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# Pertanika Journal of Social Science and Humanities

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## Role Conflict and Coping Behaviour of Married Working Women

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**Keywords:** role conflict, work-family conflict, coping behaviour, coping strategies working women

### ABSTRAK

Penyelidikan ini mengkaji konflik di antara peranan kerja dan keluarga bagi wanita yang telah berkahwin, serta strategi pengurusan konflik tersebut. Data dari 82 wanita profesional dari enam institut penyelidikan menunjukkan wanita-wanita ini mengalami konflik di antara peranan kerja dan keluarga dengan intensiti yang berbeza, dalam usaha untuk memenuhi tuntutan setiap peranan. Mereka mengurangkan konflik dengan mengguna strategi reaktif serta mengubah sikap dan persepsi diri terhadap tuntutan peranan. Kedua-dua strategi ini lebih selalu digunakan berbanding dengan strategi pendefinisian semula peranan secara struktur yang melibatkan pengubahan harapan ahli-ahli dalam set peranan seperti ahli keluarga, rakan-rakan dan ketua di tempat kerja, dan masyarakat. Implikasi hasil kajian terhadap wanita yang berkerja serta cadangan penyelidikan selanjutnya dibincangkan.

### ABSTRACT

This study examined the conflict that married women experienced between work and family roles, and analysed the coping behaviour. Data from 82 professional women from six research institutes revealed that married women experienced work-family conflict with varying intensities in trying to meet the expectations of work and family roles. In managing the work-family conflict, the women tended to cope through reactive role behaviour, and personal role redefinition by changing their own attitudes and perceptions of role expectations. These two strategies were more frequently adopted than structural role redefinition, which entails changing the expectation of members in the role set such as family members, colleagues and leaders at the work place, and society. Implications of these findings for working women and suggestions for further research are discussed.

### INTRODUCTION

Married working women are faced with problems in performing different roles, such as the wife, mother, homemaker and employee roles. The major role problem a woman faces is the conflict arising from multiple roles. According to Katz and Khan (1978), the fact that multiple roles operate at the same time should lead to greater role conflict. The expectations surrounding any of these roles can generate interrole conflict when they involve pressures to dominate the time of the focal person and interfere with fulfilling the expectations associated with the other roles.

Time utilisation studies have shown that married women spend substantial amounts of their time performing multiple roles (Hing 1984; Airmy *et al.* 1991; Aminah and Narimah 1992;

Van Der Lippe *et al.* 1992). Also, the role theory postulates that multiple roles can lead to interrole conflict and, in turn to symptoms of strain (Katz and Khan 1978).

Women in multiple role situations hence need to reduce the amount of conflict they experience by using coping strategies. Many researchers have studied role conflict (Holahan and Gilbert 1979; Pleck *et al.* 1980; Beutell & Greenhaus 1983; Koppelman *et al.* 1983; Cook and Rousseau 1984; Good *et al.* 1990; Duxbury and Higgins, 1991; Gutek *et al.* 1991; Higgins and Duxbury 1992), and coping behaviour (Hall 1972; Beutell and Greenhaus 1983; Gray 1983; Alpert and Cubertson 1987; Long 1989; Skinner and McCubbin 1991), especially focusing on women in Western cultures.

In Malaysia, with the increase in the percentage of women entering the work force, from 36.3% in 1970 to 46.8% in 1990 (Siti Rohani 1993), and their attachment to employment becoming much more permanent, it is pertinent that the diversified role expectations and coping strategies undertaken by women be explored empirically. A study of role conflict among married working women in Malaysia by Fatimah (1985) suggested the need for further studies on work-family conflict and coping behaviour of married working women.

Work-family conflict, as defined by Kahn *et al.* (1964), is a form of interrole conflict in which the role pressures from the work and family domains are mutually incompatible in some respects. Each role within the family and work environment imposes demands requiring time, energy and commitment.

Hall (1972) has identified three types of coping behaviour for dealing with interrole conflict. The three types of coping behaviour were logically derived from three role components by Levinson (1959)—structurally imposed demands, personal role conception and role behaviour. Type I coping (structural role redefinition) involves an active attempt to deal directly with role senders and lessen the conflict by mutual agreement on a new set of expectations. One way of changing structural demands would be to relocate and share one's role tasks (cleaning, washing, and child care, for example).

Type II coping (personal role redefinition) involves changing one's personal concept of role demands received from others. It entails changing the expectations themselves. An example is setting priorities among and within roles, being sure that certain demands are always met (for example, the needs of sick children), while others have lower priority (such as dusting furniture).

Type III coping (reactive role behaviour) entails attempting to improve the quality of role performance with no attempt to change the structural or personal definition of one's roles. Implicit in coping through role behaviour is the assumption that one's role demands are unchangeable and that the person's main task is to find ways to meet them; this coping strategy involves a passive or reactive orientation toward one's roles.

Recognising that the demands of multiple roles result in role conflict and, in turn, strain, and the need to adopt certain coping strategies to manage the conflict, this study investigated the intensity of work-family conflict experienced by married working women and analysed their coping behaviour using Hall's (1972) model of coping with role conflict.

## METHOD

### *Subjects and Procedure*

Subjects in this study were women who (a) were married and living with their husbands; (b) had at least one child; and (c) were full-time researchers by occupation or officers responsible for research and are employed in research institutions. These criteria were established to ensure that the women in the sample had quite similar responsibilities in performing family and work roles. One hundred and sixty-five professional women meeting these criteria from six selected research institutions were mailed questionnaires to complete and return envelopes. Of the 165 mailed questionnaires 82 were returned within a period of nine weeks.

The women in the sample averaged 38.8 years of age ( $SD = 5.50$ ). There was an average of 2.9 ( $SD = 1.46$ ) children in the family and an average of 2.7 ( $SD = 1.38$ ) children living at home. Seventy-nine of the women were researchers by occupation while three were medical officers who were also engaged in research work. The majority of the women had Master's (59.3%) and Ph.D. and M.D./M.B.B.S (24.7%) degrees; only 16.0% of them had Bachelor's degree. They earned an average gross income of RM3241.00 per month. Those who had children below four years old constituted 46.4%. Fifty seven percent of the women reported that they had domestic helpers. Among those who had domestic helpers, a majority (85.1%) had full-time helpers. Women who sent their children to child-care centres constituted 24.1%.

### *Instruments*

Conflict intensity was measured using the interrole conflict scale by Pleck *et al.* 1980. This scale consists of eight items based on the three most prevalent aspects of work-family conflict, namely excessive work time, schedule conflicts, and fatigue or irritability. The response options



for the questions or items were five-point scales ranging from strongly disagree (1) to strongly agree (5). The reliability coefficient (alpha) for this work-family conflict scale was 0.90.

Coping was assessed using an adapted version of role-coping inventory by Hall and Hall (1979). This inventory has 22 coping strategies or items for three types of coping—structural role redefinition (Type I), personal role redefinition (Type II) and reactive role behaviour (Type III). The response options for the items were five-point scales ranging from never (1) to nearly all the time (5). One of the items for Type II coping was deleted since it was inappropriate to the subjects based on content validation. The item deleted was “Eliminate certain roles (e.g., deciding to stop working)”. Another item was deleted from the Type III coping scale because of lack of variance and low item-total correlation based on the reliability test via internal consistency. The item deleted was “Do not attempt to cope with role demands and conflicts. Let role conflicts take care of themselves”. The inventory for this present study consisted of 20 items, 12 items for Type I, six items for Type II and two items for Type III coping. The reliability coefficient (alpha) for Type I coping scale was 0.69, Type II 0.77 and Type III 0.78.

TABLE 1  
Distribution of respondents by work-family conflict intensity

Conflict Intensity	Frequency	%
High (>3.1)	22	28
Medium (2.3 - 3.1)	32	40
Low (<2.3)	25	32

RESULTS

Thirty-two (40%) of the 79 women who responded to the questions on role conflict reported medium intensity of conflict. Twenty-two (28%) reported high intensity of conflict while 25 (32%) reported low intensity of conflict (Table 1). The mean for work-family conflict on a five-point scale was 2.7 (SD = 0.72).

Table 2 presents the means and standard deviations of items measuring work-family conflict. The most highly endorsed item was “After work, I come home too tired to do some of the things I would like to do” (M = 3.31; SD = 0.99). The item that was least endorsed was “My work schedule often conflicts with my family life” (M = 2.4; SD = 1.05).

TABLE 2  
Means and standard deviations of items measuring work-family conflict

Items	M	SD
My work schedule often conflicts with my family life	2.4	1.05
After work, I come home too tired to do some of the things I would like to do	3.3	0.99
On the job I have so much work to do that it takes away time for my family interests	2.7	0.82
My family dislikes how often I am preoccupied with my work while I am home	2.6	0.82
Because my work is demanding, at times I am irritable at home	2.8	1.06
The demands of my job make it difficult to be relaxed all the time at home	2.7	1.04
My work takes up time that I would like to spend with my family	2.7	0.95
My job makes it difficult to be the kind of spouse or parent I would like to be	2.8	1.13

To manage the work-family conflict all three types of coping were used by the women. Within the Type I coping (structural role redefinition), the strategies "Get help from someone outside the family (e.g. home maintenance help or child care)" ( $M = 3.4$ ;  $SD = 1.39$ ) was most frequently reported as a means to reduce role conflict (Table 3). The least frequently reported strategy was "Get help from someone at work" ( $M = 1.4$ ;  $SD = 0.69$ ).

Within the Type II coping (personal role redefinition), the women tended to report most frequently the use of the strategy "Establish priorities among your different roles, so that you are sure the most important activities are done" ( $M = 4.1$ ;  $SD = 0.74$ ) (Table 4). The least frequently reported strategy was "Develop self and own interests (e.g. spend time on leisure or self development)" ( $M = 3.1$ ;  $SD = 1.04$ ).

The women reported frequent use of both the strategies for Type III coping (reactive role behaviour) although "Plan, schedule, and

organise carefully" ( $M = 4.0$ ;  $SD = 0.85$ ) was more frequently used than "Work hard to meet all role demands. Devote more time and energy so you can do everything expected of you" ( $M = 3.8$ ;  $SD = 0.9$ ) (Table 5).

In managing the work-family conflict, overall, the Type III coping (reactive role behaviour) with a mean of 3.9 ( $SD = 0.78$ ) was most frequently used by the women whereas the least frequently used strategy was the Type I coping (structural role redefinition) with a mean of 2.5 ( $SD = 0.45$ ) (Table 6). A priori contrasts revealed that there were significant differences in the use of Type I and Type II, as well as Type I and Type III coping (Table 7). Frequency in the use of Type II and Type III coping was also significantly different.

## DISCUSSION

Role theory predicts that the expectations surrounding each of the different roles a person performs can generate interrole conflict when

TABLE 3  
Means and standard deviations of items measuring type I coping

Items	M	SD
Decide not to do certain activities that conflict with other activities	3.0	0.85
Get help from someone outside the family (e.g. home maintenance help or child care)	3.4	1.39
Get help from a member of the family	2.7	1.13
Get help from someone at work	1.4	0.69
Engage in problem solving with family members to resolve conflicts	2.7	1.15
Engage in problem solving with someone at work	2.0	0.95
Get moral support from a member of the family	3.2	1.05
Get moral support from someone at work	2.3	0.99
Negotiate or plan with someone at work, so their expectations of you are more in line with your own needs or requirements	2.4	1.09
Integrate or combine roles (e.g., combine work and family life in some ways)	2.5	1.18
Attempt to change societal definition of sex roles, work roles, or family roles	2.2	1.13
Negotiate or plan with members of your family, so their expectations of you are more in line with your own needs or requirements	3.2	1.10

TABLE 4  
Means and standard deviations of items measuring type II coping

Items	M	SD
Establish priorities among your different roles, so that you are sure the most important activities are done	4.1	0.74
Partition and separate your roles. Devote full attention to each role when you are in it	3.9	1.02
Overlook or relax certain standards for how you do certain activities (let less important things slide a bit sometimes, such as dusting or lawn care)	3.6	0.95
Modify your attitudes toward certain roles or activities (e.g. coming to the conclusion that the quality of time spent with a spouse or children is more important than the quantity of time spent)	3.8	1.00
Rotate attention from one role to another. Handle each role in turn as it comes up	3.6	1.02
Develop self and own interests (e.g. spend time on leisure or self-development)	3.1	1.04

TABLE 5  
Means and standard deviations of items measuring type III coping

Items	M	SD
Plan, schedule, and organise carefully	4.0	0.85
Work hard to meet all role demands. Devote more time and energy so you can do everything expected of you	3.8	0.95

TABLE 6  
Means and standard deviations of respondents' scores for coping types

Type of Coping	M	SD
Type I Structural Role Redefinition	2.5	0.49
Type II Personal Role Redefinition	3.7	0.59
Type III Reactive Role Behaviour	3.9	0.78

TABLE 7  
Values for the difference in the use of coping types

Type of Coping	df	t	p
Type I and Type II	68	-4.44	0.00
Type I and Type III	70	-12.72	0.00
Type II and Type III	77	-2.04	0.02



they involve pressures to dominate the time of the focal person and interfere with fulfilling the expectations associated with the other role (Katz and Kahn 1978). The multiple role expectations can lead to feelings of work overload, that is the feeling that there is too much to do on the job (Katz and Kahn 1978) since each of these roles imposes demands requiring time, energy, and commitment. The fact that women in this study experienced work-family conflict with varying intensities as they performed different roles as a wife, mother, homemaker and employee are supportive of the role theory and findings of studies by Beutell and Greenhaus (1983), Fatimah (1985), Gutek *et al.* (1991) and Higgins and Duxbury (1992).

To manage the conflict arising from the demands of work and family domains, the women in this study adopted most frequently Type III coping (reactive role behaviour). This behaviour involves attempts to meet all the role demands experienced. These strategies probably present considerable strain on the women's energies since they involve attempting to do everything demanded, rather than attempting to reduce demands. Since the assumption is that all role expectations must be met, the women engaged in careful planning, scheduling and organising of their role activities, and working harder to meet all their role demands. Although results of a study by Gray (1983) showed that professional women used Type III coping least often, the study conducted by Skinner and McCubbin (1991) found that one of the coping strategies that women in dual employed families commonly used was maximising efficiency and organisation to meet the demands of work and family roles.

Although Type III coping is thought to be less effective (Hall 1972) and less successful (Beutell and Greenhouse 1983), the attempt to be a "supermother" appears to be a common strategy among married women with relatively more traditional attitudes (Beutell and Greenhaus 1983). Elman and Gilbert (1984) reported that reactive role behaviour, which involved working more efficiently and planning their time more carefully with the idea of trying to fit everything in, was the most highly endorsed coping strategy by the professional women in their study.

The second most frequently adopted coping type was Type III coping (personal role redefinition). Type II coping involves changing

the person's perceptions of his or her role demands rather than attempting to change the environment. In other words, the women in this study tended not to redefine the expectations held by other people and tended not to negotiate a new set of expectations from their role senders as would be the case with Type I coping. Instead, the women tried to change the perceived role by seeing their own behaviour or the external expectations in a different light. By doing so, they attempted to reduce the amount of conflict actually experienced. Specific examples of Type II coping strategies commonly used by the women in this study included establishing priorities, partitioning and separating roles, reducing standards or choosing not to meet certain role demands, changing attitudes toward certain roles and rotating attention from one role to another. Compromising as a way of reducing strain and making the lifestyle manageable is a common behavioural response (Skinner and McCubbin 1991). Domestic overload, for instance, may be managed through compromise by deliberately lowering standards. An individual compromises household standards because of the constraints of time and energy to achieve them (Holmstrom 1973).

Type I coping (structural role redefinition) was the least frequently adopted coping type among the women. It involves redefining the expectations held by other people so that fewer conflicting demands are placed upon the person and a new set of role behaviours is expected from that person by members of the role set. Such coping requires communicating with one's role senders and negotiating a new set of expectations which will be mutually agreed upon. This means changing the received role as opposed to changing the perceived role alone, as would be the case with Type II coping. The lack of help obtained from family members in reducing work loads and resolving conflict suggests that the redistribution of roles within the family to match increased role responsibilities outside the home has not been widely practised.

