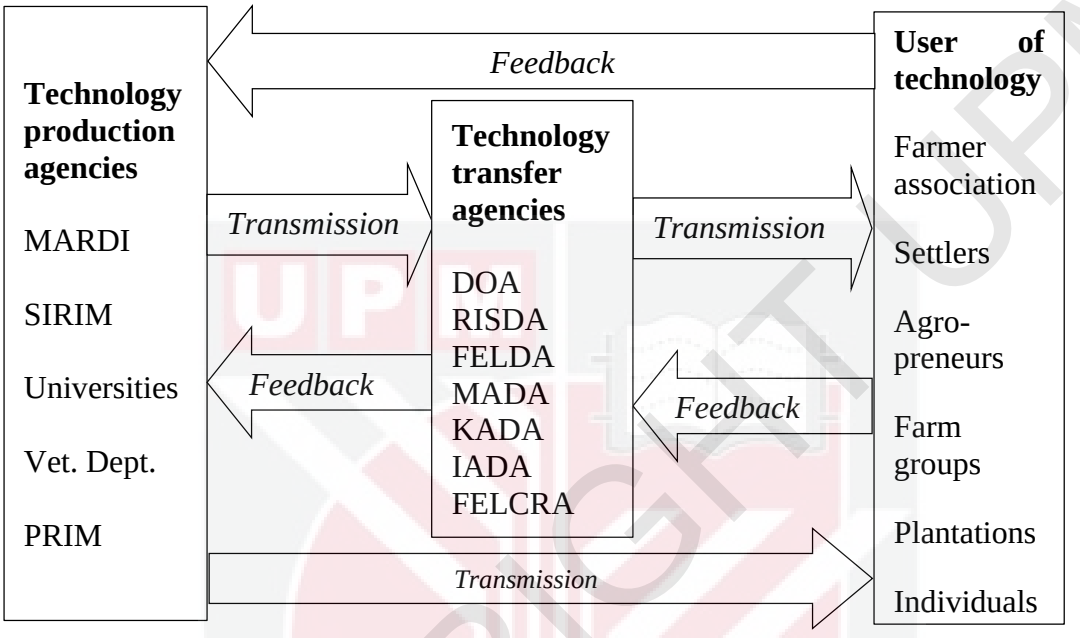

Figure 1 : Agricultural Extension Model of Technology Transfer in Malaysia

1.2.1 Department of Agriculture (DOA)

The Malaysia Department of Agriculture (DOA) was established over 110 years ago (in 1905) and vested with the major function of implementing the agricultural policies of the government including extension in form of provision of technical expertise to farmers (DOA, 2015). However, with the establishment of other sister agencies over time, the roles of DOA have been streamlined to: facilitate the agricultural transformation into a modernized sector that is economically viable; develop the food and floriculture planting industry; ensure food and environmental safety; deliver consultation and technical support facilities; protect the country's agriculture industry; active participation in international forums, two way communication and technical collaboration; and enhance the development of human capital. The DOA together with the respective states' departments of agriculture are primarily engaged in extension activities by transferring new and improved knowledge, practices and technologies from research institutes to the farmers (DOA, 2015; Tawang et al., 2001).

1.2.2 Department of Veterinary Services (DVS)

The foundation for the present day Department of Veterinary Services (DVS) was laid in 1930 with the separation of Veterinary Services from the Health Department. Currently, the DVS is a fully transformed government agency with five cardinal objectives: enhance and maintain animal health status in line with the animal production industry; controlling zoonotic diseases; facilitating sustainable livestock production and value added system; encouraging innovativeness in the animal based industry; promote animal welfare practices in all aspect of rearing and production system (DVS, 2015).

1.2.3 Department of Fisheries (DOF)

The Malaysia Department of Fisheries (DOF) started as the Colonial Fisheries Unit in 1894. By 1915, the Department of Museums and Fisheries was formed. Now, it is a full-pledged department in the Ministry of Agriculture and Agro-based Industry. The objectives of the DOF are: to increase production of food fish through an optimum contribution of both capture fisheries and aquaculture; to increase the annual growth rate of seaweed and ornamental fish; to increase private investment; to attain ISO Certification for all principal activities of the Department; to develop and commercialise new technologies; and to raise the income of the fisheries target group (DOF, 2015).

1.2.4 Integrated Agricultural Development Authorities (IADA)

The idea of an integrated agricultural development in Malaysia based on the development of "in situ" was introduced in the 1960s with the Muda Irrigation Scheme. Along the way IADAs were implemented in specific areas to bring about the desired development based on their locations starting with Muda Agricultural Development Authority (MADA) followed by the establishment of Kemubu Agricultural Development Authority (KADA). This integrated approach is needed to provide the agricultural infrastructure side-by-side with the related support services for holistic development integrating and coordinating the activities of all stakeholders in agriculture. Currently, there are nine IADAs plus MADA and KADA covering almost the entire country. They are: IADA Samayai Saribas - Betong, Saratok, Sarawak; IADA Samarahan; IADA Northwest Selangor; IADA McCoy Sungai Manik; IADA Kemasin Semarak; IADA Seberang Perak; IADA Penang; MADA and KADA.

A major function of IADA is to coordinate the activities of advisory and extension services to target groups through human development programs/trainings. Each of the IADAs has particular objectives in accordance with its local requirements. However generally IADA objectives are to: increase productivity and maximize revenue of target groups so that differences in income and other sectors could be reduced;

modernize the agriculture sector to make the production system efficient, save manpower and to compete with domestic and overseas market; develop target groups so that people become disciplined, self-reliant, progressive and vibrant entrepreneurs; and increase the average rice production to the level of 6.5 tonnes per hectare per season (MOA, 2015).

1.2.5 Muda Agricultural Development Authority (MADA)

Muda Agricultural Development Authority (MADA) was established on 30th June, 1970 by emergency decree. Later on, in 1972 it was approved by the parliament to promote, and undertake economic and social development programmes in the Muda area; such as the development of agriculture according authority as provided to MADA by the states of Kedah and Perlis (MADA, 2015).

1.2.6 Kemubu Agricultural Development Authority (KADA)

KADA, on the other hand, was established via Act 69 of 1972, and was officially launched on 2 March 1973 by the Prime Minister of Malaysia Y.A.B. Tun Hj. Abdul Razak bin Hussein. Currently, the agency is on a mission to provide efficient and effective services in water supply resources, irrigation and drainage management systems, as well as the agricultural technology through an integrated development approach towards the increasing in paddy and other food products' productivity, and enhancing living standards of farmers and their families within the areas under the KADA jurisdiction. While its vision is "to be an agency of excellence in increasing socio-economic standards of farmers and improved standards of national consumption", it covers an area with a total population of 458,243 consisting of 85,653 families out of which 54,045 are farm families (KADA, 2015).

1.2.7 The Malaysian Palm Oil Board (MPOB)

The Malaysian Palm Oil Board (MPOB) came into being on the 1st day of May, 2000 through a merger of the functions of the Palm Oil Research Institute of Malaysia (PORIM) and Palm Oil Registration and Licensing Authority (PORLA). MPOB's general function is to ensure the appropriate development of the palm oil industry and undertake all aspects of palm oil-related research and development to enhance productivity (MPOB, 2015; Tawang et al., 2001). The strategies being employed by MPOB – to expand and improve the current uses of oil palm products; to discover new uses for the products; to enhance productivity and quality of products; to optimise land use in oil palm areas; and to promote the use, consumption and marketability of oil palm (MPOB, 2015) – can only be effective with the aid of viable extension and advisory services.

1.2.8 Rubber Industry Smallholders Development Authority (RISDA)

RISDA is an agency under the Ministry of Rural and Regional Development with a general aim of improving the livelihood of rubber smallholders. It is also engaged in extension activities and the provision of quality re-planting materials and funds. The vision of RISDA is to become a leading agency in smallholder development (RISDA, 2015; Tawang et al., 2001). Extension and these agencies are important in transmitting knowledge, skills and attitudes capable of engendering adaptation among farmers. This is more so as both farmers and input retailers (which serve as another set of advisors to farmers) trust extension more than any other source of information when it comes to climate change issues (Prokopy, Carlton, et al., 2015).

