

## Capacity Building and Transfer of Technology Competencies: An Analysis of Indonesian and Malaysian Agricultural Extensionists' Work Performance

Sucihatningsih DW Prajanti<sup>1</sup>, Sri Utami<sup>2</sup>, Hanina H. Hamsan<sup>3</sup>, Lailawati M. Salleh<sup>4</sup> & Rahim M. Sail<sup>5\*</sup>

<sup>1,2</sup> Department of Economic Development, Faculty of Economics, Semarang State University, Kota Semarang, Jawa Tengah 50229, Indonesia

<sup>3</sup> Institute for Social Science Studies, Universiti Putra Malaysia, Putra Infoport, 43400 UPM Serdang Selangor Darul Ehsan, Malaysia/ Department of Social and Development Sciences, Faculty of Human Ecology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor Darul Ehsan, Malaysia

<sup>4</sup> Department of Management and Marketing, Faculty of Economic and Management, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor Darul Ehsan, Malaysia

<sup>5</sup> Department of Professional Development and Continuing Education, Faculty of Educational Studies, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor Darul Ehsan, Malaysia

---

### ABSTRACT

Capacity building and transfer of technology (ToT) competencies are two important job requirements of extensionists which are performed to benefit client groups in the form of adopting new technology/idea/practice for higher productivity and improved quality of products produced. Capacity building, in this study, focuses on human resource development (HRD) variables of leadership development, problem solving and decision-making skills (the hidden competencies). On the other hand, ToT variables comprised new technology/idea/practice (the visible competencies). The study employed a survey design using questionnaires to collect data from respondents in Central Java, Indonesia and North and Central Terengganu, Malaysia. The main objective of the study was to determine the relationships between ToT and HRD variables with extensionists' job performance. Level of performance of extensionists in ToT and HRD tasks variables were similar in Indonesia and Malaysia, ranging from as low as 5% to as high as 60%. All ToT and HRD variables were positive and significantly related to extensionists' job performance in Indonesia and Malaysia. The findings of the present study were not conclusive enough to indicate that agricultural extensionists preferred to carry out ToT task over HRD task. This was true for the Indonesian and Malaysian data when the two situations were compared. It is suggested that the mixed methods of quantitative and qualitative strategies should be used for future studies to reflect actual agricultural extensionists' job performance.

**Keywords:** Capacity Building, Transfer of Technology, Agricultural Extensionists, Indonesia, Malaysia

---

### INTRODUCTION

Several studies in the past indicated that agricultural extensionists focused most of their efforts to carry out the function of transfer of technology (ToT) to clients (Khalid et al, 2009; Rahim M. Sail & Azizam Asmuni, 2004; Rahim M. Sail et al, 2017 and Rahim M. Sail & Mazanah Ahmad, 1994). As a matter of fact, many agricultural agencies measure performance of their extensionists by the number of successful new technologies adopted by their clients. The irony of the matter is that in spite of the focus on ToT function, technology adoption among clients was still low. A study on technology adoption among rubber smallholders showed that smallholders who owned old holdings (15 years and above) adopted only 25% of the total recommended technologies, while smallholders who owned younger holdings adopted about 60% (Rahim M. Said et al, 1990). Why technology adoption among rubber smallholders was low in spite of the focus on ToT function?

There is another aspect of an extensionist job performance which has not been given due attention by many agricultural development agencies although it is as important, if not more important than the ToT function. The

\* Corresponding author: [rms@upm.edu.my](mailto:rms@upm.edu.my)  
eISSN: 2462-2079 © Universiti Putra Malaysia Press

scope of extension education and services has widened a great deal with the integration of adult education, communication studies, economics and human resource development (HRD) in its philosophy, concepts and practices. The integration with other fields of study has opened extension education applicability, flexibility, adaptability and transferability to other disciplines as long as human beings are the subject of focus for development (Rahim A. Sail, 2016). In line with this broader concept of extension education clients' empowerment and motivation to succeed become stronger through capacity building knowledge and skills with the help of extensionists. This should be another important job for an extensionist. In fact, capacity building should be an integral part of an extensionist job performance, besides the ToT function. The two competencies are inseparable to improve efficiency and productivity of an enterprise and extensionists must be equipped with knowledge and skills to carry them out effectively.