The less frequent use of Type I coping could, to a certain extent, be due to the notion that Type I coping seems more directly related to long-term conflict reduction and satisfaction than Type II or Type III coping. More convincingly, the literature on sex-role socialisation indicates that the universal culture, through what Bem and Bem (1971) call a

nonconscious ideology, rewards more reactive, less confronting and aggressive coping in women of all ages. A study by Long (1989) found that sex-role socialisation relates to differences in coping and occupational strain among working women. The fact that girls, through early socialisation, are trained to be less venturesome, independent, and aggressive than boys of the same age (Lewis 1972) could also possibly bear some relation with the type of coping women adopt.

### CONCLUSION

Married working women experience work-family conflict in trying to meet the expectations of work and family roles. In managing the conflict arising from the expectations of multiple roles, the women tended to cope through reactive role behaviour and personal role redefinition more than structural role redefinition. Hall's (1972) model of coping with role conflict was found to be useful in analysing the coping behaviour of a focal person experiencing work-family role conflict.

One of the implications of the prevalence of work-family conflict among married working women is that women will need assistance in terms of facilities, education, and advisory and support services in trying to cope with the conflict. Extension planners need to consider the problems in managing multiple roles among dual-career families when planning non-formal educational programmes. Family development practitioners should be responsive to dual-career families in need of assistance in managing work-family conflict. A knowledge of various coping strategies and their consequences is essential. Family development educators concerned with effective management of contemporary family stressors are encouraged to include more extensive coverage of the work-family interface in the curriculum.

Acknowledging that married working women experience work-family conflict, it is pertinent that employers and policy makers pay special attention to improve the welfare of employees through improved facilities and support services such as day-care on site, flex-time and 90-day maternity leave, to help them cope with their multiple roles. Besides employers, policy makers, extension planners and family development practitioners and educators, husbands also have a role to play since spousal support is a crucial

variable for the reduction of interrole conflict for working women (Holahan and Gilbert 1979).

It is important that researchers concerned with the problems of married career women avoid seeing the problem of work in isolation from the total life space of women. Another stream of research that warrants continued investigation is that of role conflict experienced by other groups of working women and their coping behaviour, and how organisations can facilitate the development of individual coping strategies through human resource development programmes. Further research concerning work-family conflict needs to address the manipulation of organisational policies to reduce the strain produced by dual roles of the home and work environments. Researchers need to investigate adjustments made by organisations which actually reduce the stresses arising from the mutual demands of the work and family domains.

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## Selecting Media for Knowledge Transfer: Experience from the Field

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**Keywords:** media selection, knowledge transfer, development communication, instructional media, campaign media

### ABSTRAK

Kajian ini meneliti cara pegawai-pegawai unit atau bahagian komunikasi agensi pembangunan pertanian memilih media untuk memindahkan pengetahuan dari agensi kepada klien mereka. Data untuk kajian ini diperolehi melalui kaedah tinjauan yang melibatkan 95 orang pegawai dari 11 buah agensi dengan menggunakan borang soalselidik yang dijawab sendiri oleh responden. Secara keseluruhannya, soalan pada borang soal selidik berbentuk pilihan dan yang menggunakan skala 1 hingga 7 untuk mendapatkan pandangan dan pengalaman responden. Hasil kajian ini mendapati bahawa responden memilih benda sebenar atau realia sebagai media atau bahan yang paling baik untuk aktiviti pemindahan pengetahuan dan diikuti oleh media-media yang berkebolehan memberikan gambaran sebenar. Responden juga menyatakan bahawa media untuk pengajaran adalah berbeza dari media untuk kempen penerangan. Berkaitan dengan unsur-unsur yang perlu diambilkira semasa pemilihan media, responden menyenaraikan ciri-ciri audien, diikuti dengan tujuan komunikasi, kegemaran media audien dan tempoh yang diberi untuk menyediakan media.

### ABSTRACT

This study examines the ways in which staff of communication units in agricultural development agencies select media to transfer knowledge to their clients. A survey for data collection was conducted and 95 staff of communication units from 11 development agencies were asked to respond to self-administered questionnaires. Most of the questions were open-ended and ratings of items for frequency and applicability were on a scale of 1 to 7. The study revealed that the respondents regarded actual objects or realia best in knowledge transfer activities, followed by media that convey a high degree of fidelity. The respondents also indicated that media for instruction are somewhat different from media for campaigns. The selection elements considered important in the media selection process were audience characteristics, followed by purpose of communication, audience's media preference, and time given to prepare the media.

### INTRODUCTION

Appropriate communication media can greatly facilitate the delivery of knowledge from a source to a receiver and thus the selection of the right media for rapid and effective dissemination of knowledge becomes a challenge.

Due to mixed outcomes regarding the apparent effectiveness of mass media for encouraging development (Beltran 1974; Kears 1978; Hornik 1988; Mayo 1989), note that other communication media have arisen to support the communication process. Small media such as flipcharts, photographs and brochures, in

particular, have gained popularity and have proven to be effective.

The Academy for Educational Development (AED) (1985) noted that there are strengths and weaknesses in the specific media and an almost universal recognition that a single medium alone accomplishes much less than several media in combination.

In light of the current advancements in communication technology, the need for the right choice of communication media is greater than ever. Proper planning and selection to develop a single medium or combination of

media to meet the specific communication objectives, is of utmost importance.

Schramm (1977) states that media selection is a rational act, as the decision-maker has to consider a host of information related to media, message, learners, cost, and so on. Pounds (1985) believes media selection is derived from research and states that "knowing where people look for information is only half the battle for an extension communicator. Knowing where people find information is the other half".

Kemp and Smellie (1989) propose that selection be done after reviewing a number of media and considering such factors as learners, purpose or objective, content, media type, active learning, technical quality, cost, and validation.

A number of media selection models for instruction have been developed by scholars such as Anderson (1983), Reiser and Gagne (1983), Romiszowski (1988), and Reynolds and Anderson (1992). As an example, according to Gagne and Briggs (1979), there are six factors that need to be considered in media selection: 1) task variables - the type of performance expected of learners as a result of instruction; 2) learner variables - the characteristics of the learners that can be matched to specific features of instruction and media as different learners have different learning styles; 3) the assumed learning environment - the practicality of media use as it relates to size of class, capability of developing new materials, availability of media equipment, etc.; 4) the assumed development environment - the time, budget, and personnel available that could ensure the success of designing the specified delivery system; 5) the economy and the culture - to ensure that the chosen media would be acceptable and practical to the users, and are within the budget and technology of the agency; and 6) the practical factors - considerations that need to be reviewed with regard to use, audience, location of use, production and so on.

Media selection in communication is mostly related to information campaigns, and few, if any, formal models have been proposed. Instead, a number of guidelines for media selection have been proposed by several scholars (Schramm 1977; Adhikarya and Middleton 1979; Adhikarya and Posamentier 1987; Rogers and Storey 1987; Mody 1991).

Media selection for agricultural development was initiated in the late 1970s. As Kears (1978)

noted, two important new questions, although not yet the focus of much research, were at least beginning to be asked: 1) what channels of communication, administrative or otherwise, will best integrate the contributions of diverse public and private agencies in meeting agricultural development needs? 2) what communication channels and devices will help rural people clarify their alternatives, organize their resources, and make those outside the community aware of their needs?"

More recently, Rosser (1987) stated that the responsibility of the communication-research unit is to ensure that the information being disseminated through the different media is being readily received and understood by the farming community. As such, technical terms have to be simplified and translated into the vernacular languages. Also, special audio and audio-visual programmes have to be presented in an acceptable cultural format.

Watts and Claar (1983) state that as media develop, as changes occur in audiences and their access to media, as research reveals more about the complexity and richness of human communication, and as planners of education and communication become more adept, an effective media selection process is very important because it is the basis for successful communication.

There are at least five ways in which appropriate communication media can help in the transfer of knowledge. First, media improve reach and access. "Reach" means that a larger number of users will receive the knowledge and "access" means users can easily get the knowledge whenever it is required. As a result of better reach and access, knowledge will be more equally distributed among the users. Second, it facilitates the teaching and learning process. When learners can understand knowledge better, it is more likely that the knowledge will eventually be utilized. Third, it helps extension agents perform their tasks more efficiently as it helps extension agents to cope with the increase of knowledge from research institutions and to present new knowledge effectively. Also, information can be disseminated more widely and democratically in this manner. Fourth, a proper media selection procedure can save time, personnel and cost of media production. In this manner the agency's resources will be better utilized. Fifth, the media serve the additional



purpose of documenting information as well as keeping records of the knowledge that has been transmitted by agencies.

### METHODOLOGY

The purpose of this media selection study was to determine how the staff of communication units of agricultural extension agencies in a developing country select particular communication media to disseminate agricultural knowledge to farmers. More precisely, the study proposed first to gain a better understanding of the following:

- a. Which communication media would developers consider most appropriate for instruction and for campaigns, and whether they perceived any difference between the media for these two particular purposes?
- b. Which selection factors were considered salient to media developers when choosing the most appropriate communication media for knowledge transfer and how the selection factors would be prioritized?

In order to answer these questions, a survey utilizing self-administered questionnaires was developed to gather data from the respondents. A scale of one to seven was often used to evaluate the perceptions and experiences of the respondents. The seven value scale was chosen because Chaffee (1991) noted that "reliability improved up to, but not beyond, seven categories".

The reliability measure, Cronbach's Alpha was applied to each question that had a scale of 1 to 7. It was found that the Cronbach's Alpha values on most of the questions were relatively high (ranged from .5939 to .9297).

The total of 108 staff members involved in media planning and production at the 11 agricultural extension agencies were selected for the study. Of the 108 questionnaires distributed to the staff, 95 were returned (88% response rate).

Data were coded and entered into the computer using the Statistical Package for Social Science X (SPSSX) program for data analysis. Percentages, means, standard deviations and difference of means t-tests were conducted. The need (Blalock 1979) to better understand and explain the differences among the respondents and among the agencies urged the researcher to

perform such statistical tests. The significance level for the statistical analyses was set at .05.

### RESULTS

Results of this study show that all 11 agricultural extension agencies were capable and had been producing many kinds of communication media for information dissemination. All agencies reported having adequate facilities, personnel and budgets for media production. The number of staff within the agencies ranged from 3 to 27.

The respondents' ages ranged from 20 to 54 years (mean = 36.93 and std. dev. = 6.54); their working experience ranged from four months to more than 25 years (mean = 8.71; std. dev. = 6.16) and their educational level ranged from high school to Master's degree. Respondents with titles "Officers," "Heads of Unit", and "Assistant Officers" possessed technical expertise in agricultural subjects, whereas "Technicians", "Artists", "Photographers", "Operators", and "Others" were familiar with the production of communication media. Thus, the communication units of these agencies had a pool of technical expertise and media preparation talent. A combination of those who know the subject matter and those who know how to present the information or message in a suitable medium for a specific communication situation can be expected to be particularly effective in knowledge transfer activities.

#### *Media Appropriate for Instruction*

Respondents were asked to rate the communication media they considered appropriate for instruction using a scale of 1 (not at all appropriate) to 7 (very/most appropriate). Out of the 29 listed media, this study found that realia (the actual object or sample of the real thing was considered by 46 respondents (48.4%) to be the most appropriate medium for instruction (scale of 7). The 10 media considered most appropriate for instruction are displayed in Table 1.

The list of media considered appropriate for instruction by respondents comprised a mixture of print, electronic, "big", and "small" media. It can be seen that the top 10 media considered appropriate for instruction by respondents are mostly visual media, i.e., media that use or contain pictures and illustrations to convey messages or knowledge. A risalah is a kind of publication containing basic and



TABLE 1  
Communication media rated for instruction

Type of Medium	Mean Values (N=95)
Realia	6.18
Video	5.98
Slides	5.79
Films	5.54
OHP Transparencies	5.49
Slide-tape series	5.45
Television	5.43
Flipcharts	5.31
Risalah	5.16
Photographs	5.08

comprehensive information on one or more agricultural techniques, written in a semi-technical to popular writing style and intended for farmers.

#### *Media Appropriate for Information Dissemination*

Using the same list of 29 media, the respondents were asked to rate the appropriateness of these media for information dissemination. Likewise, a scale of 1 (not all appropriate) to 7 (very/most appropriate) was used.

From the listed media, 50 respondents (52.6%) consider television to be the most appropriate medium for information dissemination (scale of 7). Other media rated to be appropriate for this purpose are listed in Table 2.

TABLE 2  
Communication media rated for information dissemination

Type of Medium	Mean Values (N=95)
Television	6.35
Radio	5.98
Posters	5.93
Newspapers	5.92
Video	5.83
Realia	5.79
Exhibitions	5.77
Films	5.67
Pamphlets	5.67
Risalah	5.55

As shown in Table 2, the respondents listed several mass media such as television, radio and newspapers to be appropriate for information dissemination. Other media that received relatively high ratings included video, posters, realia, and exhibitions. These results show that the respondents consider the mass media to be most appropriate for information dissemination. As such, these findings are in line with the general practices and perceptions of those involved in communication.

It can also be noted that the tenth-rated medium for information dissemination has a higher mean than the tenth-rated medium for instruction. When comparing media appropriate for instruction and for campaigns (Table 1 and Table 2), one should note that there are five media (television, video, realia, films, and risalah) that made it to the top ten media in both lists.

When asked if they considered communication media for instruction to be different from communication media for information dissemination, 72.63% of the respondents said they did, 20.00% said there was no difference between those two and 7.37% were uncertain. This acknowledgment by the respondents is clearly shown by several media that are rated differently for instruction and information dissemination. In addition, when asked whether they used different treatments when producing communication media for instruction versus information dissemination, 75.79% said they did, 20.0% said no, and 4.21% were uncertain.

To verify the respondents' opinions about the differences between media for instruction and media for information dissemination, a paired t-test procedure was performed on all 29 listed media. Basically this procedure compares the means of a medium that respondents regard as appropriate for instruction with the mean of the same medium that respondents regard appropriate for information dissemination. Results of paired t-test revealed 19 media showed statistically significant difference at  $p < .05$ , and 10 media showed no statistical difference at  $p = .05$ . The media that showed significant difference at  $p < .05$  included realia, television, radio, newspapers, risalah, posters, flipcharts, and pamphlets. The media that showed no statistical difference at  $p = .05$  included video, films, slide-tape series, and photographs.

Thus, it can be said that respondents of this study believe communication media for instruction are different from those media intended for information dissemination. This group of respondents is also more likely to record a difference throughout the media production process.

To further comprehend respondents' perceptions about the suitability of particular media for knowledge transfer, the means of media regarded as appropriate for instruction and media appropriate for information dissemination were averaged. As a result, another list of media ratings was developed. The list of top 10 media is shown in Table 3. Since the list consists of media for instruction and media for information dissemination, this new media rating is simply called "media appropriate for knowledge transfer".

TABLE 3

Communication media rated for knowledge transfer

Type of medium	Averaged mean (N=95)
Realia	5.98
Video	5.91
Slides	5.89
Films	5.61
OHP Transparencies	5.43
Slide-tape series	5.38
Television	5.36
Flipcharts	5.35
Risalah	5.31
Photographs	5.30

This new media rating clearly indicates that realia (or the real object) is the most suitable medium for either instruction or knowledge dissemination. The next four media suitable for instruction or information dissemination are also those best able to portray reality. Two print media, one audio medium, and a combination of media (exhibition) rounded out the 10 media most appropriate for knowledge transfer. This new list of media ratings can be considered a principal finding of this research because it was developed according to the perceptions and experience of the media developers themselves.

In order to ensure that the ratings of media for knowledge transfer by the respondents are

"real," a coefficient of concordance (Kendall w) was computed. A w of .1132 was found at  $p < .05$ , Chi Square = 85.6026, and d. f. = 9. Thus, there is a significant difference in the way the respondents rated the media for knowledge transfer.

It should be noted that not all media considered by the respondents to be appropriate for knowledge transfer are available within their agencies. For example, the agencies did not own television and radio stations, and they did not publish newspapers. However, the agencies usually take part or contribute in the production of television and radio programmes that are intended for farmers. Also, it is a common practice for producers of television and radio programmes to consult the agencies for programme contents. On the other hand, facilities are available for production of realia, video, slides, and slide-tape series, to mount exhibitions, and publish risalah.

Armed with knowledge of the types of communication media the respondents consider appropriate for knowledge transfer, we will examine the elements or factors they consider important when selecting appropriate medium or combination of media for particular purposes.