1.3 Climate Change and Its Impact on Agriculture

Various interest groups have tried to shape the climate change discourse in ways beneficial to their positions. However, over 50 years of research has established that anthropogenic greenhouse gases are major contributors to global climate change (Prokopy, Morton, et al., 2015). Moreover, agricultural producers irrespective of the divide agree that weather and climate are significant to their enterprises. Hence, they considered the advisory service relevant (Prokopy, Carlton, et al., 2015). According to the Intergovernmental Panel on Climate Change (IPCC) – a high-powered delegation of climate scientists under the United Nations – climate change can be defined as statistically significant variations in climate condition that persist for an extended period, typically for decades or longer. It is any change in climate, rainfall or productivity caused by natural variability and direct or indirect human activities that alter the composition of the atmosphere (IPCC, 2001, 2007; United Nations, 1998). Weather and climate play important roles in determining agricultural productivity including the seasonal variability and the spatial patterns of global agriculture (Prokopy, Morton, et al., 2015).

The climate of Malaysia is typically a tropical one: the temperature and humidity are relatively high and fairly uniform, with much rainfall, good cloud cover all the year round, and small seasonal variation in solar radiation. Environmental stresses such as flood, drought, high temperature, and other extreme situations are major limiting factors to crop productivity in the tropics. An evaluation of the impact of these climatic stresses on crop productivity assessed using morphological, physio-biochemical and yield responses revealed that climate variability does indeed affect the agricultural sector in Malaysia. The effects of such variability threaten food security and the contribution of agricultural sector to the national economy. Agricultural crop production in Malaysia is tremendously affected by climate change. Moreover, the impacts vary across geographical locations because of high variation in elements of weather and climate, especially rainfall, even among relatively close locations (Alam, Siwar, Talib, & Toriman, 2014).

A United Nations Development Report cited by Alam et al., (2014) indicated that between 1990 and 2004, the total carbon dioxide emission in Malaysia increased by 221% putting the country among the 30 highest CO_2 emitters. The adverse implications of climate change on the agricultural producer include low productivity, food shortage, low income and environmental degradation (composing a vicious circle) among others. To curb this menace, there is need to inform, enlighten and educate the farmers on climate change: its existence and extent; effects and impact on their livelihood; and adaptation and mitigation strategies (Umar, 2014). In most developing countries, agricultural extension is the most important source of information to the farmers (Agbamu, 2002). In the field of agriculture, extension service is indispensable (Zivkovic, Jelic, & Rajic, 2009). This subsector (agricultural extension and rural advisory services) links the producers with different other stakeholders in the agricultural sector such as the research institutes, the input providers and the market outlets for the agricultural produce.

Climate change has varying effects on different agricultural enterprises in different parts of the world. In the lower latitudes, where Malaysia is located, the overall impact is expected to be lower agricultural productivity (Vaghefi, Shamsudin, Radam, & Rahim, 2016). The greatest threats of climate change are on food security. Developing countries may face a decline of 9 to 21% agricultural productivity which would exacerbate food and nutritional insecurity (Devendra, 2012). Reduced productivity would lead to less availability, while availability is a major index of food security. Rice is a major staple food in Malaysia and Asia in general. Simulation studies showed that reduced rainfall and variations in temperature and solar radiation threaten Malaysian rice production and, by implication, self-sufficiency (Azdawiyah, Sahibin, & Anizan, 2014; Vaghefi et al., 2016). Rice production is projected to decrease by 13 to 80% due to variation in temperature and rainfall respectively. This, coupled with the increasing population would escalate domestic demand for food and decrease sufficiency (Siwar, Ahmed, & Begum, 2013; Siwar et al., 2014). Not only rice would suffer from changing climate. For example, animal production – a major source of quality protein, important for nutrition and health – is expected to be affected in at least two major fronts: heat stress and feed resources (Devendra, 2012). In another study (Ahmed, Al-Amin, Mohamad, & Chenayah, 2016), the monetary cost of food sufficiency would shoot up from 859.3 million US Dollar (USD) in the base year, 2015, to 987.3 million USD BY 2065. Hence, there is need for aggressive efforts by all stakeholders, especially government, to avert the looming crisis. Adverse effects of climate change on the environment and agriculture would exacerbate unless appropriate strategies are put in place (Iglesias, Garrote, Quiroga, & Moneo, 2012).

Extension and advisory services, where appropriately engaged, are effective in facilitating adaptation among farmers and vulnerable communities (Prokopy, Morton, et al., 2015). In Mali, *Projet d'Assistance Agrometeorologique au Monde Rural* has supplied farmers with agro-meteorological information and advisory services since the great droughts of 1970s. The project performed so well that the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) considered it as a success and recommended its regional upscale (Tall, Jay, & Hansen, 2012).

Similarly, India's Integrated Agrometeorological Advisory Service (AAS), provides services including two-way information, weather forecast and extension to farmers. Village level evaluation conducted jointly by CCAFS, India Meteorological Department and International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) found that the multiple targeted efforts and bottom-up engagement of clients were some of the exemplary highlights of the services (Tall et al., 2012). Such interventions showed potentials of extension services and providers in facilitating adaptation in risk-prone areas.

Although dialogue between climate scientists and agricultural stakeholders is vital for resilience and adaptation, there is a worrisome gap inhibiting two-way communication. Extension workers are identified as the linkage capable of closing that gap as shown in Figure 2 (Prokopy, Morton, et al., 2015). Therefore, this study evaluated the extension workers in Malaysia; their competence, motivation and perceived organizational support (POS) and how these affect their performance in achieving the goal of climate change adaptation.

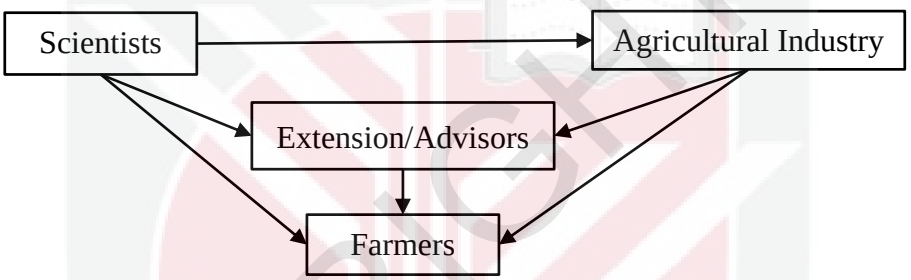

Figure 2 : Flow of Climate Change Information in the Agricultural Sector
(Adopted from Prokopy, Morton, et al. (2015))

1.4 Problem Statement

Studies in agriculture and rural development focus more on the farm production and value chain while underexposing the human face of the sector. Even extension studies mainly concentrate on the well-being of the farmers and farming communities ignoring the vital role of the extension service providers and their development. This study recognizes the need to intensively study the job behaviour of extension agents or extension workers (EWs) for enhanced performance especially with regards to the pressing issue of climate change that has broad impact on the agricultural sector and livelihoods of multitudes of communities. This is more so as agriculture becomes complicated over time with extension workers challenged with demands from multiple stakeholders, while the service faces shrinkage in financial and human resources with the need for higher performance to facilitate increased productivity in a changing climate (Prokopy, Carlton, et al., 2015).

Several theoretical and empirical studies have made assertions and postulations about what determines employee performance. This brings about the need to use an approach that takes into consideration the important predictors found in literature and evaluate how their combination explain the variation in performance among employees. Even though literature in the field of Human Resource Development (HRD) is expansive with lots of studies on motivation and performance, similar research in the field of agricultural extension is glaringly absent. Also, most of the existing studies have not used powerful tools of analysis such as the structural equation modelling (SEM) to arrive at evidence-based findings.