## LITERATURE REVIEW

A competent workforce is an important asset of any organization to ensure its survival from competitors and achieve its organizational goals. A competent workforce is a fixed asset and could not be easily 'copied' by other organizations, especially those traits that are related to positive attitudes and commitment towards work. Competency means knowledge, skills, ability, trait and behaviour that enables one to perform her/his task in a profession (Vathanophas, 2006). Boyatis (1982) defines competency as basic characteristics an individual should have to perform a task effectively or to have high work performance.

Some competencies are known by an individual worker and some are not. Those that are known by an individual worker are easily visible such as knowledge and skill of a profession (economics, fishery, and marketing) while those competencies such as self-concept, trait and motive are hidden (Spencer and Spencer, 2008). Knowledge and skill are required to perform a task, but to perform a task at a high level with high efficiency on a sustained basis requires a good mix of 'visible' and 'hidden' competencies as espoused by Spencer and Spencer 2008. Given the 'visible' competencies (knowledge and skill of a profession) as basic elements to perform a task, then what 'hidden' competencies should be combined and when and how they should be combined with the 'visible' competencies to effectively produce positive and high impact results for an organization?

Basically, an agricultural extensionist performs two basic tasks: human resource development (HRD) task and transfer of technology (ToT) task. The HRD task focuses on developing clients' potentials and capacity to make their own decisions, to solve their own problems, to plan, execute and evaluate their own socioeconomic programs. Agricultural extensionists, on the other hand, must train, guide and provide clients with ample opportunities to learn and acquire capacity building capabilities through engagement and participation in activities designed for clients' benefits. These activities may include the process of planning, implementing, monitoring and evaluating of socioeconomic programs. When clients acquire capacity building capabilities, they usually have positive attitudes, are motivated and committed to implement their projects on their own to ensure success of their enterprises.

The transfer of technology (ToT) task emphasizes on the process of transfer and the amount of adoption of new technology/idea/practice by clients to increase productivity and improve quality of clients' enterprises. The basic requirement for ToT task is for an agricultural extensionist to acquire knowledge and skills of a specific technology /idea/practice either through training programs provided by research agencies or through participating in research, extension and clients linkage programs at the operational level. Basically, an agricultural extensionist must be competent in all aspects of a technology before she/he can transfer it to the clients. Implied in the ToT task is that an agricultural extensionist must be competent in the teaching-learning techniques, especially andragogical techniques with good communication skill, to transfer a technology to clients.

Between the two basic tasks which an agricultural extensionist has to perform, findings of past studies had shown mixed results on capacity building task where 33.6% of agricultural extensionists had indicated that leadership development among clients was not related to their work while 80.3% and 85.8% of problem solving and decision-making skills were related to their work respectively (Rahim M. Sail, 2010,2008). For ToT tasks, the findings of the same study indicated that the majority of the respondents (94%) indicated that they were important to their work. In other studies conducted by Karbasioun et al.2007 and Khalil et al. 2008, the capacity building tasks were not important in an agricultural extensionists' work agenda. They would not plan and execute capacity building tasks and would leave them to chance to happen. Extensionists carry out little or no HRD tasks. This imbalance of task carried out by extensionists would trigger clients to depend on others to do for them rather than they take control of their own destiny.

The ability to do HRD and ToT tasks together should be the goal of extensionists' work performance. Both tasks complement each other. To be successful in their work and to get maximum satisfaction in helping others, extensionists need to be competent in both HRD and ToT tasks. These tasks need to be done simultaneously so as to ensure that the goal of capacity building and adoption of new technology and practices by clients achieved maximum impact.

Adoption or rejection of a technology / idea / practice by clients is a decision making as well as a change process that involves leaving an old practice and / or adding a new one. Clients are guided, persuaded and encouraged to evaluate a new technology / idea / practice in their own context to determine whether or not the new technology / idea / practice is more advantageous than the existing one (relative advantage), compatible with existing norms and values, easy to understand (not complex), easy to be tried out on a small scale and its performance is easy to be observed (Rogers & Shoemakers, 1971).