#### *Factors Considered in Selecting Media*

It is useful to note at this point that the present study assumes that the respondents would base their choice of a particular medium or combination of media for instruction or knowledge dissemination on the potential and/or proven effectiveness of certain criteria, according to certain procedures, and after considering a number of factors or elements. The questionnaire listed 25 possible elements that respondents could consider when making a media selection, and they were asked to rate the importance of the listed elements, on a scale of 1 (not at all important) to 7 (most or very important).

It was found that, overall, 53 respondents (55.79%) rated "purpose of communication" with a scale of "7" which means that the respondents considered it to be the most important element in selecting media. This was followed by "audience characteristics", chosen by 47.37% of the respondents who also gave a scale of "7." However, when mean values are listed in order to better present the ratings of selection elements, "audience characteristics" had



a higher value than "purpose of communication". Table 4 shows the ratings of the top 10 selection elements considered important by the respondents.

TABLE 4  
Elements rated for media selection

Selection element	Mean (N = 95)
Audience characteristics	6.29
Purpose of communication	6.24
Audience media preference	6.00
Time to complete media	5.98
'User' of media	5.86
Units capabilities	5.83
Visual illustration	5.79
Time to disseminate information	5.79
Availability of equipment	5.77
Location of media use	5.72

As shown in Table 4, the respondents indicated that, based on the mean values, "audience characteristics", "purpose of communication", "audience media preference", "time to complete media production" and "user of media" were the top five elements to be considered when selecting media.

To further explain the importance of the 25 listed elements in media selection, principal components analysis was performed. This analysis yielded seven factors with Eigen values of more than 1.0, (using Kaiser (1960) minimum Eigen value) and cumulative percentage of about 70%. The range of communalities for the seven factors was between .4489 and .8517, and only 35% of the residuals was less than .05. Thus, it appears that a 7 factor solution best fits the model for the 25 selection elements.

The first factor consisted of four items: "objective of communication," "audience characteristics," "user of media," and "audience media preferences," with loadings ranging from .5334 to .8606. The second factor consisted of three items: "full colour," "ease of media production," and "ease of updating content" with loadings ranging from .6511 to .7594. The third factor consisted of the items: "audio need," "visual movement," "media flexibility," and "media portability" with loadings ranging from .6226 to .7628. The fourth factor included

"location of media use," "time to disseminate information," "media durability," and "ease of media usage" with loadings ranging from .4765 to .7532. The items: "own capabilities," "colleague capabilities," and "units capabilities" were found in the fifth factor, with loadings ranging from .6872 to .8149. The sixth factor consisted of "time given to complete media production," "printed texts," and "visual illustration" with loadings ranging from .5797 to .8232. Finally, the seventh factor consisted of "production cost," "instruction from above," "availability of equipment," and "media selection guidelines" with loadings ranging from .4560 to .8083.

After ascertaining the media which the respondents consider to be appropriate for instruction and information dissemination or campaign and the kinds of selection factors that respondents considered important when deciding on the most appropriate media for knowledge transfer activity, perhaps now we have a better understanding of how the communication unit staff of the agricultural extension agencies select and make decisions on the most suitable media for their knowledge transfer activities. Can the media selection experience obtained from this study be shared by other development agencies in other parts of the world? Obviously, the potential is there.

## DISCUSSION AND CONCLUSION

It should be stressed that the main purpose of selecting communication media was to best facilitate the transfer of information or knowledge from a source to intended receivers. Theoretically, using suitable media that will carry appropriate content (information, message, or knowledge) can help the process in at least two ways: improve both reach and access and facilitate teaching-learning activities. However, methodical media selection has become necessary because information agencies can only disseminate information through media they can produce or get access to; and, on the other end, many potential receivers of information do not own or have access to certain media, resulting in the limitations on their access to information.

The types of media the staff members of the communication units considered right for knowledge transfer revealed a striking balance between the media that they considered to be highly appropriate for instruction and the media they considered to be highly appropriate for



information dissemination. According to them, methods of knowledge transfer that employ actual objects in face-to-face communication are best. However, if this is not possible then media that convey reality with a high degree of fidelity are highly recommended.

Respondents' choice of realia as the most appropriate medium for knowledge transfer is highly revealing - realia has always been ideal for any kind of teaching-learning, as it involves all human senses. Furthermore, in agriculture, use of real-life examples is highly recommended because farmers can relate to them directly, and usually the real things are particularly convincing. Respondents also considered video, television, and films to be appropriate for knowledge transfer. These media visually present real actions or motions of subjects in conjunction with audio, a portrayal of reality that is as close to reality as communication technology can get. Even though radio was rated tenth as a medium for knowledge transfer, it had been rated second by respondents as appropriate for information dissemination. Radio was rated slightly lower in this case by the respondents, perhaps due to its inability to present visual information. Nevertheless, it should be noted that radio has always been popular in project work in many developing countries.

Thus, it can be concluded that the respondents consider those communication media which can present reality with the greatest fidelity to be the most appropriate media for knowledge transfer. If it is not possible to use the kind of media just mentioned, then a media mix is preferred. If a media mix is also not possible, then an audio medium is suggested.

With regard to selection elements that respondents consider to be important when making media decisions, the top-ten elements (Table 4) can be categorized into three groups. The first group can be labelled as "theoretical" comprising the elements of audience characteristics, purpose of communication, audience media preference and user of media (extension agents or instructors). The second group can be labelled as "practical or logistic" consisting of the elements of time to complete media, unit's capabilities, time to disseminate information, availability of equipment and location of media use. The remaining element, visual illustration, can be categorized as "media attribute."

From these groupings we can see that the respondents consider theoretical and practical or logistic elements to be very important when deciding on the most appropriate media for knowledge transfer activities, followed by media attributes. Clearly, the respondents placed theoretical elements higher in their ratings than practical or logistic elements, and media attributes.

Thus, it can be concluded that the respondents regarded the theoretical elements to be the most important in deciding which medium or media combination is appropriate for a particular knowledge transfer activity, followed in order by the elements of practical or logistic, and media attributes. After all, in the final analysis, media are vehicles that facilitate the transfer of information from a source to an audience. However, communication media must be selected and developed carefully because without proper planning and consideration their use in development work could actually bring about negative outcomes.

Likewise, as noted by the respondents of this study, it is very important to treat a medium for instruction differently from a medium intended for an information campaign.

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## An Analysis of Teaching Behaviours of Preschool Student Teachers in a Laboratory School Setting

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**Keywords:** student teachers, teaching behaviours, laboratory school, observation rating scales, factor analysis

### ABSTRAK

Dalam kajian ini skala pemeringkatan terhadap sembilan dimensi tingkah laku mengajar 112 guru pelatih prasekolah yang telah dikenalpasti dalam kajian awal dianalisis semula dengan kaedah analisis faktor tinjauan. Tingkah laku mengajar dicerap dan direkodkan dengan alat pengukuran 'Observer Rating Scales'. Satu pola tingkah laku dapat dikenalpasti. Empat pembolehubah terpendam didapati mendasari sembilan dimensi tingkah laku mengajar yang dicerap. Pembolehubah-pembolehubah ini adalah: (1) 'facilitating' (2) 'interpersonal' (3) 'interactive' dan (4) 'flexible'. Pembolehubah terpendam atau faktor ini berkorelasi secara positif di antara satu dengan lain. Guru pelatih prasekolah dalam kajian ini didapati memperlihatkan tingkah laku mengajar tersebut dalam situasi sekolah makmal. Saranan untuk kajian lanjutan untuk menentusahkan dapatan ini dengan menggunakan analisis faktor pengesahan dibentangkan. Maklumat dari kajian ini diharap berguna sebagai panduan bagi pendidik guru dalam penyediaan guru pra-sekolah.

### ABSTRACT

In this study, the rating of nine dimensions of teaching behaviours of 112 preschool student teachers from a previous study was analysed using exploratory factor analysis. The teaching behaviours were observed and recorded using the observer rating scales. A pattern of behaviours was observed. Four latent variables were found to underlie the nine teaching behaviours. These are: (1) facilitating (2) interpersonal (3) interactive and (4) flexible. These latent variables are correlated with each other. Preschool student teachers in the study exhibited these teaching behaviours in their teaching performance in a laboratory school setting. Recommendations for future research to confirm the teaching behaviour model employing confirmatory factor analysis are presented. The findings of this study could hopefully serve as a useful guide for teacher educators in the preparation of preschool and early childhood teachers.

### INTRODUCTION

Data from a previous study (Briggs and Dickerscheid 1985) were re-analysed using the factor analysis options on SAS. The data came from the ratings of teaching behaviours of 112 preschool student teachers using the observer rating scales (ORS), a 6-point rating scale with a value of 1 as low and 6 as high (McDaniel *et al.* 1974). This study was done concurrently in the laboratory schools of two higher education institutions in the Midwest USA. The observer rating scales have a "relatively high degree of construct validity" and the inter-rater reliability

has been estimated to be .83 (Briggs and Dickerscheid 1985: 59).

The student teachers were observed for approximately 30 minutes. Their performance was rated by trained observers in classroom settings. All observations occurred during "free play" situations in which several classroom activities were occurring simultaneously and children were moving freely from one activity to another according to their interests.

The student teachers were rated on nine dimensions of teaching behaviours: warmth, enthusiasm, clarity, variety, individualization,

feedback, cognitive demand, freedom, and on-task activity.

Definitions of the nine behaviour dimensions (Briggs and Dickerscheid 1985) are as follows:

1. Warmth - the extent to which the teacher is relaxed and comfortable; the degree to which the teacher maintains positive interpersonal relationships with children.
2. Enthusiasm - the enthusiasm or interest level expressed by the teacher and children during nursery school activities.
3. Clarity - the clarity of communication, instructions and expectations conveyed to the children.
4. Variety - the extent to which the teacher uses a variety of materials and activities.
5. Individualization - the degree to which the teacher provides children with different levels of work suited to their particular needs, interests, and abilities, and the amount of individual assistance provided.
6. Feedback - the extent of communication to the children of information about the adequacy, acceptability, completeness or correctness of his or her response.
7. Cognitive Demand - the level of intellectual activity the teacher expects from the children.
8. Freedom - the degree to which the teacher provides arrangements which facilitate independence and individual freedom.
9. On-task Activity - the amount of child activity directed toward the accomplishment of instructional objectives.

The inter-relationship between the nine teaching behaviours of the preschool teachers was determined and the inference of the findings was made to the population of preschool teachers from which the sample was drawn. As mentioned earlier, this study was based on secondary data: it was not intended to relate the findings to the original article. Though factor analysis was used in the original study, different statistical software was used. Furthermore, only two factors were extracted in the original study. The only material that was utilized from the Briggs and Dickerscheid (1985) study was the published correlation matrix of the ratings on the nine teaching behaviours of the preschool student teachers. The emphasis of this paper is not only the interpretations of the data; equal importance is placed on creating awareness among readers of

the importance of selecting an appropriate computer program and considering issues in methodology when using factor analysis as a statistical technique.

## METHOD

The exploratory factor analysis technique was used to analyse the data as the investigator did not have any prior theories on the relationship between these teaching behaviours. The raw data from the ratings of 112 student teachers on nine measured variables were first reduced to a 9 x 9 correlation matrix. The upper triangular matrix without the diagonal was used. The correlation matrix showing the relationship of the measured variables is presented in Table 1.

Assuming that the common factor model holds, a maximum likelihood method of factor extraction was performed on the data set, based on the assumption that for  $m$  measured variables (MVs) there exists  $p$  latent variables (LVs) or factors that account for the variation and covariation in the measured variables. Another condition that needs to be satisfied is that  $p < m$ .

The Statistical Analysis System (SAS) program was used for the analysis due to its superior attributes in factor analysis procedures and options (MacCallum 1983). The maximum likelihood method of factor analysis was chosen because the investigator was not only providing a description of the relationship between the variables but also recognizing that the data came from a population. Maximum likelihood estimation provides information on whether the data could have come from a population where the common factor model also holds. This was done through hypotheses testing at each step of the maximum likelihood factor extraction method.

Starting with zero factors, that is the variables are not correlated in the population, the null hypothesis is that there is zero common factor against an alternative hypothesis that there is at least one common factor in the measured variables. At each step, the  $Q$  value at  $p$  factor hypothesized was calculated. The value of  $Q$  is obtained by dividing the Chi-square ( $X^2$ ) by the respective degree of freedom at  $p$  factor. The Chi-square ( $X^2$ ) value at each step is significant and the null hypothesis is rejected at most steps due to the power of the test enhanced by the large sample size involved. This problem is circumvented by using the rho statistics of the



TABLE 1  
Correlation matrix of the nine measured variables

Variable	2	3	4	5	6	7	8	9
1 Warmth	.72*	.53*	.33*	.45*	.39*	.26*	.40*	.42*
2 Enthusiasm		.59*	.41*	.41*	.50*	.28*	.30*	.39*
3 Clarity			.55*	.66*	.55*	.51*	.37*	.48*
4 Variety				.49*	.36*	.37*	.51*	.45*
5 Individualization					.26*	.42*	.33*	.39*
6 Feedback						.11	.20	.39*
7 Cognitive Demand							.40*	.20
8 Freedom								.30*
9 On-task Activity								

N=112

\*p < .001

Tucker-Lewis coefficient (Tucker and Lewis 1973). At each step, the appropriate values of Q at each factor are substituted in the formula. The value of the rho statistics is an indication of the goodness of fit of the model to the data.

The formula for the Tucker-Lewis coefficient is given as follows:

$$\text{rho (r)} = (Q_0 - Q_p) / (Q_0 - 1) \quad [1]$$

where

$Q_0 = X^2 / \text{df}$  at 0 factor

$Q_p = X^2 / \text{df}$  at p factor.

Rho values in the mid-nineties and above are a good indication of goodness of fit at p factor solution. Concomitantly, the Chi-square value is inspected at that point. If the Chi-square ( $X^2$ ) value is not significant at the conventional  $p < .05$  level the appropriate number of factors are arrived at. At that point, the investigator fails to reject the null hypothesis and the solution at p factor is retained. This is a unique solution that has the maximum likelihood of producing the data we obtain. Four factors were retained by this procedure. The four factors accounted for 78% of the variance in the measured variables. A summary of the steps and the resultant rho statistics are presented in Table 2.

Using another piece of information from the printout, a four-factor model is plausible and reasonable in the data if the series of eigenvalues obtained is examined. Only the first four eigenvalues are large and significant enough to be considered of importance. The fifth and subsequent eigenvalues are very small and insignificant. This is presented in Table 3.

TABLE 2  
Summary of maximum likelihood factor solution

p	X <sup>2</sup>	df	prob.	Q	rho
0	422.52	36	.0001	11.74	-
1	91.66	27	.0001	3.39	.78
2	50.55	19	.0001	2.66	.84
3	26.98	12	.0078	2.25	.88
4.	6.99*	6	.3221	1.16	.98
5	1.60*	1	.2056	1.60	.94

\* X<sup>2</sup> not significant at  $p < .05$

Fail to reject  $H_0$ : The four factor model is plausible.

TABLE 3  
Table of eigenvalues obtained in the four factor solution

Eigenvalues	
1.	8.6201*
2.	1.1834*
3.	0.5530*
4.	0.4090*
5.	0.1045
6.	-0.1280
7.	-0.1985
8.	-0.4492
9.	-0.4922

\* eigenvalues retained

Heywood cases (communality values exceeding the theoretical value of 1.00) were encountered in the data when the number of factors to be retained was greater than two. The Heywood option was used to circumvent this problem.

Using the procedure of rotation, the factor matrix F is rotated in space to achieve a condition termed as simple structure (Rummel 1970), with the objective of achieving simple structure which will enhance interpretability. The rotated factor pattern is presented in Table 4.

In deciding on the kind of rotation to be performed on the factor matrix, the Promax rotation option on the SAS factor analysis package was employed first. This is an oblique rotation method which allows the investigator to correlate the factors with each other, if they are indeed correlated. Low correlations, e.g. in the low twenties and below, could be regarded as a sign of orthogonality in the factors. Should this happen, the investigator should continue analysis using the Varimax (orthogonal) rotation option. In this data the Phi matrix indicated that the four factors were intercorrelated. The Phi matrix is presented in Table 5.