The situation in Malaysia was captured by an earlier study that tested the relationship between competencies and performance and recommended that more variables such as motivation and resources should be added in further studies of performance among extension agents (Tiraieyari, 2009). Also, a reconnaissance survey has showed that smallholder farmers are not satisfied with the level of job performance of extension agents with regards to combating environmental threats in the area. A study in Muda Agricultural Development Area (MADA) showed that part of the inefficiency in paddy production could be attributed to low extension performance (Taraka, 2012). These agree with studies that showed low job performance and effectiveness among extension agents in developing countries (Mcharo, 2013). It was also established that performance in extension services could be improved by providing continuous organizational support and by having competent and motivated personnel on the job (Samsudin, 2012). Likewise, to improve the performance of Malaysian extension agents there is need to understand their competencies, motivation and organizational support (Shah, Asmuni, & Ismail, 2013; Tiraieyari, Idris, Uli, & Hamzah, 2010). Therefore, current study developed a framework from relevant theories that have previously not been used in studying extension workers' performance, thereby extending Boyatzi's theory of effective job performance by adding motivation as a predictor and mediator.

1.5 Research Question

This study aims to answer the following research question:

To what extent do competencies and perceived organizational support predict job performance and how does motivation mediate the relationships between the predictors and job performance?

1.6 Study Objectives

1.6.1 General Objective

The main objective of the study is to determine the prediction and mediation effect of motivation in the relationships between job performance, competencies, and perceived organizational support among extension workers delivering climate-smart agriculture advisory services in Malaysia.

1.6.2 Specific Objectives

The specific objectives are to:

1) Determine the levels of job performance, competencies, POS and motivation among agricultural extension personnel;
2) Evaluate the relationships between job performance, competencies, POS and motivation among extension personnel;
3) Determine the factors influencing job performance among extension personnel; and
4) Examine the mediation role of motivation in the relationships between job performance, competencies, POS and motivation among extension personnel.

1.7 Significance of the Study

The current study is significant due its contribution to both knowledge (theoretical significance) and practice (practical significance). This study assessed the competencies, perceived organizational support, motivation and job performance of extension personnel on climate-smart agriculture (CSA) advisory services from the perspective of the personnel themselves. The product is a model that incorporated these constructs in the context of climate-smart agriculture advisory services. From the extensive literature review carried out in this study, this is the first time all of these constructs were brought together to propose and test such a model in this field. The study enhanced the relational path in the self-determination theory which linearly postulates that competence leads to motivation which leads to performance (Ryan & Deci, 2000), by adding perceived organizational support as an antecedent to motivation and performance.

Although studies (Tiraieyari, 2009) evaluated the influence of competencies on performance, theories have shown that performance is complex concept that could not be adequately explained by a single antecedent (Viswesvaran & Ones, 2000) and emphasized the need for additional factors (Ţuţu, 2012). Therefore, this work advanced earlier studies by adding more factors – including POS and motivation – to competencies in determining performance among extension workers. The model could

serve as foundation for future studies and replications to fine-tune recommendations and practical applications. Findings from this study would also be beneficial to the academia as students and scholars in similar and related research fields could find the study as part of relevant literature.

Although climate change would increase productivity in middle and higher latitudes, it would result in diminished agricultural productivity in the tropics and sub-tropics. Climate smart agriculture has been identified as an alternative that could sustainably enhance productivity and mitigate climate change. This places enormous challenge on rural advisory services to promote relevant innovations in line with the changing demands. This is more so as one of the major issues in up-scaling CSA is information dissemination (GACSA, 2016). Despite the benefits of CSA, rate of adoption is still low among farmers (Khatri-Chhetri, Aggarwal, Joshi, & Vyas, 2016). Therefore, it is significant to conduct this type of study that assesses the level of competence and performance of the EAs with regards to CSA and recommend strategies for enhancing both.

Identified relevant competencies could be added to in-service training (Tiraieyari, 2009). It is crucial for agencies (including public extension organizations which are the focus of this research) to realize the human capital value of their employees. This was shown to benefit both the organization and the worker by not just improving performance and competitive capacity but also reducing work stress, and enhancing willingness to return to work soon (Eisenberger, Malone, & Presson, 2016). This would result in better equipped EAs capable of performing their job effectively and efficiently; who would facilitate adoption of technologies and practices capable of enhancing mitigation and adaptation as well as improving farm productivity and the livelihoods of farm households.

Furthermore, policy makers would find the study relevant as it would point out the shortfalls and pressing needs in extension capacity as well as suggest possible remedies. Ways of improving effective advisory services via enhanced job performance were highlighted. This would be useful in making relevant agricultural, environmental and educational policies. Going by these, this study is both timely and crucial.

1.8 Definition of Terms

Agricultural extension: (often interchanged with rural advisory services) can be defined as the system that facilitates the access of farmers, farmer groups and other actors to knowledge, information and technologies; link them with partners in research, education, agri-business, markets and other relevant institutions; and assist them to develop their own technical, organizational and management skills and practices. It is defined as all the different activities that provide the information and advisory services that are needed and demanded by farmers and other actors in agri-

food systems and rural development (Christoplos, 2010). In this study, it refers to the services engaged by the Malaysian Department of Agriculture in linking farmers with research and ensuring transfer of technology.

Climate change: refers to any statistically significant variation in climatic condition that persists for an extended period, typically for decades or longer. It is any change in climate, rainfall or productivity caused by natural variability and direct or indirect human (anthropological) activities that alter the composition of the atmosphere (IPCC, 2001, 2007; United Nations, 1998). This definition by experts is retained by this study.

Competency: has been defined as the adequacy of skills and knowledge that enable a person to act in various situations. Competence is the ability or capability (Boyatzis, 2008) to do something efficiently and effectively (i.e. successfully). In this study, it denotes the proficiency of extension agents in planning, implementing, evaluating and communicating core and specific extension activities.

Motivation: is defined as "a set of energetic forces that originates both within as well as beyond an individual's being, to initiate work-related behaviour, and to determine its form, direction, intensity and duration" (Tremblay, Blanchard, Taylor, Pelletier, & Villeneuve, 2009). Motivation refers to the impetus within individuals by which they strive to achieve specific goal in order to fulfil some need or expectation (Osabiya, 2015). Motivation is in various continuums from intrinsic and extrinsic to amotivation. It does not necessarily mean financial incentives, but rather the mindset that gives the extension agent the impetus to do the work. It could be because of altruistic motives such as desire to help the rural community, or the passion or feeling of happiness that the career affords. This study considers this concept as the mediator of relationships between the exogenous and endogenous variables.

Performance: was simply defined as all measurable behaviours, actions and outcomes that are conducted or brought about by personnel and are related to and contribute to organizational goals and objectives (Ndirtagu, 2013; Viswesvaran & Ones, 2000). Job performance of extension agents in this study refers to their delivering relevant information and feedback.

Perceived Organizational Support (POS): according to Eisenberger et al. (2016) POS refers to the extent to which individuals feel their respective work organizations value their work contributions and care for their well-being. In this study, POS is the belief by the extension worker on the extent to which he or she is being supported on the job by the employing agency.

1.9 Thesis Organization

The body of this thesis, apart from the preliminary pages, is majorly made up of five (5) chapters covering different areas of the study. Chapter 1 is the general introduction of the study providing a background and statement of the problem at hand. It also presents research questions, the broad and specific objectives of the study, the significance of the study and definition of some terms used in the study.

In Chapter 2 a review of relevant and related literature was presented. Each construct was conceptualized, relevant theories and relationships were highlighted. The chapter concluded with theoretical and conceptual frameworks. Meanwhile, Chapter 3 discusses the methodology employed in this study. It focused on the research design, sampling procedure, instrumentation, data collection and data analysis.

Chapter 4 presents the results of the study. Also, the findings were discussed vis-à-vis relevant literature. Chapter 5 was the last and it consists of the overall summary of the study, the general conclusion and the recommendations. Finally, an appendix was attached consisting of additional but relevant information such as the questionnaire forms and some result outputs.