Knowledge and skills are prerequisites in technology adoption process, besides having favourable attitudes, commitment and motivation to adopt a technology. These are visible and hidden competencies in combination. They act together to give maximum impacts on extensionists' work performance in both functions of clients' capacity building and transfer of technology.

### **Objectives of Study**

The main objective of the study was to determine the level and relationship of ToT and HRD task variables with performance of agricultural extensionists in Indonesia and Malaysia. Specifically, the objectives of the study were to determine:

- (i) The level of technical knowledge and management practices (ToT) of agricultural extensionists in Indonesia and Malaysia;
- (ii) The level of HRD knowledge of agricultural extensionists in Indonesia and Malaysia;
- (iii) Which task (ToT or HRD) was given emphasis by agricultural extensionists in carrying out their duties in Indonesia and Malaysia; and
- (iv) The relationships between ToT and HRD variables with performance of agricultural extensionists in Indonesia and Malaysia.

### **METODOLOGY**

A field study was conducted to determine the performance of agricultural extensionists in carrying out their HRD and ToT functions. The study was conducted in Indonesia and Malaysia. A total of 267 extensionists were selected, 126 from Grobogan and Magelang (districts), Semarang, Central Java, Indonesia and 141 from north and central Terengganu, Malaysia. The respondents were selected randomly using a list sampling technique. The list of names was provided by the selected districts. The study employed a survey design using questionnaires to collect data from the respondents. The questionnaire was developed by the study team comprising HRD and ToT variables as well as items to measure level of performance of agricultural extensionists in carrying out their HRD and ToT functions (see Figure 1: research framework). A five point Likert scale, from 'don't know' (score of 0) to strongly agree (score 5) was used to measure respondents' responses. The instrument was pretested with 20 respondents in Indonesia and 20 respondents in Malaysia to determine its acceptability and compatibility with different work situations. The instrument was improved after the pretesting especially with appropriate and suitable terms used within the Indonesian and Malaysian contexts. The reliability of the instrument was measured using the sample of the study and the reliability coefficients are presented in Table 1. Data were collected through the 'drop and pick-up later' method. The questionnaires were distributed to the selected respondents and were collected back one week after distribution.

The research framework for the study is presented in Figure 1. The framework comprises ToT task and HRD task variables with performance of agricultural extensionists as the focus of the study. Under the ToT task, three variables were measured: (i) technical knowledge and management practices, (ii) process of technology transfer and (iii) process of program development. On the other hand, HRD task had also three variables, namely (i) capacity building (leadership development); (ii) capacity building (problem solving skill); and (iii) capacity building (decision making skill).