The correlations vary from 0.38 to 0.57 (Table 5). This clearly indicates that the factors are correlated with each other, implying that people who are high on Factor 1 are likely to be high on the other three factors. Using orthogonal rotation method of analysis without considering if the factors are correlated is imposing unrealistic and unnecessary restrictions on the factors trying to be uncovered. This may lead to difficulty and erroneous interpretations of the results.

The factor matrix was rotated using the Harris-Kaiser class of rotations with the HK power set to zero to check if the factors exhibited independent clusters; such clusters were not found. The Promax rotation, however, seems to provide a cleaner simple structure with better interpretability.

## FINDINGS AND DISCUSSION

The four factors retained accounted for 78% of the variances in the measured variables. What is left unaccounted for is the portion contributed by the unique variances associated with each unique factor and measurement error. Teaching behaviour is very complex. It is not a unitary attribute that can be observed and singled out from a single observation of a teaching episode of any individual teacher. Different teachers exhibit different teaching behaviours depending on the kind of subjects taught, the level of the students, the teacher's personality and situation. Furthermore, what the behaviours of the teachers is the product of the interaction between the teacher presage variables and the environment, that is the teacher education curriculum that they have been exposed to. The ratings given were based on the raters' perceptions of what these teaching behaviours ought to be. However, interpretations were attempted after examining the rotated factor pattern matrix. By grouping

TABLE 4  
Obliquely rotated (promax) factor matrix (F\*)

Rating Scales Variable	Factor 1 FACILIT	Factor 2 INTERPE	Factor 3 INTERAC	Factor 4 FLEXIBL
Warmth	0.01	<b>0.99</b>	0.01	0.00
Enthusiasm	0.03	<b>0.52</b>	0.34	0.05
Clarity	<b>0.79</b>	-0.01	0.37	-0.09
Individualization	<b>0.56</b>	0.12	-0.02	0.15
Cognitive Demand	<b>0.64</b>	-0.02	-0.22	0.17
Freedom	0.14	0.20	-0.13	<b>0.50</b>
Variety	0.10	-0.11	0.21	<b>0.76</b>
Feedback	-0.15	0.05	<b>0.84</b>	0.01
On-Task Activity	0.05	0.15	<b>0.30</b>	0.26
FACILIT = Facilitating Behaviour INTERPE = Interpersonal Behaviour INTERAC = Interactive Behaviour FLEXIBL = Flexible Behaviour				



TABLE 5  
Phi matrix - inter-factor correlations

	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1	1.00			
Factor 2	<b>0.48</b>	1.00		
Factor 3	<b>0.57</b>	<b>0.48</b>	1.00	
Factor 4	<b>0.51</b>	<b>0.37</b>	<b>0.38</b>	1.00

Factor 1 = Facilitating behaviour

Factor 2 = Interpersonal behaviour

Factor 3 = Interactive behaviour

Factor 4 = Flexible behaviour

those measured variables with high loadings on a particular factor (latent variable), a distinct pattern emerged, indicating which variables share a common characteristic. Four latent variables were identified; given labels to designate a certain teaching behaviour. The teaching behaviours of the preschool student teachers in the study seem to be inter-related. They were named appropriately based upon their common feature and, to a degree, reflecting the cluster of teaching behaviours observed and rated. These teaching behaviours are: facilitating behaviour, interpersonal behaviour, interactive behaviour, and flexible behaviour. The teaching behaviours identified in this study are described as follows:

1. Facilitating behaviour - the measured variables designated as clarity (0.79), individualization (0.56), and cognitive demand (0.64) have high loadings on this factor. This teaching behaviour, which facilitates the learning process, is common among these measured variables.
2. Interpersonal behaviour - the measured variables designated as warmth (0.99) and enthusiasm (0.52) have high loadings on this factor. This attribute is related to the teacher's personal disposition.
3. Interactive behaviour - the measured variables designated as feedback (0.84) and on-task activity (0.30) have high loadings on this factor. This is an indication of the degree of interactivity of the student teachers with the children.
4. Flexible behaviour - the measured variables of variety (0.76) and freedom (0.50) have high loadings on this factor. This is an indication of the flexibility of the student teachers as rated by the observers.

As the sample used in the study came from a population of preschool student teachers from two institutions of higher learning in the Midwest the findings could only be generalized to this population of preschool student teachers.

Based on this investigation, the preschool student teachers exhibit these four teaching behaviours in their classroom performance as rated by the trained observers. The preschool student teachers in these institutions possess facilitating, interpersonal, interactive and flexible teaching behaviours in varying amounts and the variances in their performance are explained by the four latent variables stated earlier.

Since these latent variables are correlated with each other, it is not possible to partition the variance of their performance between each of the latent variables identified in this investigation.

Because the common factors are correlated with each other, people who manifest the characteristic governed by one factor tend to possess the characteristics attributed to the other three factors as well. Specifically, in this study student teachers who exhibited a high degree of facilitating behaviour also tended to be highly endowed in interpersonal, interactive and flexible behaviours as well. The reverse is also true.

Most of the measured variables are good indicators of the latent variables or construct. This is clearly shown by their final communality values ( $h^2$ ) in Table 6. High communality values (mid 0.30s and above) are desirable. The final communality value is the proportion of variance shared by the common factors.

Based on the findings of this study, future studies on the teaching behaviours of preschool student teachers (new data) should employ

TABLE 6  
Final communality values of the measured variables

Variable	Communality ( $h^2$ )
Warmth	1.0000
Enthusiasm	0.6205
Clarity	1.0000
Variety	0.7733
Individualization	0.5186
Feedback	0.6246
Cognitive Demand	0.4042
Freedom	0.4151
On-task Activity	0.3519

confirmatory factor analysis with the following hypotheses:

1. The nine dimensions of teaching behaviour could be explained by four latent variables.
2. These four latent variables are correlated with each other.
3. The variables clarity, individualization, and cognitive demand load only on the facilitating factor; The variables warmth and enthusiasm load only on the interpersonal factor; the variables on-task activity and feedback load only on the interactive factor; and finally, the variables variety and freedom load only on the flexible factor.
4. Each variable is assumed to contain some unique variance.

Confirmatory factor analysis (Long 1983) can be done using the Linear Structural Relations (LISREL) program (Jöreskog and Sörbom 1989). This program gives measures of goodness of fit of the specified model to the data. If the hypothesized model is plausible and can be confirmed, a parsimonious path diagram (model) can be drawn to represent the relationships among the variables in the population (Zulkifli 1987, 1994, 1995). This could be used as a theoretical framework for further research and validation studies of teaching behaviours of preschool student teachers.

Other research questions that need to be addressed in future studies should include the following:

1. Do preschool teachers who possess these teaching behaviours contribute to significant learning among preschoolers?

2. Are these teaching behaviours exhibited by preschool teachers in Malaysia or other cultures? (Cross-culture validation studies)
3. Can these teaching behaviours be taught to teacher trainees.

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## Appraising Intellectual Giftedness Using the Malay Version of WISC-R

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**Keywords:** intellectual giftedness, Wechsler Scale, intelligence

### ABSTRAK

Kajian kesesuaian WISC-R yang diterjemahkan kepada Bahasa Melayu ini dijalankan ke atas 100 pelajar (53 lelaki dan 47 perempuan) yang berumur 11 tahun. Sebelum ianya dijalankan, proses penterjemahan WISC-R ini dilakukan secara sistematik iaitu menggunakan panel dan 'back translation'. Hasil daripada kajian ini mendapati indeks kebolehpercayaan WISC-R bahasa Melayu ialah .91 dan ini selaras dengan syarat yang ditetapkan untuk sesuatu ujian piawai individu. Skor bagi setiap sub-ujian juga tidak berbeza dengan data yang dikemukakan oleh WISC-R. Oleh itu, WISC-R yang diterjemah dalam Bahasa Melayu sesuai untuk digunakan untuk mengukur kecerdasan (IQ).

### ABSTRACT

An appropriateness study of the Malay version of the WISC-R was conducted on one hundred 11 year old students (53 boys and 47 girls). Prior to the study, the WISC-R was systematically translated using the back translation method with a panel of experts as moderators. From the results of the study, the reliability index of the Malay version of the WISC-R is .91 and this coefficient is consistent with the condition set for an individual standardised test. The score for each sub-tests too does not differ from the data presented by the original WISC-R. Therefore, the Malay version of WISC-R is appropriate for use as a measure of intelligence (IQ).

### INTRODUCTION

Under the present review of the Malaysian Education Act 1961 changes will be made to incorporate a special educational provision for intellectually gifted children. Various measures are used to identify gifted children. The most commonly used measure is intelligence tests. Intelligence tests may not be able to identify all mentally gifted. However, they are the most effective single selection instrument available (Hollingworth 1942; Martinson 1961; Reynold 1962). Karnes and Collins (1978) found that the Stanford Binet Intelligence Test and Wechsler Intelligence Scale for Children-Revised (WISC-R) (Wechsler 1974) are the most commonly used tests in identifying intellectually gifted children in the United States of America. Furthermore, the WISC-R was found to be the most popular and well-researched instrument used for the assessment of intellectual

functioning in both clinical and academic settings (Rashed 1989).

The items in the WISC-R have been intensively investigated and found to be clinically and psychometrically sound. The WISC-R Verbal and Performance Scales were found to be correlated with Cattell's (1971) crystallised and fluid abilities (Kaufman 1979). Meeker (1975) indicated that the WISC-R was developed from Guilford's SOI (Structure of Intellect) model. Therefore, the WISC-R had a strong theoretical foundation in quantifying intelligence. Also, intelligence as measured by the WISC-R was found to be the best predictor of school achievement. Sattler (1974) found that the correlations between the Full Scale IQ of WISC-R and a wide variety of achievement measures averaged .61. For the Full Scale IQ of WISC-R, similar magnitudes, in terms of correlations, were reported for groups of white or

predominantly white children (Hale 1978), for groups of minority or primarily minority youngsters (Harlage and Steele 1977), and for exceptional populations (Raskin *et al.* 1978). The WISC-R, which is the revised version of the 1949 WISC, is an individually administered intelligence test and has been the major instrument for assessing the intellectual functioning of school-age children (Anderson 1976; Karnes and Collins 1978). Also, the WISC-R has superior reliability; is culturally unbiased, and has up-to-date items (Sattler 1974). Moreover, its norming quality is well accepted because of its diverse representation (Sattler 1974).

The WISC-R reports 3 types of IQ: 1) the Verbal Scale IQ; 2) the Performance Scale IQ; and 3) the Full Scale IQ. The sub-tests for the Verbal Scale are Information (Info), Comprehension (Com), Arithmetic (Arit), Similarities (Sim) and Vocabulary (Voc). The Performance IQ, on the other hand, consists of Picture Completion (PC), Block Design (BD), Picture Arrangement (PA), Object Assembly (OA) and Coding (Cod). All the sub-tests (Verbal and Performance) are used to compute the Full Scale IQ. The administration of the WISC-R to each child requires approximately 1-1 1/2 hours.

The rationale for this study to test the applicability of WISC-R in Malaysian classrooms is because it has not been done before. Therefore, basic research and development for establishing the reliability and the validity of WISC-R in Malaysia was necessary. This study will justify its potential as a selection tool for identifying intellectually gifted children in Malaysia and also ascertain that the Malay version of the WISC-R is able to do so.

### METHOD

The English version of WISC-R was initially translated into Malay and then given to a translation panel comprised of 5 local experts. They were two associate professors in Malay Studies, two lecturers in Educational Psychology and a teacher with 12 years' experience teaching Malay children in a rural area.

#### *Item Analysis and Back Translation*

The amendments suggested by the panel were made after receiving separate comments from each translation panel member. The WISC-R

was then administered to a class of 25 primary six pupils in a school in Selangor. The respondents were instructed not only to respond to every item but also to mark whether they did or did not understand each item. All pupils indicated that they understood the items. The final version of the WISC-R was given to 5 final year Bachelor of Education students (Teaching English as a Second Language) at Universiti Pertanian Malaysia. Each item was translated into English. This 'back translation procedure' was essential to ensure that the content of the final Malay version of the WISC-R had not deviated from the original English version. From the back translation, only one item had been mistranslated. Item 18 of the vocabulary sub-test was translated as 'lagenda' meaning 'heroic act' in place of the original concept of 'fable'. Subsequently, the word 'lagenda, was changed to 'dongeng', which means 'fairy tale or folk story'.

The subjects in the study were 100 primary six pupils comprising 53 boys and 47 girls from a single school in Rembau. This sample size was adequate to minimize Type II error consistent with the t-test statistic set at a power level .8 and alpha at .05 (Cohen 1992). The average age of the subjects was 11 years 5.8 months (SD=2.8 months). Although the boys were slightly older (11.7 years) than to the girls (11.5 years), there was no significant difference in age. The WISC-R was administered in July, 1992 to an average of 5 pupils a day. After a lapse of 30 days, 30 pupils were randomly selected and administered another WISC-R.

### RESULTS

The Malay version of the WISC-R total scores and its sub-tests, with the exception of Vocabulary, very close to a normal distribution (Table 1). The means of the sub-test scores were generally close to the 'Western' values,  $X=10$  and  $SD=3$  for every sub-test. The sub-test with lower values than the values published in the manual (Wechsler 1974) were Comprehension and Object Assembly. On the contrary, the mean for Block Design and Coding were comparatively higher. However, the differences between the mean of these four scores and the values published in the manual were not significant as determined by t-test statistics.

The mean and the standard deviation for the Verbal Scale IQ, Performance Scale IQ and Full Scale IQ of the Malay version of WISC-R



were similar to those in the manual, 50 and 10 for Verbal and Performance IQ and 100 and 15 for the Full Scale IQ. Although the mean for the Verbal IQ of the Malay version WISC-R was lower than the English version, the mean for the Performance and the Full Scale IQ was higher than the value reported in the manual. As in the case of its sub-tests, the differences were not significant as determined by t-test statistics.

The consistency of the Malay version of the WISC-R score, with the exception of Coding, was measured by Cronbach's alpha. The Cronbach's alpha values ranged from .65 to .91. As the number of items for each sub-test was between 4 and 30, no greater Cronbach alpha values could be expected. Based on these data, it could be concluded that the WISC-R score has modest internal consistency (Table 2).

The stability of the WISC-R score was measured by the test-retest procedure after a lapse of 30 days using 30 randomly selected subjects. The correlation between the first and the second administration was between .73 and .91. Although the scores of the second administration were higher than the initial administration, there were no significant differences indicated by the t-test result for each sub-test (Table 2).

It is the objective of test and inventory developers to produce an instrument that is free from gender bias. However, there are still cultures that encourage differences between feminine and masculine behaviour. In this respect, response differences between gender are to be

expected (Maccoby and Jacklin 1975).

Therefore, in appraising intellectual quotient, it is essential to study the gender differences. In this regard, different norms have to be proposed for the two genders, if the differences are significantly large.

The WISC-R scores (Table 3) indicate that it was only in the Arithmetic sub-test that the scores for boys were significantly higher than those for girls. This phenomenon is common, indicating boys are better than girls in mathematical skill and achievement (Maccoby and Jacklin 1975). In the Verbal, Performance and Full Scale IQ, the differences were not significant. Therefore, the IQ appraised by the Malay version of WISC-R has no gender bias.

The intercorrelation among the test or an inventory's sub-tests is a common procedure used to re-validate the test or an inventory (Sattler 1974). The intercorrelation coefficients of the Malay version WISC-R sub-tests were modest, ranging from .20 to .58 (Table 4). The correlation coefficients of Verbal sub-tests with Verbal IQ were generally higher than the correlation coefficients of Performance sub-tests with Performance IQ. These data confirm that each sub-test measured related constructs.

Also, the Verbal Scale IQ and Performance Scale IQ were strongly correlated with the Full Scale IQ, with values of .92 and .89 respectively. Based on these findings, it can be concluded that the Malay version of WISC-R is similar to the original version in determining IQ, thus showing validity.