REFERENCES

Abou-Moghli, A. (2015). The Role of Organizational Support in Improving Employees Performance. *International Business Research*, *8*(2), 198–204. http://doi.org/10.5539/ibr.v8n2p198

Abubakar, K., & Abiodun, A. (2014). An Assessment of the Levels of Job Motivation and Satisfaction as Predictors of Job Performance of Library Personnel in Nigerian Universities. *Journal of Balkan Libraries Union, Vol. 2*(No. 2), 26–33. http://doi.org/10.16918/bluj.34774

Agbamu, J. U. (2002). Agricultural Research-Extension Farmer Linkages in Japan: Policy issues for Sustainable Agricultural Development in Developing Countries. *International Journal of Social and Policy Issues, 2002(1)*, 252–263.

Agut, S., Grau, R., & Peiró, J. M. (2003). Individual and contextual influences on managerial competency needs. *The Journal of Management Development;*, *22*(10), 906–918.

Ahmed, F., Al-Amin, A. Q., Mohamad, Z. F., & Chenayah, S. (2016). Agriculture and food security challenge of climate change: a dynamic analysis for policy selection. *Scientia Agricola*, *73*(4), 311–321. http://doi.org/10.1590/0103-9016-2015-0141

Alam, M. M., Siwar, C., Talib, B., & Toriman, M. E. (2014). Impacts of Climatic Changes on Paddy Production in Malaysia : Micro Study on IADA at North West Selangor. *Research Journal of Environmental and Earth Sciences*, *6*(5), 251–258.

Alibaygi, A., & Zarafshani, K. (2008). Training needs of Iranian extension agents about sustainability : The use of Borich's need assessment model. *African Journal of Agricultural Research*, *3*(October), 681–687. Retrieved from http://www.academicjournals.org/AJAR

Allen, D. G., Shore, L. M., & Griffeth, R. W. (2003). The Role of Perceived Organizational Support and Supportive Human Resource Practices in the Turnover Process, *29*(1), 99–118.

Ary, D., Jacobs, L. C., Sorensen, C. K., & Walker, D. A. (2014). *Introduction to Research in Education*.

Awang, Z. (2016). *SEM Made Simple: A gentle approach to learning structural equation modeling*. Kuala Lumpur: MPWS Rich Publication.

Ayanwuyi, E. (2013). Extension Services Strategies in Adaptation to Climate Change in Oyo State, Nigeria. *Civil and Environmental Research*, *3*(7), 115–121.

Azdawiyah, A. T. S., Sahibin, A. R., & Anizan, I. (2014). Preliminary Study on Simulation of Climate Change Impacts on Rice Yield Using Dssat 4 . 5 At Tanjung Karang , Selangor. *Malaysian Applied Biology Journal*, *43*(November 2015), 81–89.

Azril, M. S. H., Jegak, U., Asiah, M., Azman, A. N., Samah, B. A., Jamilah, O., & Thomas, K. (2010). Can Quality of Work Life Affect Work Performance among Government Agriculture Extension Officers? A Case from Malaysia. *Journal of Social Sciences*, *6*(1), 64–73.

Baard, P. P., Deci, E. L., & Ryan, R. M. (2004). Intrinsic Need Satisfaction: A Motivational Basis of Performance and Well-Being in Two Work Settings. *Journal of Applied Social Psychology*, *34*(10), 2045–2068. http://doi.org/10.1111/j.1559-1816.2004.tb02690.x

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. *Journal of Social and Clinical Psychology*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1994). Self-Efficacy. In V. S. Ramachaudran (Ed.), *Encyclopedia of human behavior* (Vol. 4, pp. 71–81). New York: Academic Press. Academic Press. Retrieved from https://www.uky.edu/~eushe2/Bandura/Bandura1994EHB.pdf

Bernard, H. R. (2006). *Research Methods in Anthropology* (4th ed.). Oxford: AltaMira Press.

Bezu, D. C., Okoyo, E. N., & Hassen, J. Y. (2016). Factors influencing work motivation of development agents : The case of Agarfa and Sinana Districts , Bale Zone , Oromia Regional State , Ethiopia. *International Journal of Agricultural Science Research*, *5*(February), 1–18.

Bhatti, M. A., Sundram, V. P. K., & Hee, H. C. (2012). Expatriate Job Performance and Adjustment: Role of Individual and Organizational Factors. *Journal of Business & Management*, *1*(1), 29–39.

Bitzer, V. (2016). *Incentives for enhanced performance of agricultural extension systems* (KIT Sustainable Economic Development and Gender No. 2016–6).

Boachie-Mensah, F., & Dogbe, O. D. (2011). Performance-Based Pay as a Motivational Tool for Achieving Organisational Performance: An Exploratory Case Study. *International Journal of Business and Management*, *6*(12), 270–285. http://doi.org/10.5539/ijbm.v6n12p270

Bonye, S. Z., Alfred, B. K., & Jasaw, G. S. (2012). Promoting Community-Based Extension Agents as an Alternative Approach to Formal Agricultural Extension Service Delivery in Northern Ghana. *Asian Journal of Agriculture and Rural Development*, *2*(1), 76–95.

Borich, G. D. (1980a). A needs assessment model for conducting follow-up studies. *The Journal of Teacher Education*, *31*(3), 39–42.

Borich, G. D. (1980b). *Three Models for Conducting Follow-Up Studies of Teacher Education and Training*.

Boyatzis, R. E. (1982). *The Competent Manager: A Model for Effective Performance*. New York: John Wiley & Sons.

Boyatzis, R. E. (2008). Competencies in the 21st century. *Journal of Management Development*, *27*(1), 5–12. http://doi.org/10.1108/02621710810840730

Byrne, B. M. (2010). *Structural Equation Modeling with AMOS*. *Structural Equation Modeling* (Vol. 22). http://doi.org/10.4324/9781410600219

Campbell, J. P., McCloy, R. A., Oppler, S. H., & Sager, C. E. (1993). A theory of performance. In N. Schmitt, W. C. Bormann, & et al (Eds.), *Personnel selection in organizations* (pp. 35–70). San Francisco: Jossey-Bass.

Chang, J. H., & Teng, C. C. (2017). Intrinsic or extrinsic motivations for hospitality employees??? creativity: The moderating role of organization-level regulatory focus. *International Journal of Hospitality Management*, *60*, 133–141. http://doi.org/10.1016/j.ijhm.2016.10.003

Chaudhuri, A., & Boer, H. (2016). The impact of product-process complexity and new product development order winners on new product development performance: The mediating role of collaborative competence. *Journal of Engineering and Technology Management - JET-M*, *42*, 65–80. http://doi.org/10.1016/j.jengtecman.2016.10.002

Chiang, C., & Hsieh, T. (2012). The impacts of perceived organizational support and psychological empowerment on job performance: the mediating effects of organizational citizenship behavior. *International Journal of Hospitality Management*, *31*(1), 180–190. http://doi.org/10.1016/j.ijhm.2011.04.011

Chikaire, J. U., Ani, A. O., Atoma, C. N., & Tijjani, A. R. (2015). Extension Services for Effective Agricultural Risk Management in Orlu Agricultural Zone of Imo State , Nigeria. *Sch J Agric Vet Sci*, *2*(1A), 1–8.

Chouhan, V. S., & Srivastava, S. (2014). Understanding Competencies and Competency Modeling — A Literature Survey. *IOSR Journal of Business and Management*, *16*(1), 14–22. http://doi.org/10.9790/487X-16111422

Chowdhury, M. S. (2008). Enhancing motivation and work performance of the salespeople: the impact of supervisors ' behavior. *International Journal of Applied Management and Technology*, *6*(1), 166–181. Retrieved from http://www.academicjournals.org/AJBM

Christoplos, I. (2010). *Mobilizing the potential of rural and agricultural extension*. Rome: FAO.

Clark, D. O. (1996). Age, Socioeconomic Status, and Exercise Self-Efficacy. *The Gerontologist*, *36*(2), 157–164.