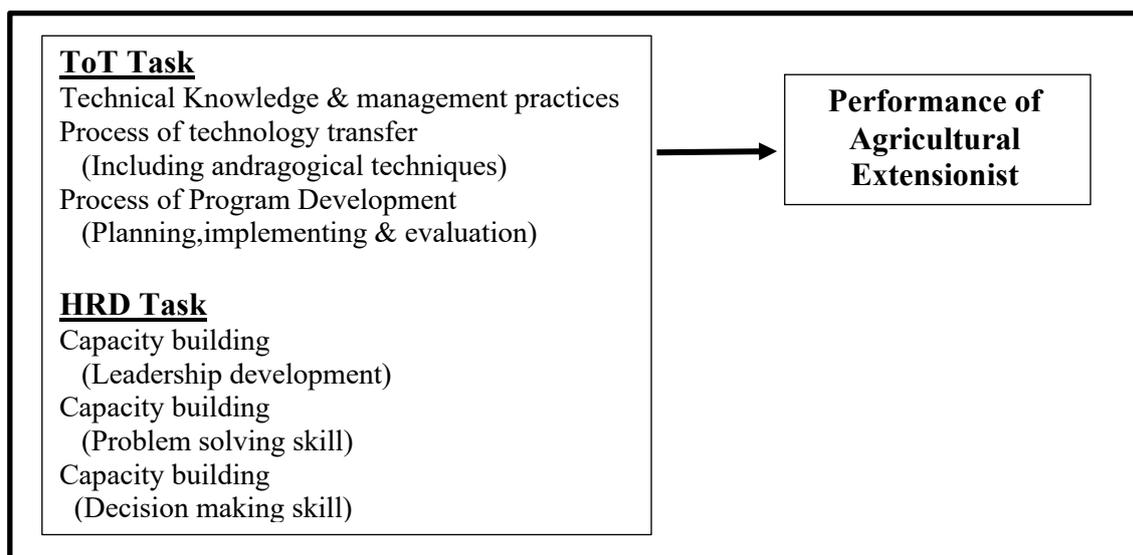


Figure 1: Research Framework

### Reliability Coefficients of Study Instrument

The reliability coefficients of all study variables for Indonesia and Malaysia were at acceptable levels ranging from r value of 0.69 for process of program development to r value of 0.94 for capacity building: leadership development, Malaysia. (See Table 1)

TABLE 1  
Reliability Coefficient

Variables	No. Item	Cronbach Alpha	
		Indonesia (n=126)	Malaysia (n=141)
Performance of agricultural extensionists	15	0.83	0.93
Technical knowledge and management practices	10	0.81	0.92
Process of transfer technology	6	0.73	0.90
Program development process	9	0.79	0.64
Capacity building – Leadership devpt.	7	0.72	0.94
Capacity building - Problem Solving	5	0.73	0.91
Capacity building - Decision Making	5	0.73	0.92

### RESULT AND DISCUSSION

Table 2 depicts the respondents' profile. About two-thirds of the respondents (66.7% Indonesia, 68.1% Malaysia) were males and the rest were females. Slightly more than two-thirds (67.4%) of the respondents from Malaysia were between 20-40 years old, while 73.8% of the respondents from Indonesia had the same age range. The mean age of respondents from Indonesia and Malaysia was 35.7 years and 38.9% years respectively. In terms of educational level, the majority of the Indonesian respondents (89.7%) had bachelor degrees while only 29.1% of the Malaysian respondents had similar qualifications.

TABLE 2  
Respondents' Profile

	Indonesia (n=126)		Malaysia (n=141)	
	<i>f</i>	%	<i>f</i>	%
<b>Gender</b>				
Male	84	66.7	96	68.1
Female	42	33.3	45	31.9
<b>Age Group</b>				

20-30	31	24.6	29	20.6
31-40	62	49.2	66	46.8
41-50	33	26.2	24	17.0
>50	0	0	22	15.6
	$\bar{x} = 35.7$		$\bar{x} = 38.9$	
<b>Education Level</b>				
SPM	0	0	22	15.6
Sijil	0	0	44	31.2
Diploma	0	0	31	22.0
Bachelors	113	89.7	41	29.1
Masters	13	10.3	3	2.1

Similar performance levels were found among agricultural extensionists in Indonesia and Malaysia in carrying out both ToT and HRD tasks. The data centred around 50% for high level and 30% for moderate level, indicating that the majority of the agricultural extensionists performed moderate to high levels of ToT and HRD tasks. This trend of job performance by agricultural extensionists contradicted earlier belief that agricultural extensionists preferred to do ToT task rather than HRD task. Why is this so?

TABLE 3  
Level of Performance of ToT and HRD Task Variables Practised by Respondents in Indonesia (n=126) and Malaysia (n=141)

			Low(%)	Moderate(%)	High(%)
Overall performance of agric. Extensionist in ToT &HRD tasks	I		11.1	38.9	50.0
	M		7.9	33.8	58.3
<b>ToT</b>					
Technical knowledge & management practices	I		10.3	30.2	59.5
	M		8.0	29.7	62.3
Process of technology transfer	I		18.3	32.5	49.2
	M		5.2	40.3	54.5
Process of program development	I		11.9	26.2	61.9
	M		6.6	30.9	62.5
<b>HRD</b>					
Capacity (leadership development) building	I		20.6	31.7	47.6
	M		15.2	29.7	55.1
Capacity (problem solving skill) building	I		12.7	40.5	46.8
	M		12.1	34.8	53.2
Capacity (decision making skill) building	I		20.6	30.2	49.2
	M		15.6	30.5	53.9

I = Indonesia                      M = Malaysia

One of the reason was that the results of ToT task could be easily seen and evaluated such as the number of new technologies that clients had adopted and the number of practices that clients had followed as being taught by agricultural extensionists. On the other hand, the results of HRD tasks were not easily seen and usually would take a longer time to detect any changes in clients' knowledge, attitude and skills they had acquired. Agricultural extensionists were beginning to realize through field experience, suggestions and feedback from clients that both ToT and HRD tasks when performed together could have higher impact on technology adoption with favourable development of attitudes, commitment and willingness among them to do their own projects initiatives.