TABLE 1  
Descriptive statistics of WISC-R  
(N=100)

Subtests	Mean	SD	Median	Mode	Kurtosis
Info	10.98	2.54	11	12	.63
Sim	9.49	2.98	10	10	-.15
Arit	10.87	3.01	11	13	-.13
Voc	9.27	3.18	10	10	1.48
Com	9.95	3.67	8	9	-.29
PC	10.31	3.37	10	10	-.05
PA	11.25	3.68	11	14	-.26
BD	11.01	2.97	12	13	.12
OA	9.56	4.03	9	11	-.46
Cod	10.18	3.21	10	10	.66
Verbal	49.13	11.31	52	54	.08
Performance	52.32	11.29	53	56	.02
Full IQ	103.12	14.92	104	101	-.28

TABLE 2  
Reliability of the Malay version of WISC-R

Sub-test	No of Items	First Administration			After 30 Days				
		Mean (N=100)	SD	Alpha*	Mean (N=30)	SD	r	SEM	t
Info	30	10.98	2.54	.75	11.33	2.63	.81	1.68	-0.65
Sim	17	9.49	2.98	.66	9.71	2.51	.76	2.23	-0.41
Arit	18	10.87	3.01	.86	11.66	2.96	.86	1.52	-1.28
Voc	32	9.27	3.18	.89	10.09	2.88	.86	1.78	-1.33
Com	17	9.95	3.18	.84	10.50	2.05	.84	2.01	-1.13
PC	26	10.31	3.37	.87	10.72	2.66	.88	1.66	-0.71
PA	12	11.25	2.97	.65	12.11	2.87	.73	1.80	-1.43
BD	11	11.01	2.97	.78	11.56	3.00	.81	1.84	-0.89
OA	4	9.56	4.03	.74	10.75	3.66	.79	2.72	-1.52
Cod	93	10.18	3.21	NA	11.12	3.33	.83	1.79	-1.36
Verbal		49.13	11.3	.89	52.74	10.8	.90	5.17	-1.59
Performance		52.31	11.3	.87**	57.06	12.0	.91	5.57	-1.63
Full IQ		103.12	14.9	.91**	106.77	13.9	.91	6.19	-1.24

\* Calculates based on Cronbach Alpha except in for Cod where it was calculated based on test-retest procedure.

\*\* Excluding Cod.

TABLE 3  
Inter-correlation coefficient\* of WISC-R  
(N=100)

Sub-tests	1	2	3	4	5	6
Verbal:						
1. Info						
2. Sim	49					
3. Arit	20	30				
4. Voc	47	43	33			
5. Com	45	50	44	58		
6. Verbal	68	75	59	77	79	
7. Full IQ	64	73	50	73	72	71
Performance:						
1. PC						
2. PA	39					
3. BD	46	29				
4. OA	37	43	40			
5. Cod	21	30	25	31		
6. Performance	71	68	66	74	60	
7. Full IQ	57	59	65	57	92	89

All r are significant at p<.01

\*decimal point is omitted



TABLE 4  
Gender differences of WISC-R score  
(Boys=53 Girls=47)

Subtests	Gender	Mean	Std. Dev.	t
Info	Boy	11.08	2.60	.40
	Girl	10.87	2.49	
Sim	Boy	9.41	3.42	-.27
	Girl	9.57	2.42	
Arit	Boy	12.55	2.71	2.18*
	Girl	11.26	3.16	
Voc	Boy	9.23	3.59	-.14
	Girl	9.32	2.68	
Com	Boy	7.75	3.59	-.15
	Girl	8.17	3.55	
PC	Boy	10.58	3.42	.87
	Girl	10.00	3.31	
PA	Boy	11.26	2.74	.02
	Girl	11.25	2.66	
BD	Boy	12.55	2.98	1.95
	Girl	11.40	2.87	
OA	Boy	8.39	4.24	-.43
	Girl	8.74	3.83	
Cod	Boy	12.75	3.35	-1.42
	Girl	13.66	3.02	
Verbal IQ	Boy	48.38	11.97	-.70
	Girl	49.98	10.58	
Performance IQ	Boy	55.17	12.55	-.14
	Girl	55.49	9.80	
Full IQ	Boy	102.66	16.73	-.33
	Girl	103.64	12.74	

\* $p < 0.05$

## CONCLUSION

The study indicated similarities in the reliability and validity of the Malay version of the WISC-R with the data of the original WISC-R. Although there are variations in the findings, these values are expected because of the small, yet adequate sample size. Nevertheless, the National Foundation of Educational Research (NFER) (1977) suggests a reliability coefficient of .9 for an individual appraisal instrument. The Malay version of WISC-R in this study had a test-retest reliability and an internal consistency of .91 and therefore meets this criterion. On the basis of these data, the usage of the Malay version of WISC-R to assess general intellectual functioning among the Malaysian children is justified.

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## Sikap dan Masalah Guru Pelatih dalam Menjalani Latihan Mengajar

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**Kata kunci:** latihan mengajar, guru pelatih, sikap, pendidikan perguruan

### ABSTRAK

Latihan mengajar adalah aktiviti penting dalam program pendidikan perguruan. Melalui aktiviti ini, pelajar didedahkan kepada keadaan sebenar alam perguruan. Kajian ini cuba mengenal pasti sikap pelajar terhadap latihan mengajar dan masalah yang dihadapi semasa menjalani latihan tersebut. Populasi terdiri daripada guru pelatih UPM yang menjalani latihan mengajar pada semester Disember 1993/94. Teknik persampelan kelompok bersistematik digunakan untuk memilih sampel sejumlah 215 orang guru pelatih. Dapatan menunjukkan, secara keseluruhan guru pelatih mempunyai sikap yang positif terhadap latihan mengajar. Sikap terhadap latihan mengajar didapati mempunyai hubungan yang signifikan dengan pengalaman mengajar. Guru pelatih bukan bekas guru mempunyai sikap yang lebih positif terhadap latihan mengajar daripada guru pelatih bekas guru. Dapatan juga menunjukkan guru pelatih mempunyai kesukaran untuk (1) mengajar dalam tempoh masa yang membolehkan pelajar memberi tumpuan sepenuhnya, (2) memilih alat bantu mengajar yang sesuai, (3) memilih kaedah mengajar yang sesuai, (4) mengetahui latar belakang setiap pelajar yang diajar, (5) mengingati semua nama pelajar yang diajar, (6) mengatasi masalah kewangan, (7) mengatasi masalah kerisauan, dan (8) menyediakan berbagai-bagai jenis soalan. Dua daripada masalah ini, iaitu kesukaran memilih alat bantu mengajar dan kaedah mengajar yang sesuai mempunyai hubungan yang signifikan dengan sikap terhadap latihan mengajar.

### ABSTRACT

Practical teaching is an important component in the teacher education programme, as it exposes students to the actual teaching environment. A study was conducted to identify the attitude of student teachers towards practical teaching and the problems they faced during practicum. The population comprised UPM student teachers of the December semester 1993/94. The systematic cluster sampling technique was used to select the sample of 215 student teachers. The findings showed that, in general, student teachers have a positive attitude towards practical teaching; this attitude was found to have a significant relationship with teaching experience. Student teachers without teaching experience were found to have a more positive attitude towards practical teaching than those who had teaching experience. The findings also showed that student teachers found difficulties in (1) teaching with full concentration in the time frame given, (2) choosing appropriate audiovisual teaching aids, (3) choosing appropriate teaching methods, (4) knowing the background of every student that he/she taught, (5) remembering the names of all students he/she taught, (6) solving financial problems, (7) solving the problem of anxiety, and (8) preparing various types of questions. Two of these problems, i.e. the difficulties of choosing appropriate audiovisual teaching aids and teaching methods, had significant relationships with attitude towards practical teaching.

### PENDAHULUAN

Latihan mengajar adalah komponen penting dalam program pendidikan perguruan. Melalui latihan mengajar, secara terus guru pelatih mengalami alam pekerjaan yang akan diceburi setelah bergraduasi. Latihan mengajar memberi guru pelatih kemahiran, sikap dan tanggung-

jawab baru yang berbeza daripada apa yang mereka alami sebagai pelajar.

Henry dan Beasley (1979) menyatakan latihan mengajar mempunyai dua dimensi. Dimensi pertama ialah hubungan sosial antara guru pelatih dengan penyelia, pengetua, guru pembimbing, guru lain di sekolah dan murid.

Dimensi ini melibatkan interaksi guru pelatih atas dasar emosi dan sosial. Hasil daripada hubungan ini timbul dalam diri guru pelatih sikap, nilai dan perasaan terhadap bidang perguruan. Dimensi kedua ialah proses pengajaran di mana guru pelatih mesti belajar prosedur asas untuk menentukan kandungan mata pelajaran yang hendak diajar dan membentuk dengan jayanya strategi pengajaran. Kedua-dua dimensi ini perlu dialami oleh guru pelatih kerana kedua-duanya adalah saripati latihan mengajar yang tidak boleh dipisahkan.

Pada peringkat awal latihan mengajar, guru pelatih mungkin mengalami kerisauan. Tetapi masalah ini dapat dikurangkan setelah mereka lama berada di sekolah. Sharpe (1970) mendapati guru pelatih memulakan latihan mengajar dengan perasaan tidak selamat dan ketakutan. Besar kemungkinan mereka mengalami kombinasi perasaan ingin tahu, pengharapan dan kerisauan. Di samping itu, guru pelatih suka mengajar bukan sepertimana mereka diajar untuk mengajar tetapi dengan cara yang mereka telah diajar (Henry dan Beasley 1979). Zevin (1971) pula menyatakan guru pelatih suka meniru cara mengajar guru pembimbing mereka, tanpa menghiraukan pandangan yang diberikan oleh penyelia. Seperson dan Joyce (1973) menyokong pandangan itu dengan menyatakan guru pembimbing banyak mempengaruhi tingkah laku guru pelatih.

Semasa menjalani latihan mengajar, kebanyakan guru pelatih menghadapi masalah. Kajian tentang masalah yang dihadapi oleh guru pelatih menunjukkan masalah sahsiah adalah masalah utama yang dihadapi oleh guru pelatih (Henry 1963). Selain itu, Henry menyatakan guru pelatih juga mengalami masalah pengajaran. Tambahan, Cohen *et al.* (1972) mendapati di antara masalah yang dihadapi oleh guru pelatih ialah menghiaskan bilik darjah supaya kelihatan lebih menarik, menyusun kandungan mata pelajaran, memberi peluang kepada semua murid melibatkan diri dalam aktiviti, dan menyediakan bahan yang membolehkan murid memahaminya. Satu lagi masalah yang selalu disuarakan oleh guru pelatih ialah penyeliaan. Acheson dan Gall (1980) mendapati guru pelatih memang tidak suka diselia, walaupun penyeliaan itu dianggap sebagai aktiviti penting dalam latihan mengajar. Terdapat guru pelatih yang memberi reaksi yang tidak baik terhadap penyeliaan. Walau bagaimanapun, Acheson dan Gall menyatakan

guru pelatih sebenarnya bukan tidak suka kepada penyeliaan, tetapi mereka tidak suka kepada cara penyeliaan. Walau apapun, segala masalah yang dihadapi oleh guru pelatih semasa menjalani latihan mengajar sedikit sebanyak mempengaruhi sikap mereka terhadap latihan mengajar.

## TUJUAN KAJIAN

Tujuan utama kajian ini ialah untuk mengenal pasti sikap guru pelatih Universiti Pertanian Malaysia (UPM) terhadap latihan mengajar dan juga masalah yang mereka hadapi semasa menjalani latihan mengajar. Selain itu, kajian ini juga bertujuan untuk menentukan sama ada terdapat hubungan antara sikap guru pelatih terhadap latihan mengajar dengan pembolehubah latar belakang dan masalah yang dihadapi. Dapatan kajian ini boleh digunakan oleh pelbagai pihak yang terlibat dalam pendidikan perguruan. Mereka yang boleh memanfaatkan dapatan kajian ini termasuklah penyelia, pensyarah, pengetua, guru pembimbing dan guru pelatih itu sendiri.

## METODOLOGI

### *Populasi dan Sampel*

Populasi kajian terdiri daripada guru pelatih yang menjalani latihan mengajar pada semester Disember 1993/94. Senarai nama guru pelatih yang terlibat dalam latihan mengajar pada semester tersebut diperoleh daripada Urusetia Latihan Mengajar dan Praktikum Kaunseling (LMPK), Fakulti Pengajian Pendidikan, UPM. Sebanyak 430 orang guru pelatih menjalani latihan mengajar pada semester tersebut.

Teknik persampelan rawak berkelompok bersistematik digunakan untuk memilih sampel kajian. Pemilihan dibuat berdasarkan program pengajian. Saiz sampel yang diperlukan untuk populasi 430 orang ialah 203 orang (Krejcie dan Morgan 1971). Untuk memenuhi keperluan saiz sampel itu, 50% guru pelatih daripada setiap program pendidikan perguruan telah dipilih secara rawak bersistematik (iaitu setiap nama dalam senarai nama yang bernombor ganjil dipilih) untuk dijadikan sampel kajian yang bersaiz 215 orang.

### *Instrumentasi*

Instrumen dibentuk untuk mendapat maklumat tentang masalah yang dihadapi oleh guru pelatih semasa menjalani latihan mengajar dan juga



untuk mengukur sikap mereka terhadap latihan mengajar. Sebanyak 80 item yang berupa aktiviti yang akan dilakukan oleh guru pelatih semasa menjalani latihan mengajar disenaraikan. Guru pelatih diminta menandakan darjah kesukaran mereka dalam melakukan setiap aktiviti tersebut. Hanya aktiviti yang dikatakan oleh 50% guru pelatih dan lebih dianggap sebagai bermasalah. Skala bagi darjah kesukaran ialah 1 sebagai tidak sukar, 2 sedikit sukar, 3 sukar dan 4 sangat sukar. Skala bagi 1 dan 2 (iaitu tidak sukar dan sedikit sukar) dan juga skala 3 dan 4 (iaitu sukar dan sangat sukar) disatukan supaya menjadi tidak sukar dan sukar. Sebanyak 35 item telah dibentuk untuk mengukur sikap guru pelatih terhadap latihan mengajar. Skala bagi setiap item ialah 5 sebagai sangat setuju, 4 setuju, 3 tidak pasti, 2 tidak setuju dan 1 sangat tidak setuju.

Instrumen yang dibentuk itu telah diberikan kepada enam orang pensyarah di Fakulti Pengajian Pendidikan, UPM untuk memberi pandangan. Tujuannya ialah untuk menentukan kesahan muka dan kesahan kandungan instrumen berkenaan. Instrumen itu kemudiannya dikaji rintis dengan sekumpulan 30 orang pelajar Fakulti Pengajian Pendidikan, UPM yang akan keluar menjalani latihan mengajar dan mereka tidak dipilih sebagai sampel kajian. Kebolehpercayaan instrumen ditentukan dengan menggunakan Cronbach alpha. Pekali kebolehpercayaan instrumen untuk mengukur sikap guru pelatih terhadap latihan mengajar didapati .85 dan pekali kebolehpercayaan instrumen untuk menentukan darjah kesukaran guru pelatih dalam melakukan aktiviti atau perkara tertentu semasa latihan mengajar didapati .83.

#### *Analisis Data*

Data telah dianalisis dengan menggunakan perisian SPSSPC+. Data deskriptif dianalisis sebagai peratusan dan kecenderungan memusat dengan menggunakan statistik yang sesuai dengan jenis data. Pekali korelasi 'Point Biserial ( $r_{pb}$ )' diguna untuk menentukan hubungan antara pemboleh ubah jantina, pengalaman mengajar dan masalah yang dihadapi dengan sikap terhadap latihan mengajar. Pekali Phi diguna untuk menentukan hubungan antara pemboleh ubah aktiviti yang bermasalah dengan jantina dan pengalaman mengajar.

#### **DAPATAN**

Daripada 215 responden yang diharapkan, 173 (80.5%) telah mengembalikan soal selidik. Sembilan puluh orang (52.0%) daripada jumlah tersebut adalah lelaki dan 83 orang (48.0%) adalah perempuan. Sebanyak 105 orang (60.7%) adalah bekas guru dan 68 orang (39.3%) adalah bukan bekas guru.