Darolia, C. R., Kumari, P., & Darolia, S. (2010). Perceived organizational support, work motivation, and organizational commitment as determinants of job performance. *Journal of the Indian Academy of …*, *36*(1), 69–78. Retrieved from http://medind.nic.in/jak/t10/i1/jakt10i1p69.pdf

Davis, K. (2015). *The New Extensionist: Core competencies for individuals. GFRAS Brief 3*. Lindau, Switzerland: The Global Forum for Rural Advisory Services. Retrieved from http://ebrary.ifpri.org/cdm/ref/collection/p15738coll5/id/5143

Devendra, C. (2012). *Climate change threats and effects: challenges for agriculture and food Security*. *Academy of Science Malaysia*. Academy of Sciences Malaysia. Retrieved from http://agrilinks.org/sites/default/files/resource/files/climate_change_threats_effects_strategies.pdf

DFID. (2011). *Climate and environment advisers competency framework*. Retrieved from https://www.gov.uk/government/publications/climate-and-environment-advisers-competency-framework

Diehl, D. C., Sloan, N. L., Galindo-Gonzalez, S., Bartels, W.-L., Dourte, D. R., Furman, C., & Fraisse, C. W. (2015). Toward engagement in climate training: findings from interviews with agricultural extension professionals. *Journal of Rural Social Sciences*, *30*(1), 25–50.

Dieleman, M., & Harnmeijer, J. W. (2006). *Improving health worker performance: in search of promising practices*. *Human Resources for Health*. Geneva. Retrieved from http://scholar.google.com/scholar?hl=en&q=Improving+health+worker+performance:+in+search+of+promising+practices&btnG=Search&as_sdt=2000&as_ylo=&as_vis=0#0

Dinno, A. (2009). Implementing Horn ' s parallel analysis for principal component analysis and factor analysis. *The Stata Journal*, (2), 291–298.

Dinpanah, G., & Morzapour, V. (2015). Effective factors on job performance of agricultural extension experts in Iran. *Journal of Scientific Research and Development*, *2*(7), 264–269. Retrieved from www.jsrad.org

DOA. (2015). Background and History. Retrieved November 15, 2015, from http://www.doa.gov.my/latarbelakang-dan-sejarah

DOA. (2018). Portal Rasmi Jabatan Pertanian. Retrieved March 26, 2018, from http://www.doa.gov.my/index.php/pages/view/610?mid=222

DOF. (2015). No Title. Retrieved November 15, 2015, from http://www.dof.gov.my/en

Duncan, D. W., Ricketts, J. C., Peake, J. B., & Uesseler, J. (2005). Identifying Teaching and Learning In-Service Needs of Georgia Agriculture Teachers. In *Proceedings of the 2005 American Association for Agricultural Education National Research Conference* (Vol. 32, pp. 91–102). Texas: American Association for Agricultural Education.

Duncan, D. W., Ricketts, J. C., Peake, J. B., & Uesseler, J. (2006). Teacher preparation and in-service needs of Georgia agriculture teachers. *Journal of Agricultural Education*, *47*(2), 24–36.

DVS. (2015). Profile. Retrieved November 15, 2015, from http://www.dvs.gov.my/en

Edwards, M. C., & Briers, G. E. (1999). Assessing the in-service needs of entry-phase agriculture teachers in Texas: A discrepancy model versus direct assessment. *Journal of Agricultural Education*, *40(3)*, 40–49.

Eisenberger, R. (1984). Format for the 36-item Survey of Perceived Organizational Support. Retrieved March 3, 2016, from http://classweb.uh.edu/eisenberger/articles/

Eisenberger, R., Huntington, R., Hutchison, S., & Sowa, D. (1986). Perceived organizational support. *Journal of Applied Psychology*, *71*(3), 500–507. http://doi.org/10.1037/0021-9010.75.1.51

Eisenberger, R., Malone, G. P., & Presson, W. D. (2016). *Optimizing Perceived Organizational Support to Enhance Employee Engagement*. *SHRM-SIOP Science of HR Series*. Retrieved from http://www.siop.org/SIOP-SHRM/SHRM-SIOP POS.pdf

Elhamoly, A. I. M. A., Koledoye, G. F., & Kamel, A. (2014). Assessment of Training Needs for Egyptian Extension Specialists (SMSs) in Organic Farming Field: Use of the Borich Needs Model. *Journal of Agricultural & Food Information*, *15*(3), 180–190. http://doi.org/10.1080/10496505.2014.921110

Fabusoro, E., Awotunde, J. a., Sodiya, C. I., & Alarima, C. I. (2008). Status of Job Motivation and Job Performance of Field Level Extension Agents in Ogun State: Implications for Agricultural Development. *The Journal of Agricultural Education and Extension*, *14*(2), 139–152. http://doi.org/10.1080/13892240802019113

FAO. (2010). *Climate-Smart Agriculture: Policies, Practices and Financing for Food Security, Adaptation and Mitigation*. *"Climate-Smart" Agriculture: Policies, Practices and Financing for Food Security, Adaptation and Mitigation*. Retrieved from http://www.fao.org/docrep/013/i1881e/i1881e00.htm

FAO. (2013). *Climate-Smart Agriculture Sourcebook. Sourcebook on Climate-Smart Agriculture, Forestry and Fisheries*. Retrieved from http://www.fao.org/docrep/018/i3325e/i3325e00.htm

Felicio, J. A., & Rodrigues, R. (2015). Organizational factors and customers' motivation effect on insurance companies' performance. *Journal of Business Research*, *68*(7), 1622–1629. http://doi.org/10.1016/j.jbusres.2015.02.006

Field, A. (2009). *Discovering Statistics Using SPSS* (3rd ed.). London: Sage. http://doi.org/10.1017/CBO9781107415324.004

GACSA. (2016). *Compendium on Climate-Smart Agriculture & Extension*. (S. Sala, F. Rossi, & S. David, Eds.). Retrieved from www.fao.org/gacsa/en/

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior*, *26*(4), 331–362. http://doi.org/10.1002/job.322

Gagné, M., Forest, J., Gilbert, M.-H., Aube, C., Morin, E., & Malorni, A. (2010). The Motivation at Work Scale: Validation Evidence in Two Languages. *Educational and Psychological Measurement*, *70*(4), 628–646. http://doi.org/10.1177/0013164409355698

Garton, B. L., & Chung, N. (1996). The in-service needs of beginning teachers of agriculture as perceived by beginning teachers, teacher educators, and state supervisors. *Journal of Agricultural Education, 37(3)*, 52–58.

Garton, B. L., & Chung, N. (1997). An assessment of the in-service needs of beginning teachers of agriculture using two assessment models. *Journal of Agricultural Education, 38(3)*, 51–58.

Gaskin, J. (2016). Gaskination Statistics. Retrieved February 2, 2017, from http://statwiki.kolobkreations.com/

Gillet, N., Colombat, P., Michinov, E., Pronost, A., & Fouquereau, E. (2013). Procedural justice, supervisor autonomy support, work satisfaction, organizational identification and job performance: the mediating role of need satisfaction and perceived organizational support. *Journal of Advanced Nursing*, *69*(11), 2560–71. http://doi.org/10.1111/jan.12144

Gombe, S. Y., Suandi, T., Ismail, I. A., & Omar, Z. (2015). Extension Worker Competencies Needed for Effective Management of Self- Help Groups (SHG) in Gombe State. *International Journal of Education and Training*, *1*(1), 1–7.

Green, S. B., & Salkind, N. J. (2005). *Using SPSS for Windows and Macintosh: Analyzing and Understanding Data*. *The American Statistician* (5th ed., Vol. 59). New Jersey: Pearson Prentice Hal. http://doi.org/10.1198/tas.2005.s139

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate Data Analysis. Prentice-Hall, Inc* (Vol. 1). London: Pearson Education. http://doi.org/10.1038/259433b0

Harder, A., & Wingenbach, G. (2008). Texas 4-H agents' perceptions of selected competencies in the 4-h professional research, knowledge, and competencies model. *Journal of Agricultural Education*, *49*(2), 64–74.