Another possible reason why the findings of the descriptive data on performance was leaning towards moderate and high-performance levels was related to biasness of the study instrument, favouring respondents to respond in positive ways. Other methods of data collection could be instituted for future studies.

TABLE 4  
Pearson Correlation for ToT and HRD Variables with Performance of Agricultural Extensionists in Indonesia and Malaysia

Variable	Performance of agricultural extensionist	
	Indonesia (n=126)	Malaysia (n=141)
<b>ToT task</b>		
Technical knowledge & management practices	.218**	.528**
Process of technology transfer	.320**	.571**
Process of program development	.245**	.566**
<b>HRD task</b>		
Capacity building – (leadership development)	.379**	.339**
Capacity building – (problem solving skill)	.276**	.429**
Capacity building – (decision making skill)	.178*	.580**

\*\*Correlation is significant at the 0.01 level

\* Correlation is significant at the 0.05 level

Table 4 presents correlation coefficients of ToT and HRD variables with job performance of agricultural extensionists in Indonesia and Malaysia. All ToT and HRD variables were positive and significantly related with job performance of agricultural extensionists, indicating that these variables had some influence on the job performance of extensionists. However, further examination of the data indicated that the r values for ToT variables were slightly higher than the HRD variables, especially so for the Malaysian case. The r values of HRD variables, although generally lower than the r values of ToT variables for both countries, gave a positive indication that HRD elements were beginning to be considered to be part of an extensionist's job description.

TABLE 5  
Multiple Linear Regression for ToT and HRD Variables with Job Performance of Agricultural Extensionist in Indonesia (n=126)

Variable	Unstandardized Coefficients	Std. Error	Beta (Standardized Coefficients)	t	p-Value
Constant	1.111	.314		3.537	.001
<b>ToT task</b>					
Technical knowledge & management practices	.071	.076	.081	.935	.352
Process of technology transfer	.169	.074	.200	2.280	.024
Process of program Development	-.014	.079	-.017	-.180	.858
<b>HRD task</b>					
Capacity building – (leadership development)	.168	.056	.273	3.010	.003
Capacity building – (problem solving skill)	.154	.068	.191	2.248	.026
Capacity building – (decision making skill)	.113	.060	.154	1.881	.062

Note:  $R^2 = .261$ , adjusted  $R^2 = .224$

TABLE 6  
Multiple Linear Regression for ToT and HRD Variables with Job Performance of Agricultural Extensionist in Malaysia (n=141)

Variable	Unstandardized Coefficients	Std. Error	Beta (Standardized Coefficients)	t	p-Value
<b>Constant</b>	.918	.227		4.042	.000
<b>ToT task</b>					
Technical knowledge &	.230	.077	.248	2.987	.003

management practices					
Process of technology transfer	.191	.091	.219	2.097	.038
Process of program Development	.079	.086	.086	.920	.359
<b>HRD task</b>					
Capacity building – (leadership development)	-.011	.065	-.014	-.168	.867
Capacity building – (problem solving skill)	.120	.082	.144	1.455	.148
Capacity building – (decision making skill)	.094	.078	.124	1.211	.228

Note:  $R^2 = .421$ , adjusted  $R^2 = .394$

When regression analysis was carried out to determine which particular ToT and HRD variables influenced more on agricultural extensionists' job performance, it was found that process of technology transfer (ToT), capacity building (leadership development) and capacity building (problem solving skill) were found to influence Indonesian agricultural extensionists' job performance (Table 5). For the Indonesian data, the results indicated that 22.4% of the variance on agricultural extensionists' job performance were explained by three variables, one from ToT and the other two from HRD.