#### *Aktiviti yang Bermasalah*

Daripada 80 pernyataan berkaitan dengan aktiviti yang dilakukan semasa menjalani latihan mengajar, lebih daripada 50% guru pelatih menyatakan mereka menghadapi kesukaran untuk melakukan lapan aktiviti berikut:

- 1) mengajar dalam tempoh masa yang membolehkan murid memberi tumpuan sepenuhnya (V1),
- 2) memilih alat bantu mengajar yang sesuai (V2),
- 3) memilih kaedah mengajar yang sesuai (V3),
- 4) mengetahui latar belakang setiap murid yang diajar (V4),
- 5) mengingat semua nama murid yang diajar (V5),
- 6) mengatasi masalah kewangan (V6),
- 7) mengatasi masalah kerisauan (V7), dan
- 8) menyediakan berbagai-bagai jenis soalan (V8).

Dari segi jantina, lebih 50% guru pelatih perempuan menyatakan mereka menghadapi kesukaran dalam semua lapan aktiviti tersebut. Kebanyakan mereka terdiri daripada guru pelatih bukan bekas guru. Bagi guru pelatih lelaki, lebih 50% daripada mereka menyatakan sukar menyediakan berbagai-bagai jenis soalan, mengingat semua nama murid yang diajar dan mengatasi masalah kewangan (lihat Jadual 1).

Dari segi pengalaman mengajar, lebih 50% daripada guru pelatih bukan bekas guru menyatakan mereka menghadapi kesukaran dalam semua lapan aktiviti tersebut. Bagi guru pelatih bekas guru, lebih 50% daripada mereka menyatakan mereka hanya menghadapi kesukaran untuk mengingat semua nama murid yang diajar dan mengatasi masalah kewangan (lihat Jadual 2).

JADUAL 1  
Aktiviti bermasalah mengikut jantina

Jantina	Darjah Kesukaran	Perkara							
		V1	V2	V3	V4	V5	V6	V7	V8
Lelaki (n=90)	Tidak sukar	49	46	49	53	50	45	35	37
		(59.8) *	(59.0)	(60.5)	(67.1)	(59.9)	(54.9)	(46.1)	(54.4)
	Sukar	(54.4)**	(51.1)	(58.9)	(58.9)	(55.6)	(50.0)	(50.0)	(41.1)
		41	44	41	37	40	45	55	53
Perempuan (n=83)	Tidak sukar	(45.1)	(46.3)	(44.6)	(39.4)	(44.9)	(49.5)	(56.7)	(50.3)
		(45.6)	(48.9)	(45.6)	(41.1)	(44.4)	(50.0)	(61.1)	(58.9)
	Sukar	33	32	32	26	34	37	41	31
		(40.2)	(41.0)	(39.5)	(32.9)	(40.5)	(45.1)	(53.9)	(45.6)
Perempuan (n=83)	Tidak sukar	(39.8)	(38.6)	(38.6)	(31.3)	(41.0)	(44.6)	(49.4)	(37.3)
		50	51	51	57	49	46	42	52
	Sukar	(54.9)	(53.7)	(55.4)	(60.6)	(55.1)	(50.5)	(43.3)	(49.5)
		(60.2)	(61.4)	(61.4)	(68.7)	(59.0)	(55.4)	(50.6)	(62.7)

( )\* Peratusan antara kumpulan lelaki dan perempuan

( )\*\* Peratusan dalam kumpulan lelaki atau perempuan

Nota:

- V1 = Mengajar dalam tempoh masa yang membolehkan murid memberi tumpuan sepenuhnya
- V2 = Mengatasi masalah kerisauan
- V3 = Memilih alat bantu mengajar yang sesuai
- V4 = Memilih kaedah mengajar yang sesuai
- V5 = Menyediakan alat bantu mengajar
- V6 = Menyediakan pelbagai jenis soalan
- V7 = Mengingati semua nama murid yang diajar
- V8 = Mengatasi masalah kewangan



**JADUAL 2**  
Aktiviti bermasalah mengikut pengalaman mengajar

Pengalaman Mengajar	Darjah Kesukaran	Perkara							
		V1	V2	V3	V4	V5	V6	V7	V8
Bekas Guru (n=105)	Tidak sukar	56	54	55	57	56	53	45	48
		(68.3)* (53.3)**	(69.2) (51.4)	(67.9) (52.4)	(75.2) (54.3)	(66.7) (53.3)	(64.6) (50.5)	(59.2) (42.9)	(70.6) (45.7)
	Sukar	49	51	50	48	49	52	60	57
		(53.8) (46.7)	(53.7) (48.6)	(54.3) (47.6)	(51.1) (45.7)	(55.1) (46.7)	(57.1) (49.5)	(61.9) (57.1)	(54.3) (54.3)
Bukan Bekas Guru (n=68)	Tidak sukar	26	24	26	22	28	29	31	20
		(31.7) (38.2)	(30.0) (35.3)	(32.1) (38.2)	(27.8) (32.4)	(33.3) (41.2)	(35.4) (42.6)	(40.8) (45.6)	(29.4) (29.4)
	Sukar	42	44	42	46	40	39	37	48
		(46.2) (61.8)	(46.3) (64.7)	(45.7) (61.8)	(48.9) (67.6)	(44.9) (58.8)	(42.9) (57.4)	(38.1) (54.4)	(45.7) (70.6)

( )\* Peratusan antara kumpulan lelaki dan perempuan

( )\*\* Peratusan dalam kumpulan lelaki atau perempuan

Nota:

- V1 = Mengajar dalam tempoh masa yang membolehkan murid memberi tumpuan sepenuhnya
- V2 = Mengatasi masalah kerisauan
- V3 = Memilih alat bantu mengajar yang sesuai
- V4 = Memilih kaedah mengajar yang sesuai
- V5 = Menyediakan alat bantu mengajar
- V6 = Menyediakan pelbagai jenis soalan
- V7 = Mengingati semua nama murid yang diajar
- V8 = Mengatasi masalah kewangan

### *Sikap Terhadap Latihan Mengajar*

Dari segi sikap, secara keseluruhannya guru pelatih mempunyai sikap positif terhadap latihan mengajar (Min = 3.0, Sd = .50).

### *Hubungan Antara Pemboleh Ubah*

Hubungan yang sangat rendah tetapi signifikan wujud antara kesukaran memilih alat bantu mengajar yang sesuai dan memilih kaedah mengajar yang sesuai dengan jantina. Peratus guru pelatih perempuan yang menghadapi masalah tersebut adalah lebih banyak daripada guru pelatih lelaki. Hubungan yang sangat rendah tetapi signifikan juga wujud antara kesukaran mengatasi masalah kerisauan, memilih kaedah mengajar yang sesuai dan mengatasi masalah kewangan dengan pengalaman mengajar (lihat Jadual 3). Peratus guru pelatih bukan bekas guru didapati lebih banyak menghadapi masalah tersebut daripada guru pelatih bekas guru.

Dari segi hubungan antara sikap guru pelatih terhadap latihan mengajar dengan jantina, pengalaman mengajar dan aktiviti bermasalah, kajian mendapati (lihat Jadual 4):

- 1) Jantina tidak mempunyai hubungan yang signifikan dengan sikap guru pelatih terhadap latihan mengajar ( $r_{pb} = .04, p > .05$ ). Ini bermakna tidak terdapat perbezaan sikap terhadap latihan mengajar antara guru pelatih perempuan dan guru pelatih lelaki.
- 2) Pengalaman mengajar mempunyai hubungan sederhana yang signifikan dengan sikap guru pelatih terhadap latihan mengajar ( $r_{pb} = .40, p < .05$ ). Guru pelatih bukan bekas guru didapati mempunyai sikap yang lebih positif daripada guru pelatih bekas guru (Min untuk guru pelatih bukan bekas guru = 3.2, dan min untuk guru pelatih bekas guru = 2.8).
- 3) Di antara perkara yang dinyatakan sukar, memilih kaedah yang sesuai ( $r_{pb} = .18, p < .05$ ) dan menyediakan alat bantu mengajar ( $r_{pb} = .18, p < .05$ ) mempunyai hubungan yang sangat rendah tetapi signifikan dengan sikap guru pelatih terhadap latihan mengajar. Guru pelatih yang tidak menghadapi kesukaran dalam perkara-perkara ini didapati mempunyai sikap yang lebih positif terhadap latihan mengajar daripada guru pelatih yang menghadapi kesukaran (lihat Jadual 5).

## PERBINCANGAN

Latihan mengajar adalah suatu program yang penting dalam pendidikan perguruan. Semasa menjalani latihan mengajar, kedudukan guru pelatih bukan lagi sebagai seorang pelajar tetapi mereka juga bukan seorang guru. Keadaan ini mungkin disedari apabila mereka merasakan murid yang diajar bukanlah murid mereka dan segala tindakan mereka mestilah dipersetujui oleh guru pembimbing atau pengetua sekolah terlebih dahulu (Henry dan Beasley 1979). Keadaan ini akan membuat mereka dalam keadaan serba salah. Di samping itu, mereka juga menghadapi pelbagai masalah sepanjang tempoh menjalani latihan mengajar. Ada di antara masalah itu, mereka tidak mempunyai cara untuk mengatasinya.

Untuk mengelak daripada menghadapi banyak masalah semasa menjalani latihan mengajar, guru pelatih perlu mengenal pasti masalah yang mungkin dihadapi sebelum menjalani latihan mengajar dan kemudian membuat satu rancangan yang logikal untuk mengatasinya. Penyelia, pengetua dan guru pembimbing boleh membantu mereka mengatasi masalah tersebut dengan memberi galakan, panduan dan pertolongan yang sewajarnya.

Kajian mendapati empat aktiviti yang berkaitan dengan pengajaran yang sukar diatasi oleh guru pelatih terutamanya di kalangan guru pelatih perempuan bukan bekas guru. Aktiviti tersebut ialah memilih alat bantu mengajar yang sesuai, memilih kaedah mengajar yang sesuai, mengajar dalam tempoh masa yang membolehkan murid memberi tumpuan sepenuhnya, dan menyediakan pelbagai jenis soalan. Golongan guru pelatih ini juga didapati menghadapi kesukaran untuk mengatasi kerisauan. Keadaan ini timbul mungkin kerana golongan guru pelatih ini baru pertama kali mengalami keadaan sebenar alam perguruan. Selain itu, pengajaran mereka diselia dan dinilai oleh penyelia daripada universiti dan pengetua sekolah. Oleh kerana harapan untuk berjaya dalam latihan mengajar begitu tinggi, membuatkan, mereka merasa mempunyai kekurangan dan tidak cukup bersedia untuk mengajar. Perasaan ini membuat mereka risau tentang pencapaian mereka dalam latihan mengajar. Jika prestasi pengajaran mereka tidak memuaskan, keputusan penilaian akan menjejaskan pencapaian mereka secara



JADUAL 3  
Hubungan antara jantina dan pengalaman mengajar dengan aktiviti bermasalah

Pemboleh ubah	Aktiviti Bermasalah							
	V1	V2	V3	V4	V5	V6	V7	V8
Jantina	.15	.13	.16 *	.28 *	.15	.05	.11	.04
Pengalaman Mengajar	.14	.16 *	.14	.22	.12	.08	.03	.16 *

Pekali korelasi Phi, \*  $p < .05$

Nota:

- V1 = Mengajar dalam tempoh masa yang membolehkan murid memberi tumpuan sepenuhnya  
 V2 = Mengatasi masalah kerisauan  
 V3 = Memilih alat bantu mengajar yang sesuai  
 V4 = Memilih kaedah mengajar yang sesuai  
 V5 = Menyediakan alat bantu mengajar  
 V6 = Menyediakan pelbagai jenis soalan  
 V7 = Mengingati semua nama murid yang diajar  
 V8 = Mengatasi masalah kewangan

keseluruhan kerana jumlah jam kredit yang besar (5 jam kredit) telah diperuntukkan untuk latihan mengajar.

Semasa menjalani latihan mengajar, guru pelatih terutamanya yang baru pertama kali mengajar, mungkin ingin cuba menggunakan apa yang dipelajari di universiti seperti kaedah mengajar dan cara memilih alat bantu mengajar yang baru. Tetapi apabila berada di dalam keadaan sebenar di sekolah, mereka tidak dapat mengaplikasikan apa yang dipelajari itu, mungkin kerana keadaan di sekolah yang serba kekurangan. Di samping itu, mereka tidak dapat mencari alternatif baru untuk disesuaikan dengan keadaan. Sebaliknya, bagi kebanyakan guru pelatih bekas guru, mereka tidak berasa sukar dengan keadaan itu. Ini mungkin kerana mereka sudah biasa dengan keadaan di sekolah. Pengalaman mereka sebagai guru membantu mereka menyesuaikan diri dengan keadaan di sekolah. Walau bagaimanapun, golongan guru pelatih ini menunjukkan sikap dingin terhadap latihan mengajar. Ini mungkin kerana mereka berasa latihan mengajar tidak banyak menyumbang kepada perkembangan profesionalisme mereka ataupun mungkin mereka berasa latihan mengajar mencabar kebolehan mereka mengajar, sedangkan mereka adalah guru berpengalaman. Walaupun mereka

mempunyai sikap dingin terhadap latihan mengajar, mereka dapat menunjukkan prestasi yang lebih cemerlang daripada guru pelatih bukan bekas guru. Ini menunjukkan mereka hanya bersikap dingin terhadap latihan mengajar tetapi masih mencintai profesion perguruan. Di samping itu mereka tidak menghadapi kesukaran dalam menjalankan pelbagai aktiviti semasa latihan mengajar jika dibandingkan dengan guru pelatih bukan bekas guru. Ini menunjukkan pengalaman mereka sebagai guru, membantu mereka dalam menjalani latihan mengajar.

#### CADANGAN

Berdasarkan kepada dapatan kajian, cadangan berikut disarankan:

- 1) Perancang kurikulum pendidikan perguruan perlu memikirkan cara menggabungkan kursus kaedah mengajar dengan kursus teknologi pendidikan. Tujuannya ialah supaya pelajar dapat melihat dengan lebih jelas alat bantu mengajar yang sesuai digunakan dalam sesuatu kaedah mengajar.
- 2) Pensyarah kaedah mengajar dan juga teknologi pendidikan seharusnya menunjukkan kaedah mengajar dan penggunaan alat bantu mengajar yang sesuai dengan isi pelajaran tertentu supaya pelajar dapat menggunakannya dengan lebih baik

JADUAL 4  
 Hubungan antara sikap guru pelatih terhadap latihan mengajar dengan jantina, pengalaman mengajar dan aktiviti bermasalah (n = 173)

Pemboleh Ubah Hubungan	Signifikan ( $r_{pb}$ )	(p)
1. Jantina	.04	.62
2. Pengalaman mengajar	.39	.00 *
3. Kesukaran mengajar dalam tempoh masa yang membolehkan murid memberi tumpuan sepenuhnya.	.14	.07
4. Kesukaran mengatasi masalah kerisauan	.05	.49
5. Kesukaran memilih alat bantuan mengajar yang sesuai.	.05	.49
6. Kesukaran memilih kaedah yang sesuai	.18	.02 *
7. Kesukaran menyediakan alat bantu mengajar.	.18	.02 *
8. Kesukaran menyediakan berbagai-bagai jenis soalan.	.12	.12
9. Kesukaran mengetahui latar belakang murid yang diajar.	.02	.74
10. Kesukaran mengingat nama murid yang diajar.	.06	.43
11. Kesukaran mengatasi masalah kewangan.	.14	.07

\*  $p < .05$

Skala untuk sikap terhadap latihan mengajar:

- 1 = Tidak Setuju
- 2 = Kurang Setuju
- 3 = Setuju
- 4 = Sangat Setuju

JADUAL 5  
 Jadual min sikap guru pelatih terhadap latihan mengajar mengikut kesukaran aktiviti (n = 173)

Aktiviti Bermasalah	Darjah Kesukaran	Min
Memilih kaedah mengajar yang sesuai	Tidak Sukar	3.09
	Sukar	2.92
Menyediakan alat bantuan mengajar	Tidak Sukar	3.08
	Sukar	2.91

Skala untuk sikap terhadap latihan mengajar:

- 1 = Tidak Setuju
- 2 = Kurang Setuju
- 3 = Setuju
- 4 = Sangat Setuju



- lagi. Pengajaran secara umum sesuatu kaedah mengajar dan penggunaan alat bantu mengajar tidak banyak membantu pelajar dalam mengaplikasikannya dalam pengajaran yang khusus. Begitu juga dengan pengajaran secara teori tentang sesuatu kaedah mengajar atau alat bantu mengajar tanpa diikuti dengan menunjukkan penggunaannya membuat pelajar tidak tahu menggunakannya apabila diperlukan. Alat bantu mengajar yang diajar atau digunakan biarlah selaras dengan yang terdapat di sekolah atau yang mudah diperolehi.
- 3) Guru pelatih seharusnya didedahkan lebih awal lagi di sekolah supaya mereka dapat memahami alam persekolahan dengan lebih baik sebelum menjalani latihan mengajar. Selain itu mereka juga seharusnya dibiarkan membiasakan diri dengan alam persekolahan sebelum mereka diselia.
  - 4) Penyelia haruslah menyelia guru pelatih dalam keadaan yang tenang. Masa perlu diperuntukkan secukupnya untuk berada bersama-sama dengan guru pelatih sepanjang tempoh pengajaran mereka dan juga perbincangan sebelum dan selepas pengajaran. Malah Hedges (1989) mencadangkan agar penyelia seharusnya bersama-sama dengan guru pelatih menentukan tarikh dan masa yang sesuai untuk penyeliaan. Tujuannya ialah untuk mengelak guru pelatih daripada mengalami perasaan ketegangan dan kerisauan.
  - 5) Menurut Acheson dan Gall (1980), guru pelatih bukan tidak suka kepada penyeliaan tetapi mereka sebenarnya tidak suka kepada cara penyeliaan. Oleh itu, adalah baik sekiranya penyelia mengikuti kursus untuk mempertingkatkan teknik dan cara penyeliaan mereka supaya disenangi oleh guru pelatih. Tujuannya juga ialah untuk mengelak ketegangan dan kerisauan di kalangan guru pelatih.
  - 6) Guru pelatih seharusnya menyiapkan diri mereka dari segi kewangan dan pelbagai keperluan lain sebelum menjalani latihan mengajar supaya masalah yang berkaitan dapat dielakkan.
  - 7) Guru pelatih bekas guru disyor supaya dikecualikan daripada menjalani latihan mengajar. Kajian menunjukkan mereka

mempunyai sikap yang dingin terhadap latihan mengajar tetapi mendapat keputusan yang baik dalam latihan mengajar. Ini bermakna mereka boleh menggunakan pengalaman mereka untuk menjalani latihan mengajar. Walau bagaimanapun, mereka merasakan latihan mengajar kurang sesuai untuk mereka yang sudah biasa dengan alam persekolahan. Program latihan mengajar, walau bagaimanapun perlu diadakan untuk guru pelatih bukan bekas guru supaya mereka dapat mengalami alam persekolahan sebagai seorang guru sebelum mereka benar-benar layak menjadi guru.

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## Memahami Pemelajaran Menerusi Penyelidikan Fenomenografi

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### ABSTRAK

Kertas kerja ini cuba mengengahkan pandangan bahawa pemelajaran harus dikaji dari perspektif pelajar memandangkan cara ini berupaya menghuraikan fenomena pemelajaran dengan lebih tepat dan terperinci. Huraian seperti ini didapati lebih bermakna dalam menangani masalah pemelajaran. Satu kaedah penyelidikan yang digunakan bagi tujuan tersebut digelar sebagai fenomenografi. Bagi menghuraikan apa, bagaimana dan peranan penyelidikan tersebut, sebuah penyelidikan telah dipetik. Penyelidikan tersebut bertujuan mengkaji perbezaan kualitatif yang wujud dalam hasil pemelajaran.

### ABSTRACT

This paper tries to focus attention to the fact that learning should be studied from the students' perspective. In this way the learning phenomena could be better described in detail and learning problems could probably be solved in a more meaningful manner. To achieve this objective, one research study on qualitative differences in learning outcome approach is cited to explain phenomenography.

### PENGENALAN

Pada umumnya, pemelajaran didapati sebagai satu fenomena yang sehati dengan kehidupan manusia. Menurut Horton dan Turnhage (1967), apa saja yang dilakukan oleh manusia yang matang, atau sesuatu yang mampu dilakukan olehnya, boleh dilihat sebagai suatu hasil daripada pemelajaran. Borger dan Seaborne (1982) pula mendakwa, hampir seluruh masa dalam hidup ini, manusia terlibat dalam aktiviti pemelajaran. Maka tidak menghairankan jika pemelajaran telah dikaji sejak lebih seratus tahun yang lalu (Saljo 1982). Ia dikaji dari pelbagai perspektif, sama ada dari perspektif pengajar, ahli psikologi mahupun penyelidik pendidikan. Tujuan asas penyelidikan-penyelidikan ini ialah untuk meningkatkan pemelajaran menerusi pemahaman yang mendalam mengenai bagaimana proses ini berlaku (Entwistle 1981). Penyelidikan pemelajaran pada peringkat

awalnya dibuat berlandaskan paradigma tradisional dan berkisar di sekitar tajuk tingkah laku manusia. Kajian terhadap tingkah laku manusia pula merupakan komponen asas dan teras bidang psikologi (Marx dan Bunch 1977). Dengan sendirinya, pemelajaran menjadi suatu tajuk utama dalam bidang ini.

Penyelidikan psikologi mempunyai cara-caranya yang tersendiri dalam mencari prinsip-prinsip pemelajaran yang dipercayai dapat digunakan secara meluas dalam pelbagai jenis pemelajaran manusia. Misalnya, dalam penyelidikan yang mengkaji tentang bagaimana pelajar berfungsi dalam persekitaran akademiknya, penyelidik menumpukan perhatian ke arah memerhati dan menghuraikan tingkah laku pelajar; bagaimana mereka berfungsi, apakah fungsi tersebut mempunyai kaitan dengan ciri-ciri pelajar dan sebagainya. Penyelidik ini akan mentafsirkan apa yang dilihatnya sebagai

apa yang sebenarnya dialami oleh pelajar tersebut. Seterusnya, huraian yang dihasilkan diterima sebagai realiti yang wujud dalam kehidupan akademik pelajar.

Pendekatan seumpama ini didapati melahirkan keputusan yang sungguh impresif, tetapi agak kurang menyakinkan dari segi nilainya kepada pembelajaran yang sebenar atau "real life learning" (Entwistle 1984; Biggs 1991). Sebabnya, pembelajaran dalam penyelidikan ini telah didapati dihuraikan dari luar, terasing dan berpusatkan penyelidik. Ia mengeneipkan aspek dari "dalam" pelajar itu sendiri, apa yang dialami dan apa yang difahami oleh mereka mengenai sesuatu fenomena yang berlaku dalam hidupnya. Penyelidikan yang berpendekatan sedemikian didapati gagal untuk mengesan aspek kawalan sedar (conscious control) pelajar ke atas strategi dan pendekatan yang dipilih semasa belajar (Wilson 1977; Filstead 1979). Ia juga gagal menerangkan bagaimana pelajar boleh hilang minat belajar (Entwistle 1975).

Penyelidikan dari paradigma tradisional yang bercorak "hypothetico-deductive method" telah dikritik kerana ketidawajarannya membentuk suatu teori atau prinsip pembelajaran yang umum. Apatah lagi mengaplikasikan hasil penyelidikan yang menggunakan haiwan, tumbuhan dan benda-benda lain dalam penghuraian mengenai pembelajaran manusia sepertimana yang dilakukan oleh Pavlov, Kohler, Thorndike, Skinner dan lain-lain lagi (Entwistle 1981). Paradigma ini disamakan oleh Parlett dan Hamilton (1977) sebagai "agricultural-botanical experimental paradigm" kerana reka bentuk penyelidikannya seolah-olah menyamakan pelajar dengan tumbuhan. Bagaimana pelajar bertindak ke atas "treatment" yang berbeza samalah seperti tumbuhan bertindak ke atas baja.

Manusia terlibat dalam pelbagai proses pembelajaran, umpamanya mendapatkan kemahiran fizikal (berenang, menaip, memandu), kemahiran intelektual atau akademik (matematik, sejarah, perisian komputer) dan sebagainya. Kesemua proses ini berbeza di antara satu dengan lain dan tidak mungkin dapat digolongkan ke dalam suatu proses yang umum. Menurut Svensson (1979), adalah amat salah mengandaikan fenomena pembelajaran terdiri daripada set-set fenomena yang seragam kerana ini menyebabkan penghuraian ke atas fenomena tersebut tidak menitikberatkan perbezaan-perbezaan yang wujud di dalamnya. Sementara

itu, Neisser (1982) mendakwa bahawa pembelajaran dalam bentuk umum tidak wujud, kecuali dalam bentuk ayat-ayat yang abstrak yang tidak dapat memandu penyelidikan ke arah memahami dan mempertingkatkan mutu pendidikan.

Jadi, apakah caranya untuk kita memahami pembelajaran? Saljo (1988) mengesyorkan agar kita menoleh perhatian ke arah bilik darjah dan sistem pendidikan. Di sana, aktiviti-aktiviti yang berlaku diteliti supaya elemen-elemen khusus mengenai bagaimana manusia belajar dapat dihasilkan.

Ini bermakna, penyelidikan yang dijalankan perlu mengkaji aktiviti belajar atau menelaah pelajaran dari perspektif pelajar sendiri. Ia bercitarasakan antropologi dan berusaha ke arah melahirkan penjelasan secara konseptual tentang apakah yang sebenarnya berlaku dalam fenomena yang kompleks dan luas ini.

Penyelidikan pembelajaran dari perspektif pelajar telah mendapat perhatian para penyelidik pembelajaran masa kini (Gibbs *et al.* 1984). Menurut pandangan Zuber-Skerritt (1987), penerimaan para penyelidik terhadap metodologi ini berlaku setelah menyedari bahawa

"... that the nature, behaviour and mind of human kind constitute a complex whole which cannot be observed objectively or in parts by an outside researcher." (Zuber-Skerritt 1987: 43)

Ini bermakna, jika seseorang penyelidik ingin memahami pembelajaran, dia mestilah mengkaji sifat pengetahuan yang dihasilkan oleh pelajar dan proses yang dilalui oleh mereka untuk mencipta pengetahuan tersebut (Kolb 1984). Jika seseorang itu berhasrat untuk meningkatkan kefahaman pelajar mengenai sesuatu perkara pula, dia harus menggunakan maklumat yang diberikan oleh pelajar itu sendiri tentang apakah yang mereka faham mengenai perkara tersebut (Kroksmark 1987).

Sejenis penyelidikan yang mengkaji pembelajaran dari perspektif pelajar dikenali sebagai *fenomenografi*. Pendekatan penyelidikan ini berasaskan kepada prinsip niat atau tujuan (*principle of intentionality*) (Husserl 1970:1901), iaitu pengalaman seperti memahami atau menanggapi biasanya didapati menjurus ke arah sesuatu yang telah difahami atau ditanggapi (Marton *et al.* 1993).



Istilah fenomenografi diperkenalkan oleh Marton pada tahun 1981 (Saljo 1988). Ia bermaksud:

“...phenomenography is a research method for mapping the qualitatively different ways in which people experience, conceptualize, perceive, and understand various aspects of, and phenomena in, the world around them.” (Marton 1986: 31)

Perkataan fenomenografi terbit daripada dua perkataan Yunani, iaitu “phenomenon” bermaksud “sesuatu yang boleh ditonjolkan dan diperjelaskan” dan “grapho” yang bererti “menulis, melukis atau menghurai”. Jadi, keseluruhan erti fenomenografi ialah “menghuraikan sesuatu yang boleh ditonjolkan dan diperjelaskan” (Neuman 1987).

Maka, tujuan penyelidikan fenomenografi adalah untuk menghuraikan apa yang kelihatan pada mata seseorang terhadap pelbagai fenomena yang dialami dalam hidupnya. Kemudian, ia dicirikan dan dibezakan secara kualitatif (Neuman 1987).

Jelasnya, penyelidikan ini memberi keutamaan kepada aspek pengalaman (experiential). Ia dilabelkan sebagai *perspektif order kedua* (Marton 1981). Perspektif ini berbeza daripada penyelidikan *perspektif order pertama* yang berminat untuk menghuraikan sesuatu persoalan sepertimana kewujudannya. Misalnya, dalam kajian mengenai peranan baka dan persekitaran dalam perlakuan melangsang di kalangan remaja, penyelidik dari perspektif order pertama akan menumpukan perhatian untuk mengkaji bagaimanakah kedua-dua faktor ini mempengaruhi perlakuan melangsang tersebut. Sementara, penyelidik dari perspektif order kedua, berusaha memahami pendapat orang ramai tentang bagaimanakah faktor baka dan persekitaran memainkan peranannya dalam konteks persoalan yang dikaji. Tegasnya, penyelidik tidak membuat kenyataan mengenai X, tetapi idea manusia mengenai X. “Man-world relation” adalah perkara yang dikaji dalam fenomenografi (Marton 1986).

Satu lagi aspek yang diambil kira dalam kajian fenomenografi ialah deskripsi mengenai konsepsi, persepsi ataupun pengalaman mestilah dibuat berdasarkan sesuatu perkara yang khusus. Rasionalnya ialah setiap manusia tidak meluahkan persepsi atau pengalaman mereka secara tiba-tiba, tanpa asas. Mereka semestinya mengalami sesuatu terlebih dahulu. Biasanya, dalam pemelajaran, *kandungan* adalah perkara yang khusus itu.

Secara umum, huraian mengenai pemelajaran yang dihasilkan daripada penyelidikan fenomenografi bersifat *relasional, eksperiensial, kualitatif dan berorientasikan kandungan* (Marton 1986). Huraian ini pula dilakukan dalam bentuk set-set pencirian yang digelar sebagai kategori deskripsi.

#### *Pembelajaran dalam penyelidikan fenomenografi*

Bagi memperlihatkan dengan jelas bagaimana penyelidikan fenomenografi dapat meng-huraikan persoalan mengenai pemelajaran secara saintifik, maka dipetik sebahagian daripada penyelidikan yang telah dilakukan oleh penulis untuk disertasinya. Aspek pemelajaran yang akan difokuskan dalam kertas ini ialah hasil pemelajaran (learning outcome).

Dari sudut penyelidikan fenomenografi, hasil pemelajaran merupakan komponen pemelajaran yang sama pentingnya dengan proses pemelajaran. Kedua-dua aspek ini amat berkait rapat dan kefahaman tentangnya akan dapat membantu pendidik ke arah meningkatkan mutu pemelajaran (Marton 1976).

Pandangan ini agak berbeza dengan pegangan penyelidikan pemelajaran dari paradigma tradisional yang beranggapan proses pemelajaran adalah perkara “pokok” sementara hasil pemelajaran hanyalah berfungsi sebagai pelengkap kepada perkara pokok ini (Bower dan Hilgard 1981). Ertinya, aspek hasil pemelajaran seolah-olah berada dalam satu domain yang berasingan daripada proses pemelajaran. Menurut Dahlgren (1984), pandangan ini boleh menyekat kefahaman manusia mengenai pemelajaran yang sebenarnya.

Dalam mengkaji hasil pemelajaran, penyelidikan fenomenografi lebih berminat untuk meneliti tentang *apakah* yang difahami atau dipelajari oleh pelajar tentang kandungan sesuatu pelajaran daripada *jumlah* atau *amaun* pelajaran (seperti fakta, prosedur dll) yang berjaya diluahkan oleh pelajar. Penelitan ke atas aspek *apakah* ini akan membolehkan pengajar atau pendidik mengenalpasti pelbagai cara pelajar berfikir tentang kandungan sesuatu pelajaran. Maka, pendidik dapat melihat dengan jelas apakah perkara yang difahami atau disalah tafsir oleh pelajar. Ia juga dapat membantu pengajar mengesan pendekatan pemelajaran pelajar tersebut (Marton 1979).

Menurut Marton dan Saljo (1984), jika pelajar mendekati bahan pemelajaran dengan

hasrat untuk memahami isi kandungannya, maka peluang untuk dia memahami teks tersebut serta mengingati fakta-fakta penting adalah besar. Tetapi, jika seseorang pelajar itu menumpukan perhatiannya kepada mengingati fakta dan memperlakukan tugas yang diberi sebagai suatu yang membebankan, maka kefahaman yang dihasilkan amatlah lemah. Ini bermakna, pelajar yang salah tafsir dan hanya meluahkan kembali fakta yang diterimanya bukanlah disebabkan oleh kurang keupayaan. Ia berpunca daripada niat atau tujuan belajar yang tersemam di hati mereka. Keputusan ini disokong oleh Van Rossum dan Schenk (1984) dan Wan Zah (1993).