Hayati, K., & Caniago, I. (2012). Islamic Work Ethic: The Role of Intrinsic Motivation, Job Satisfaction, Organizational Commitment and Job Performance. *Procedia - Social and Behavioral Sciences*, *65*(ICIBSoS 2012), 1102–1106. http://doi.org/10.1016/j.sbspro.2014.05.148

Henman, P. (2016). Techniques and paradoxes in performing performance measurements: concluding reflections. *Policy Studies*, *37*(6), 597–609. http://doi.org/10.1080/01442872.2016.1190447

Hochwarter, W. A., Witt, L. A., Treadway, D. C., & Ferris, G. R. (2006). The Interaction of Social Skill and Organizational Support on Job Performance. *Journal of Applied Psychology*, *91*(2), 482–489. http://doi.org/10.1037/0021-9010.91.2.482

Hoyle, H. R. (2012). *Handbook of Structural Equation Modeling*. (H. R. Hoyle, Ed.). New York. http://doi.org/10.4135/9781412961288.n69

Iglesias, A., Garrote, L., Quiroga, S., & Moneo, M. (2012). From climate change impacts to the development of adaptation strategies: challenges for agriculture in Europe. *Climatic Change*, *112*, 143–168. http://doi.org/10.1007/s10584-011-0344-x.330

IPCC. (2001). *Impact, adaptation and vulnerability. Contribution of working group II of the IPCC to the third assessment report of the IPCC.* London.

IPCC. (2007). *Tide guage measurements and satellite imagery suggest that sea level has risen. Recent climate change – sea level changes, climate, science. The fourth assessment report of the IPCC*. London.

Issahaku, A. (2014). Perceived Competencies of Agriculture Extension Workers in Extension Services Delivery in Northern Region of Ghana , Perspective from Literature, *4*(15), 107–115.

Joerger, R. (2002). A Comparison of the in-service education needs of two cohorts of beginning Minnesota agricultural education teachers. *Journal of Agricultural Education, 43(3)*, 11–24.

KADA. (2015). No Title. Retrieved November 11, 2015, from http://www.kada.gov.my

Karabay, M. E., Tezergil, S. A., & Köse, A. (2014). Does Motivation Mediate the Job Performance and Burnout? Evidence from Turkish Banking Sector. *American International Journal of Social Science*, *3*(6), 98–108.

Kassem, H. S., & Sarhan, A. M. (2013). Effect of job characteristics on satisfaction and performance: A test in Egyptian agricultural extension system. *African Journal of Agricultural Research*, *8*(48), 6126–6130. http://doi.org/10.5897/AJAR09.698

Kesler, K. C. (1989). Job satisfaction and perceived inservice needs of Iowa Cooperative Extension personnel.

Khalil, O., Ismail, M., Suandi, T., & Silong, A. D. (2008). Extension worker as a leader to farmers: Influence of extension leadership competencies and organizational commitment on extension workers' performance in Yemen. *The Journal of International Social Research, 1 (4),* pp.-368-387. Retrieved from http://www.sosyalarastirmalar.com/cilt1/sayi4/sayi4pdf/khalil_and_vd.pdf

Khatri-Chhetri, A., Aggarwal, P. K., Joshi, P. K., & Vyas, S. (2016). Farmers' prioritization of climate-smart agriculture (CSA) technologies. *Agricultural Systems*, *151*(2017), 184–191. http://doi.org/10.1016/j.agsy.2016.10.005

Kirkbesoglu, E. (2015). The Effects of Organizational Performance on the Relationship between Perceived Organizational Support and Career Satisfaction : An Application on Insurance Industry. *Journal of Management Research*, *7*(3), 35–50. http://doi.org/10.5296/jmr.v7i3.7094

Kumar, R. (2011). *Research Methodology: a step by step guide for beginners* (3rd ed.). London: Sage.

Kwaw-mensah, D. (2008). *Perceptions of agricultural extension educators regarding livestock waste management education in the North Central Region*. Iowa State University.

Laakso-manninen, R., & Viitala, R. (2007). *Competence Management and Human Resource Development*. *HAAGA-HELIA Research*. Retrieved from http://share.its.ac.id/pluginfile.php/42790/mod_resource/content/1/COMPETENCE MANAGEMENT-book.pdf%5Cnhttp://www.haaga-helia.fi/sites/default/files/Kuvat-ja-liitteet/Palvelut/Julkaisut/hrdweb.pdf%5Cnhttp://share.its.ac.id/pluginfile.php/42790/mod_resource/

Lakai, D. (2010). *Identification of Competencies Needed by Extension Agents in North Carolina Cooperative Extension*. North Carolina State University.

Latir, S. (2013). *Knowledge, attitude, school support, motivation and use of contextual teaching among secondary school agriculture teachers in Malaysia*.

Lee, M. T., & Raschke, R. L. (2016). Understanding employee motivation and organizational performance: Arguments for a set-theoretic approach. *Journal of Innovation & Knowledge*, *1*(3), 162–169. http://doi.org/10.1016/j.jik.2016.01.004

Locke, E. a, & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *The American Psychologist*, *57*(9), 705–717. http://doi.org/10.1037/0003-066X.57.9.705

Lopokoiyit, M., Onyango, C., & Kibett, J. K. (2013). Extension Management Competency Needs of Agricultural Extension Agents in Kenya. *Mediterranean Journal of Social Sciences*, *4*(6), 11–20. http://doi.org/10.5901/mjss.2013.v4n6p11

Lunenburg, F. C. (2011). Goal-Setting Theory of Motivation. *International Journal of Management, Business, and Administration*, *15*(1), 1–6.

Lunjew, M. D. (1994). *Participation in decision-making among trainers and relationships with job satisfaction and performance*. Universiti Pertanian Malaysia, Serdang.

Lussier, R. N. (2005). *Human relations in organizations: Applications and skill building*. Boston: McGraw -Hill.

MADA. (2015). No Title. Retrieved November 10, 2015, from www.mada.gov.my/latar-belakang

Mastoi, Q., Rahman, A., & Dahlan, A. (2014). Agro-tech in Malaysia and Literature Review Knowledge Sharing from Agro-Technology Using Nations, *5*(12), 606–611.

McClelland, D. . (1973). Testing for competence rather than for "intelligence". *The American Psychologist*, *28*(1), 1–14. http://doi.org/10.1037/h0038240

McCook, K. D. (2002). *Organizational perceptions and their relationships to job attitudes, effort, performance and organizational citizenship behaviors*. Louisiana State University.

Mcharo, A. C. (2013). *Perception of farmers on effectiveness of Agricultural Extension Agents In Knowledge Transfer To Maize Growers In Kilinde District*. Sokoine University of Agriculture.

Mckim, B. R. (2013). *Assessing knowledge, performance, and consequence competence with the Borich needs assessment model* (Vol. 1–5).

Mitchell, J. I., Gagné, M., Beaudry, A., & Dyer, L. (2012). The role of perceived organizational support, distributive justice and motivation in reactions to new information technology. *Computers in Human Behavior*, *28*(2), 729–738. http://doi.org/10.1016/j.chb.2011.11.021

MOA. (2003). *Third National Agricultural Policy (1998-2010)*. Putrajaya, Malaysia.

MOA. (2011). *Kementerian Pertanian & Industri Asas Tani Malaysia : Perangkaan Agromakanan 2011*.

MOA. (2015). IADA. Retrieved November 17, 2015, from http://www.moa.gov.my/iada

Mohamed, A., & Ali, M. (2015). The Influence of Perceived Organizational Support on Employees ' Job Performance. *International Journal of Scientific and Research Publications*, *5*(4), 1–6.