For the Malaysian case, technical knowledge and management practices and process of technology transfer (both are ToT variables) were found to influence agricultural extensionists' job performance. None of the HRD variables had significant influence on the Malaysian agricultural extensionists' job performance (Table 6). For the Malaysian case, the results showed that 39.4% of the variance on agricultural extensionists' job performance was explained by two ToT variables.

Comparing the two regression analyses data for Indonesia and Malaysia, the variance explained for agricultural extensionist job performance was considerably low (22.4% and 39.4% respectively), indicating that there were other more important variables that might influence agricultural extensionists' job performance which were not considered in this study. Scrutinizing the data in Table 5 and Table 6, two HRD variables were in the regression equation for the Indonesian case and none for the Malaysian data. On the other hand, two variables and one variable respectively for the Malaysian and the Indonesian data were in the regression equation. Overall, the data in the regression analyses for Indonesia and Malaysia were similar in many aspects, indicating that there was no significant difference in agricultural extensionists' job performance of both countries. Extensionists for both countries tend to prefer ToT function over HRD function due to visibility outcomes of ToT function. The outcome of HRD function was slow and difficult to substantiate.

## CONCLUSION AND RECOMMENDATION

Based on the findings of the study, several conclusions could be made. They are:

- (i) The level of technical, management knowledge and HRD skills of agricultural extensionists were at moderate and high levels for both Indonesia and Malaysia.
- (ii) Agricultural extensionists' job performance in Indonesia and Malaysia was similar in many aspects when they carried out ToT and HRD tasks. However, they were more well-versed in ToT tasks compared to HRD tasks, implying that they carried out more visible tasks than the hidden ones.
- (iii) There was no conclusive evidence that agricultural extensionists preferred to do ToT tasks over HRD tasks from the data and findings of the present study. The findings of past studies showed that results of ToT tasks were more tangible and faster to be achieved compared to results of HRD tasks.
- (iv) Agricultural extensionists were beginning to learn and appreciate that ToT and HRD tasks were complementary in their overall job performance, especially in effective delivery and adoption of new technology and practices by clients.

Based on the findings and conclusions of the study, several recommendations are put forward for implementation and further research. They are:

- (i) Agricultural extensionists should learn how to develop local leaders among clients through formal and informal methods. The formal methods are through training programs, while the informal methods are through engaging clients in the process of planning, implementing, monitoring and evaluating socioeconomic projects. By involving clients in the process of program development, they would not only learn how to do it but also would inculcate the sense of belongingness to the program. Both the

formal and informal methods of leadership development would augur well for clients to learn further and to try on their own what they have learned.

- (ii) All orientation and in-service training programs for agricultural extensionists must include HRD elements besides technical and management practices. HRD elements such as leadership development process, decision and problem-solving knowledge and skills and empowerment to manage programs on their own. Agricultural extensionists must be made aware that their job performance covers both HRD and ToT tasks.
- (iii) Since the variance explained are relatively small for the Indonesian and Malaysian data, additional variables need to be added to expand the study. Variables such as the usage of modern media to acquire a broad range of technology information and practices from within the country as well as from abroad. The use of local traditional games as teaching and learning tools to disseminate new technology information and practices is another example of a variable that can be included in future studies.
- (iv) The strategy of teaching and learning to transfer new technology / idea / practices as well as to enhance and inculcate HRD traits must use both pedagogical and andragogical technique and strategies. With modern communication technology and the internet of things (IOT), agricultural extensionist must be prepared and be knowledgeable to use these gadgets to maximize impacts of their work on ToT and HRD.
- (v) Choose one district in Indonesia and one in Malaysia to start a pilot project to develop capacity building and transfer of technology competencies among agricultural extensionists in the districts selected. Provide all necessary trainings and guidance to extensionists for six to 12 months and measure their competencies and outcomes at the end of the pilot project. These outcomes must be compared with other districts other than the pilot project areas, to determine the effectiveness of capacity building implemented together with ToT strategies.
- (vi) Since findings of previous studies using quantitative methods with self-administered questionnaire in determining job performance of agricultural extensionists had mixed results, it is suggested that a similar study could be conducted using qualitative methods such as focus group discussion (FGD), in-depth interviews or field observation or any combination of these methods to get a more extensive and probably more accurate data to account for agricultural extensionists' job performance.