MPOB. (2015). No Titl. Retrieved from http://www.mpob.gov.my/en/about-us/about

Murphy, P. K., & Alexander, P. A. (2000). A Motivated Exploration of Motivation Terminology. *Contemporary Educational Psychology*, *25*, 3–53. http://doi.org/10.1006/ceps.1999.1019

Ndirtagu, G. (2013). Employee Motivation and Performance as a Catalyst for Organizational Growth. *Academic Journal of Interdisciplinary Studies*, *2*(7), 41. http://doi.org/10.5901/ajis.2013.v2n7p41

Nielsen, S. K. (2006). *A multi-source model of perceived organizational support and performance*. University of Tennessee. Retrieved from http://search.proquest.com.elib.tcd.ie/docview/304981535/abstract/13A9F58F20569EBF938/6?accountid=14404

Notenbaert, A., Pfeifer, C., Silvestri, S., & Herrero, M. (2016). Targeting, out-scaling and prioritising climate-smart interventions in agricultural systems: Lessons from applying a generic framework to the livestock sector in sub-Saharan Africa. *Agricultural Systems*, *151*, 153–162. http://doi.org/10.1016/j.agsy.2016.05.017

O'Connor, B. P. (2000). SPSS and SAS programs for determining number of components using parallel analysis and Valcer's Map test. *Behavior Research Methods, Instrumentation, and Computers*, *32*, 396–402. Retrieved from https://people.ok.ubc.ca/brioconn/nfactors/nfactors.html

Ogunlade, I., Aderinoye-Abdulwahab, S. A., & Mensah, A. O. (2014). Knowledge levels of extension agents and their perceived impact of climate change on extension service provision in Ghana. *Ethiopian Journal of Environmental Studies & Management*, *7*(November), 96–103. http://doi.org/10.4314/ejesm.v7i1.12

Oladele, O. I., & Tekena, S. S. (2010). Factors influencing agricultural extension officers' knowledge on practice and marketing of organic agriculture in North West Province , South Africa. *Life Science Journal*, *7*(3), 91–98.

Osabiya, B. J. (2015). The effect of employees motivation on organizational performance. *Journal of Public Administration and Policy Research*, *7*(4), 62–

75. http://doi.org/10.5897/JPAPR2014.0300

Özyer, K., & Polatci, S. (2017). The effects of organizational and social support on employees psychological well-being. *PEOPLE: International Journal of Social Sciences*, *3*(3), 258–267.

Pallant, J. (2011). *SPSS survival manual: a step by step guide to data analysis using IBM SPSS* (2011th ed.). Australia: Allen and Unwin. http://doi.org/10.1046/j.1365-2648.2001.2027c.x

Patanakul, P., Pinto, J. K., & Pinto, M. B. (2016). Motivation to perform in a multiple-project environment: The impact of autonomy, support, goal clarity, and opportunities for learning. *Journal of Engineering and Technology Management - JET-M*, *39*, 65–80. http://doi.org/10.1016/j.jengtecman.2016.02.001

Peake, J. B., Duncan, D. W., & Ricketts, J. C. (2007). Identifying Technical Content Training Needs of Georgia Agriculture Teachers. *Journal of Career and Technical Education*, *3*(1), 2007–44. Retrieved from http://scholar.lib.vt.edu/ejournals/JCTE/v23n1/peake.html

Priyadarshini, R. R. G., & Dave, D. (2012). Competency-based Training Needs Assessment Model. *Management and Labour Studies*, *37*(3), 195–207. http://doi.org/10.1177/0258042X13484834

Prokopy, L. S., Carlton, J. S., Arbuckle, J. G., Haigh, T., Lemos, M. C., Mase, A. S., … Power, R. (2015). Extension's role in disseminating information about climate change to agricultural stakeholders in the United States. *Climatic Change*, *130*(2), 261–272. http://doi.org/10.1007/s10584-015-1339-9

Prokopy, L. S., Morton, L. W., Arbuckle, J. G., Mase, A. S., & Wilke, A. K. (2015). Agricultural stakeholder views on climate change: Implications for conducting research and outreach. *Bulletin of the American Meteorological Society*, *96*(2), 181–190. http://doi.org/10.1175/BAMS-D-13-00172.1

Randall, M. L., Cropanzano, R., Bormann, C. A., & Birjulin, A. (1999). Organizational politics and organizational support as predictors of work attitudes, job performance, and organizational citizenship behavior. *Journal of Organizational Behavior*, *20*, 159–174. http://doi.org/10.1002/(SICI)1099-1379(199903)20

Rhoades, L., & Eisenberger, R. (2002). Perceived Organizational Support : A Review of the Literature. *Journal of Applied Psychology*, *87*(4), 698–714. http://doi.org/10.1037//0021-9010.87.4.698

Riana, I. G. (2015). Effects motivation on business performance: the mediation role of job satisfaction and leadership (a study in village credit institutions). *European Journal of Business, Economics and Accountancy*, *3*(2), 1–11.

Ricketts, J. C., Duncan, D. W., Peake, J. B., & Uesseler, J. (2005). Teacher Preparation and In-Service Needs Associated With Management of the Total Program of Agricultural Education in Georgia. *Journal of Southern Agricultural Education Research*, *55*(1), 46–59.

RISDA. (2015). Profile. Retrieved November 17, 2015, from http://www.risda.gov.my/index.php/en/about-us/profile

Rotundo, M. (2002). Defining and measuring individual level job performance: a review and integration. *CiteSeer: An Automatic Citation Indexing System*, (September), 1–72. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.129.7597&rep=rep1&type=pdf

Rusu, G., Avasilcăi, S., & Huţu, C.-A. (2016). Organizational Context Factors Influencing Employee Performance Appraisal: A Research Framework. *Procedia - Social and Behavioral Sciences*, *221*, 57–65. http://doi.org/10.1016/j.sbspro.2016.05.090

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, *25*, 54–67. http://doi.org/10.1006/ceps.1999.1020

Salawu, J. A. (2008). AEM 301: INTRODUCTION TO AGRICULTURAL EXTENSION AND RURAL SOCIOLOGY. Lagos: NOUN. Retrieved from www.nou.edu.ng

Saleh, J. M., Man, N., Salih, M. H., Hassan, S., Nawi, N. M., & Jasim, S. (2016). A Review: Training Requirement of Agriculture Extension Officers in Iraq. *Asian Journal of Applied Sciences*, *9*(2), 34–40. http://doi.org/10.3923/ajaps.2016.34.40

Samah, B. A. (2016). *Enhancing extension education research using structural equation modeling*. Serdang: UPM Press.

Samsudin, A. F. M. (2012). Agriculture extension and its roles in ensuring food safety , quality and productivity in Malaysia. In *The 9th International Students Summit on Food, Agriculture and Environment in the New Century* (pp. 1–11).

Shah, J. A., Asmuni, A., & Ismail, A. (2013). Roles of Extension Agents Towards Agricultural Practice in Malaysia. *International Journal on Advanced Science, Engineering and Information Technology*, *3*(1), 59–63.

Shanker, R., Bhanugopan, R., van der Heijden, B. I. J. M., & Farrell, M. (2017). Organizational climate for innovation and organizational performance: The mediating effect of innovative work behavior. *Journal of Vocational Behavior*, *100*, 67–77. http://doi.org/10.1016/j.jvb.2017.02.004

Shikuku, K. M., Valdivia, R. O., Paul, B. K., Mwongera, C., Winowiecki, L., Läderach, P., … Silvestri, S. (2016). Prioritizing climate-smart livestock technologies in rural Tanzania: A minimum data approach. *Agricultural Systems*, *151*, 204–216. http://doi.org/10.1016/j.agsy.2016.06.004

Singh, J., Singh, K., Hasnaa, N., & Mahmood, N. (2016). Relationship Between Competencies, Cultural Adjustment and job Performance in the ICT Sector. *International Review of Management and Business Research*, *5*(1), 2306–9007.

Siwar, C., Ahmed, F., & Begum, R. A. (2013). Climate change, agriculture and food security issues: Malaysian perspective. *Journal of Food, Agriculture and Environment*, *11*(2), 1118–1123.

Siwar, C., Idris, N. D. M., Yasar, M., & Morshed, G. (2014). Issues and challenges facing rice production and food security in the granary areas in the East Coast Economic Region (ECER), Malaysia. *Research Journal of Applied Sciences, Engineering and Technology*, *7*(4), 711–722. http://doi.org/ISSN:2020-7459;e-ISSN:2040-7467

Sonnentag, S., & Frese, M. (2002). Performance concepts and performance theory. In *Psychological Management of Individual Performance* (pp. 3–25). http://doi.org/10.1002/0470013419.ch1

Sonnentag, S., Volmer, J., & Spychala, A. (2008). Job Performance. *The SAGE Handbook of Organizational Behavior*, *1*, 427–447. http://doi.org/10.4135/9781849200448

Sulaiman, R. V., & Davis, K. (2012). The "New Extensionist": Roles, Strategies, and Capacities to Strengthen Extension and Advisory Services. Retrieved from http://www.g-fras.org/en/knowledge/gfras-publications/file/126-the-new-extensionist-position-paper?start=20

Suvedi, M., & Kaplowitz, M. (2016). *What Every Extension Worker Should Know: Core Competency Handbook*. Michigan: MEAS Project.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Pearson Education.

Tall, A., Jay, A., & Hansen, J. (2012). *Scaling Up Climate Services for Farmers in Africa and South Asia.* (No. 40). *CCAFS Working Paper*. Copenhagen. Retrieved from www.ccafs.cgiar.org

Taraka, K. (2012). *Effects of Agricultural Extension and Environment-*.

Tawang, A., Ahmad, T. M. A., & Abdullahi, M. Y. (2001). *Stabilization of Upland Agriculture under El Nino Induced Climatic Risk: Impact Assessment and Mitigation Measures in Malaysia* (No. 61). *Agriculture*.

Teh, S. (1980). *Professional competencies needed by Malaysian agricultural extension supervisors*. Iowa State University.

Tiraieyari, N. (2009). *Relationships between Extension Workers' Competencies and Job Performance in Implementing the Good Agricultural Practices Programme in Malaysia*. Universiti Putra Malaysia.

Tiraieyari, N., Hamzah, A., & Samah, B. A. (2014a). Extension agents and sustainable cocoa farming: A case study of extension agents in Sabah state, Malaysia. *Modern Applied Science*, *8*(6), 210–218. http://doi.org/10.5539/mas.v8n6p210

Tiraieyari, N., Hamzah, A., & Samah, B. A. (2014b). Organic Farming and Sustainable Agriculture in Malaysia : Organic Farmers' Challenges towards Adoption. *Asian Social Science*, *10*(4), 1–7. http://doi.org/10.5539/ass.v10n4p1

Tiraieyari, N., Idris, K., Uli, J., & Hamzah, A. (2010). Competencies Influencing Extension Workers' Job Performance in Relation to the Good Agricultural Practices in Malaysia. *American Journal of Applied Sciences*, *7*(10), 1379–1386.

Toure-Tillery, M., & Fishbach, A. (2014). How to Measure Motivation: A Guide for the Experimental Social Psychologist. *Social and Personality Psychology Compass*, *8*(7), 328–341. http://doi.org/10.1111/spc3.12110

Tremblay, M. A., Blanchard, C. M., Taylor, S., Pelletier, L. G., & Villeneuve, M. (2009). Work Extrinsic and Intrinsic Motivation scale: its value for organizational psychology research. *Canadian Journal of Behavioural Science*, *41*(4), 213–226. http://doi.org/10.1037/a0015167

Trépanier, S. G., Fernet, C., & Austin, S. (2013). The moderating role of autonomous motivation in the job demands-strain relation: A two sample study. *Motivation and Emotion*, *37*(1), 93–105. http://doi.org/10.1007/s11031-012-9290-9

Ţuţu, A. (2012). Is Competency Enough? Understanding Job Performance in an Economic Depression Context. *International Journal of Learning & Development*, *2*(1), 320–329. http://doi.org/10.5296/ijld.v2i1.1273

Umar, S. (2014). *Analysis of Indigenous Coping Strategies against Climate Change for Food Security among Irrigation Farmers in Katsina State, Nigeria.* Ahmadu Bello University, Zaria, Nigeria.

UnitedNations. (1998). *Framework convention on climate change, article 1*. Retrieved from http://unfccc.int/essential_background/convention/background/items/2536.php

Vaghefi, N., Shamsudin, M. N., Radam, A., & Rahim, K. A. (2016). Impact of climate change on food security in Malaysia: economic and policy adjustments for rice industry. *Journal of Integrative Environmental Sciences*, *8168*(1), 1–17. http://doi.org/10.1080/1943815X.2015.1112292

Vathanophas, V., & Thai-ngam, J. (2007). Competency Requirements for Effective Job Performance in The Thai Public Sector. *Contemporary Management Research*, *3*(1), 45–70.

Viswesvaran, C., & Ones, D. S. (2000). Perspectives on Models of Job Performance. *International Journal of Selection and Assessment*, *8*(4), 216–226.

Vroom, V. H. (1964). *Work and motivation*. San Francisco, CA: Jossey-Bass.

Wanyama, W. K., Nassiuma, D., & Zakayo, C. (2014). Impact of motivation as HR bundle on performance of teachers of public schools in Bungoma County. *African Journal of Business Management*, *8*(3), 101–112. http://doi.org/10.5897/AJBM2013.7203

Welbourne, T. M., & Johnson, D. E. (1998). The Role-Based Performance Scale : Validity Analysis of a Theory-Based Measure W ORKING P APER S ERIES The Role-Based Performance Scale : Validity Analysis of a Theory-Based Measure. *Academy of Management Journal*, *41*(5), 540–555. Retrieved from http://www.jstor.org/stable/256941

Wickramasinghe, V., & Zoyza, N. De. (2008). Gender, age and marital status as predictors of managerial competency needs: Empirical evidence from a Sri Lankan telecommunication service provider. *Gender in Management: An International Journal*, *23*(5), 337–354. http://doi.org/10.1108/17542410810887365

Williams, B., Brown, T., & Onsman, A. (2010). Exploratory factor analysis: A five-step guide for novices. *Journl of Emergency Primary Health Care*, *8*(3), 42–50. http://doi.org/10.1080/09585190701763982

Wingenbach, G. (2013). Using the Borich Needs Assessment Model to Prioritize Competencies for Training and Development Programs, 1–14. Retrieved from http://www.lamolina.edu.pe/innovacioneducativa/images/files/innovacion2013/Conferencias/Gary Wingenbach Uso del modelo Borich para identificar y priorizar competencias.pdf

WMO. (2016). Climate services competencies. Retrieved August 6, 2016, from https://www.wmo.int/pages/prog/dra/etrp/documents/Climate_services_competencies_draft_05_14.pdf

Wu, Y., Li, C., & Khoo, S. (2015). Predicting future volunteering intentions through a self-determination theory perspective. *Voluntas*, (2014). http://doi.org/10.1007/s11266-015-9570-6

Xu, A., & Ye, L. (2014). Impacts of teachers' competency on job performance in research universities with industry characteristics: taking academic atmosphere as moderator. *Journal of Industrial Engineering and Management JIEM*, *7*(5), 1283–1292. http://doi.org/10.3926/jiem.1261

Zaim, H., Yaşar, M. F., & Ünal, Ö. F. (2013). Analysing the effects of individual competencies on performance: A field study in services industries in Turkey. *Journal of Global Strategic Management* |, *7*(2), 67–77. http://doi.org/10.20460/JGSM.2013715668

Zainal Ariffin, A., & Yekta, Z. A. (2010). Relationship between perceived organizational support, leadership behavior, and job satisfaction: An empirical study in Iran. *Intangible Capital*, *6*(2), 162–184. http://doi.org/10.3926/ic.2010.v6n2.p162-184

Zivkovic, D., Jelic, S., & Rajic, Z. (2009). Agricultural extension service in the function of rural development. In *The role of knowledge, innovation and human capital in multifunctional agriculture and territorial rural development* (pp. 1–10). Belgrade, Republic of Serbia: EAAE Seminar.