## REFERENCES

- Boyatzis, R. E. (1982). *The competent manager: A model for effective performance*. John Wiley & Sons.
- Creswell, J. W., & Clark, V. L. P. (2007). *Designing and conducting mixed methods research*. Sage publications.
- Karbasioun, M., Mulder, M., & Biemans, H. (2007). Towards a job competency profile for agricultural extension instructors: A survey of views of experts. *Human Resource Development International*, 10(2), 137-151.
- Khalil, A. H. O., Ismail, M., Suandi, T., & Silong, A. D. (2009). Human resource development competencies as predictors of agricultural extension agents' performance in Yemen. *Human Resource Development International*, 12(4), 429-447
- Punch, K. (2000). *Developing effective research proposals*. Sage.
- Rahim M. Sail (2016). Extension education for a developed malaysia: relevance and its applicability for clients' capability and capacity building. Kertas dibentangkan di International Agricongress 2016: Enhancing Green Agriculture (4-6 Oktober, 2016; Hotel Bangi-Putrajaya, Malaysia).
- Rahim M. Sail (2016b). Capacity Building as an Enable for Sustained Economic Growth and Development of Rural Communities: Roles of Research and Extension Agencies. Kertas dibentangkan di "International Conference on Economics, Education, Business and Accounting (ICEEBA 2016) (18-19 Oktober, 2016; Universitas Negeri Semarang (UNNES), Indonesia).
- Rahim, M. Sail (2010). "Empowerment of Agrifood Stakeholders in Facing Global Challenges towards Sustainability", International Conference on Agricultural Extension, AGREX 10, Palm Garden IOI Hotel & Resort, 26-28 October, 2010. Centre for Extension, Entrepreneurship and Profesional Advancement (APEEC).
- Rahim, M. Sail (2008). "Kompetensi Pembangunan Sumberdaya Manusia dan Pemindehan Teknologi dan Kaitannya dengan Prestasi Kerja Agen Pendidikan Pengembangan" (Human Resource Development Competency and Transfer of Technology and their Relationship with Extension Agents' Work Performance), Kertas Kerja yang dibentangkan di Seminar Pengembangan, anjuran sebuah agensi pengembangan, Selangor, Malaysia.

- Rahim M. Sail & Azizan Asmuni (2004). Pemindahan Teknologi Pertanian Berkesan untuk Pekebun Kecil. Kertas kerja dibentangkan di Persidangan Kebangsaan Pekebun Kecil Sawit 2004, Century Mahkota Hotel, Melaka.
- Rahim M. Sail & Mazanah Muhamad (1994). Factors associated with non-adoption of technology by rubber smallholders. *Pertanika Journal Social Sciences and Humanities*, 2 (1): 29-41.
- Rahim M. Sail, Raja Badrul Shah Raja Shah Kobat, Abdul Ghani Ibrahim, Ahmad Fuad Muhammad, Mazanah Muhammad, M. Hanim M. Tahir, M. Yusof M. Noor & W. Mansor W. Salleh (1990). From Smallholder's Practices Constraints and Needs to Appropriate Technology Generation, Development and Adoption: The Case of Rubber Smallholdings in Peninsular Malaysia. Kuala Lumpur: Rubber Research Institute of Malaysia (RRIM) and Universiti Pertanian Malaysia (UPM), Serdang.
- Rogers, E. M., & Shoemaker, F. F. (1971). Communication of Innovations; A Cross-Cultural Approach.
- Sail, R. M., Prajanti, S.D.W., & Hamsan, H. H.(2017). Necessity Is the Mother of Intervention for Research and Extension Agenda of Rubber Smallholders. *Journal of Agricultural Science and Technology B*, 7.
- Spencer, L. M., & Spencer, P. S. M. (2008). *Competence at Work models for superior performance*. John Wiley & Sons.
- Vathanophas, V. (2006). Competency requirements for effective job performance in Thai public sector. *Contemporary Management Research*, 3(1), 45.