Tujuan penyelidikan ini ialah meneliti perbezaan kualitatif yang terdapat dalam jawapan pelajar terhadap suatu soalan umum mengenai sebuah teks akademik. Persoalan yang ingin dijawab ialah apakah yang difahami oleh pelajar tentang maksud teks? Adakah terdapat perbezaan kefahaman di antara pelajar? Jika ada, apakah perbezaan itu?

Di samping meneliti aspek kefahaman, penyelidikan ini juga berminat untuk meneliti corak jawapan yang ditunjukkan oleh pelajar. Apakah perbezaan kualitatif yang terdapat dalam corak jawapan mereka? dan adakah wujud perkaitan di antara kefahaman dengan corak jawapan tersebut?

#### *Kaedah Penyelidikan*

Subjek terdiri daripada 30 orang pelajar tahun dua dari Universiti Malaya yang sedang mengikuti kursus Sarjana Muda Sains dengan Pendidikan. Kesemua subjek adalah lepasan sekolah menengah dan tidak pernah bekerja. Sebahagian besar daripada mereka (23 orang) memasuki universiti melalui kursus Sains Asasi, dan selebihnya mempunyai Sijil Tinggi Persekolahan Malaysia (STPM).

Sebuah teks akademik telah dipilih sebagai bahan pembelajaran. Teks tersebut bertajuk, "Masyarakat berdisiplin dan bermotivasi: Tinjauan kembali terhadap orientasi pendidikan" adalah sebuah teks ucapan oleh Awang Had Salleh (1982). Ia terdiri daripada sembilan muka surat yang mengandungi lebih kurang 2,600 perkataan. Pemilihan teks ini berdasarkan faktor kesesuaiannya dengan pelajar dari segi bahasa, tajuk, kesukaran dan panjang teks. Pemilihan ini dijalankan oleh satu panel hakim dan beberapa orang pelajar (dalam kajian rintis).

Perkara pokok yang terkandung di dalam teks tersebut adalah mengenai kurangnya penekanan para guru untuk menerapkan disiplin yang aktif di kalangan murid mereka. Para guru didapati hanya menitikberatkan disiplin yang pasif. Penulis membezakan konsep disiplin yang aktif daripada yang pasif berasaskan aspek yang ditekankan dalam konsep-konsep disiplin ini. Disiplin yang pasif dikatakan hanya menekankan aspek "conformity", manakala disiplin yang aktif merangkumi aspek "conformity" serta aspek kreatif, produktif dan kecemerlangan. Disiplin yang aktif ataupun secara intelektual amat berkehendakkan motivasi. Perakuan tentang intipati teks ini diperoleh daripada penulis teks itu sendiri.

Setiap subjek dijemput ke bilik penyelidik untuk ditemubual. Sebelum subjek memulakan bacaan, mereka diberitahu tentang beberapa perkara, seperti soalan mengenai teks akan dikemukakan sebaik sahaja selesai membaca, masa membaca tidak dihadkan dan mereka dibenarkan membaca mengikut kebiasaan masing-masing, seperti membaca dengan kuat atau perlahan, menggaris, menanda dan sebagainya.

Setelah membaca, teks dan segala catatan diambil. Soalan pertama yang di ajukan ialah "Apakah yang anda faham tentang kandungan teks yang baru dibaca?" diikuti dengan beberapa soalan khusus. Semasa temubual ini, penyelidik juga mengemukakan soalan tambahan di mana-mana bahagian yang difikirkan kurang jelas atau yang mengelirukan. Semua jawapan subjek dirakamkan dan ditranskripsikan patah demi patah perkataan.

Data-data berupa jawapan subjek dianalisis dengan mengguna kaedah induktif yang dikenali sebagai hermeneutik fenomenografi (Saljo 1988), yakni ia tidak berdasarkan kepada sebarang set pengkategorian tertentu. Tujuannya supaya dapatan penyelidikan ini benar-benar menggambarkan pengalaman pembelajaran 30 orang subjeknya. Jika set pengkategorian yang sedia ada digunakan, dapatan penyelidikan ini mungkin akan dikongkong oleh dapatan kajian sebelumnya. Maka, deskripsi yang dihasilkan mungkin kurang mencerminkan keadaan yang sebenar memandangkan subjek dan konteks penyelidikan ini berbeza daripada kajian-kajian yang lepas. Cuma bagi menentukan kefahaman subjek, jawapan subjek dibandingkan dengan maksud asal teks.



Langkah pertama dalam proses analisis data ialah membaca setiap jawapan subjek berulang kali dan teliti bagi mengenalpasti intipati yang terdapat di dalamnya. Intipati ini lalu dicatatkan berserta pernyataan atau ekspresi yang berkaitan. Pada tahap ini, penyelidik dapat menentukan secara kasar kedudukan kategori subjek yang dikaji. Seterusnya, pernyataan yang membayangkan intipati dikumpulkan menurut persamaan dan perbezaannya.

Langkah kedua dalam proses ini ialah mengkaji kumpulan intipati yang mempunyai maksud yang sama yang telah dipilih dalam langkah pertama. Satu tema diberikan kepada setiap satu kumpulan intipati (kategori). Setelah itu, keputusan dibuat bagi menentukan garis pemisah di antara kategori-kategori.

Akhir sekali, usaha ditumpukan ke arah mengenalpasti variasi yang wujud dalam setiap kategori dan di susun menurut hirarki.

Hasil analisis disemak oleh tiga orang juri. Peratus persetujuan yang diperolehi daripada penyemakan ini adalah 90-95%.

#### *Keputusan Penyelidikan*

Penyelidikan ini menemui dua aspek perbezaan kualitatif dalam jawapan subjek, iaitu pertama, perbezaan dalam kefahaman dan kedua perbezaan dalam corak (orientasi) jawapan.

#### *Aspek Kefahaman*

Dari aspek kefahaman, didapati tidak ada satupun jawapan subjek yang menepati sepenuhnya maksud teks. Walau bagaimanapun, penyelidikan ini berjaya mengenalpasti lima kategori kefahaman yang disusun bermula daripada kategori yang paling menghampiri maksud penulis dan berakhir dengan kategori yang paling jauh daripadanya. Jadual 1 menunjukkan kategori tersebut.

Huraian mengenai lima kategori kefahaman tersebut adalah seperti berikut:

**Kategori A:** *Kelemahan sistem penilaian menjadi punca matlamat pembinaan masyarakat yang berdisiplin dan bermotivasi.*

Bagi kategori jawapan ini, perhatian subjek didapati tertumpu kepada *punca* yang menyebabkan masalah disiplin dan motivasi sukar di atasi. Punca masalah ini dikatakan terletak pada *kelemahan sistem penilaian* yang tidak mampu untuk menguji dan mengukur tahap disiplin dan motivasi murid atau pelajar. Sistem penilaian

JADUAL 1  
Kategori hasil pembelajaran

Kategori	Kefahaman
A	Kelemahan sistem penilaian menjadi punca matlamat pembinaan masyarakat yang berdisiplin dan bermotivasi sukar dicapai.
B	Matlamat membina masyarakat yang berdisiplin dan bermotivasi belum tercapai. Oleh itu, satu langkah perlu diambil (langkah tersebut dinyatakan dengan khusus)
C	Disiplin dan motivasi adalah penting untuk membina masyarakat yang maju dan kukuh.
D	Bagaimana membentuk sebuah masyarakat yang berdisiplin dan bermotivasi (tanpa menyebutkan langkahnya khusus).
E	Mengenai masyarakat berdisiplin dan bermotivasi.

masa kini hanya menitikberatkan aspek-aspek akademik. Pencapaian murid di dalam pelajaran dapat diukur dengan mudahnya, tetapi skala yang khusus untuk mengukur disiplin dan motivasi masih tidak kedapatan hingga ke hari ini. Ini menyebabkan para guru hanya menumpukan perhatian kepada soal akademik sahaja sehinggakan persoalan mengenai pencapaian murid dari segi disiplin dan motivasi menjadi persoalan kedua. Oleh yang demikian, subjek menyarankan supaya sistem penilaian perlu digubal atau dipertingkatkan keberkesannya supaya nilai-nilai murni seperti disiplin dan motivasi turut dapat diuji dan dinilai. Subjek berpendirian bahawa disiplin yang disertai dengan motivasi adalah penting dipupuk dalam diri setiap pelajar.

Contoh pernyataan yang mewakili kategori jawapan ini adalah seperti berikut:

...kita terlalu berasaskan kepada penilaian dalam aspek yang bukan salah tapi dalam aspek yang tertentu. Misalnya seorang murid, pencapaian akademiknya kita boleh membuat penilaian, tapi pencapaian dalam tingkah laku iaitu behaviour,

the level of motivation achieved cannot be assessed by the present system of penilaian. This is basic. I think it (evaluation system) has to be improved by the authority. They should structure a system of assessment that can really test or assess the values acquired by the students throughout their education...not just certain aspects but all the aspects. I am talking on academic aspects and any other aspects. (S 03, m.s.69)

Jawapan ini menunjukkan bahawa subjek berupaya melihat perbincangan teks secara menyeluruh serta mengeluarkan buah fikiran sendiri terhadap isu yang dibincangkan.

**Kategori B:** *Matlamat memupuk masyarakat yang berdisiplin dan bermotivasi belum tercapai. Oleh itu, satu langkah perlu diambil (dinyatakan dengan khusus)*

Jawapan bagi kategori ini agak berbeza daripada kategori di atas dari segi isu yang menjadi tumpuan subjek. Jika dalam kategori A, punca masalah menjadi tumpuan mereka, tetapi bagi kategori ini pencapaian matlamat masyarakat berdisiplin dan bermotivasi itu yang ditekankan. Subjek meluahkan pandangan mereka bahawa matlamat untuk mencapai sebuah masyarakat yang berdisiplin dan bermotivasi di negara ini masih belum dicapai. Perkara ini berlaku kerana disiplin tidak dititikberatkan dalam pendidikan formal dewasa ini. Guru-guru didapati lebih mementingkan soal akademik dalam pengajaran mereka seperti menyudahkan silabus, memastikan pelajar dapat menyelesaikan masalah dengan menggunakan sesuatu formula dan sebagainya. Jadi, satu langkah ke arah mencapai matlamat tersebut perlu diambil, seperti para guru haruslah berfikir cara-cara untuk menerapkan disiplin dan motivasi di kalangan pelajar mereka, satu tinjauan harus dilakukan untuk memastikan tahap pencapaian matlamat pendidikan setakat ini, mengadakan kursus mengenai disiplin dan motivasi, para pendidik harus kembali kepada matlamat pendidikan yang asal dan sebagainya.

Walaupun setiap subjek menyatakan langkah yang berbeza, tetapi apa yang penting di sini subjek dapat mengemukakan apakah langkah tersebut dan tidak hanya menyebutkannya secara umum seperti yang terdapat dalam Kategori D yang akan dibincangkan nanti.

Contoh pernyataan subjek yang mewakili kategori jawapan ini adalah seperti di bawah ini:

"...berfikir bagaimana kita boleh menyediakan sebuah masyarakat yang begitu berdisiplin dan bermotivasi dalam generasi yang akan datang." (S 06, m.s.172)

"...kita perlu ada pendidikan mengenai disiplin dan motivasi." (S 06, m.s.172)

"...membuat tinjauan mengenai pendidikan sekarang ini, adakah mencapai matlamat itu." (S 17, m.s. 478)

Pada dasarnya, jawapan dari kategori B dan kategori A sama-sama memperlihatkan subjek mengulas perbincangan teks secara menyeluruh serta mengeluarkan idea tersendiri terhadap persoalan teks. Namun begitu, skop perbincangan jawapan daripada kategori B tidak seluas dan sedalam jawapan daripada kategori A.

**Kategori C:** *Disiplin dan motivasi adalah penting untuk membina masyarakat yang maju, kukuh dan bersepadu.*

Perhatian subjek dalam jawapan ini didapati tertumpu kepada bahagian pertama teks iaitu tentang pentingnya disiplin dan motivasi dipupuk dalam pendidikan masa kini. Subjek menerangkan sebab-sebab mengapa disiplin perlu disertai dengan motivasi, umpamanya untuk menyediakan sebuah generasi yang bertanggungjawab, menjamin kewujudan sebuah negara yang maju, kukuh dan sebagainya. Masyarakat yang hanya berdisiplin dikatakan masyarakat yang statik dan tidak berkembang. Tetapi masyarakat yang bermotivasi adalah masyarakat yang bergerak dan sentiasa berusaha untuk mencapai kejayaan yang lebih baik. Berikut, adalah dua pernyataan yang tergolong dalam kategori ini:

"...berdisiplin dan bermotivasi adalah diperlukan untuk pendidikan...kalau masyarakat berdisiplin sahaja, mereka cuma boleh survive sahaja. Tapi, kalau ada motivasi, masyarakat itu boleh maju." (S 07, m.s.104)

"...untuk membentuk sebuah masyarakat, bukan sahaja berdisiplin, tapi juga mestilah bermotivasi." (S 13, m.s. 385)

Kebanyakan jawapan didapati memetik kembali kenyataan penulis dan amat kurang memasukkan pandangan sendiri terhadap isu yang dibahaskan.

**Kategori D:** *Bagaimana membentuk sebuah masyarakat yang berdisiplin dan bermotivasi (tanpa menyebutkan langkahnya yang khusus).*

Jawapan subjek dalam kategori ini menekankan aspek **bagaimana** untuk menerapkan disiplin dan



motivasi dalam sistem pendidikan formal. Bagaimana atau cara-cara di sini dilihat dari konteks pendidikan seperti apakah yang boleh dilakukan oleh guru dalam usaha membentuk masyarakat yang berdisiplin dan bermotivasi. Sebahagian subjek menggunakan perkataan "peranan" umpamanya, "peranan pendidikan dalam menyediakan masyarakat yang berdisiplin dan bermotivasi". Pada pandangan penyelidik, kedua-duanya mempunyai maksud yang sama. Berbeza daripada kategori B, perkataan "bagaimana" atau "peranan" atau "cara" tidak diterangkan secara khusus, yakni subjek tidak menerangkan apakah cara yang mereka maksudkan itu. Subjek didapati hanya menyebut perkataan "bagaimana" itu sahaja tanpa ulasan yang lebih lanjut. Oleh kerana itu, jawapan subjek ini boleh dianggap sebagai satu kenyataan umum sahaja.

Pernyataan yang mewakili kategori jawapan ini adalah seperti berikut:

"...bagaimana cara dia hendak aplikasikan kepada pelajar-pelajar, kepada murid-murid." (S 08, m.s. 225)

"...rencana itu menceritakan bagaimana kita nak tingkatkan motivasi dan disiplin pelajar-pelajar." (S 18, m.s. 519)

Sama seperti kategori C, kategori ini juga amat kurang mengandungi pandangan atau buah fikiran subjek. Hampir keseluruhan jawapan merupakan idea asal penulis yang diluahkan kembali oleh subjek.

#### **Kategori E:** *Mengenai masyarakat berdisiplin dan bermotivasi.*

Dalam jawapan bagi kategori ini, subjek didapati hanya memetik beberapa isi kandungan teks tanpa merumuskannya. Isi-isi yang dikira penting oleh subjek adalah seperti definisi disiplin dan motivasi, hubungan disiplin dan motivasi dengan pendidikan. Sebahagian subjek memetik isi-isi secara yang tidak tersusun, menurut apa sahaja yang diingati ketika itu. Bukti-bukti subjek meluahkan semula apa yang diingati mengenai teks adalah amat ketara. Kefahaman subjek mengenai teks juga didapati tidak mendalam, malah terdapat sebilangan subjek yang tidak memahami persoalan sebenar. Di samping itu, arah pemikiran subjek mengenai teks amat sukar untuk dikesan dalam kategori ini. Jawapan subjek mendatar tanpa sebarang penekanan pada mana-mana aspek perbincangan.

Ciri-ciri kategori ini dapat ditunjukkan oleh pernyataan berikut:

Rencana ini menyatakan hal masyarakat yang berdisiplin dan masyarakat yang bermotivasi. Dia terangkan apa yang dikatakan berdisiplin, bermotivasi dan cara-cara yang digunakan untuk mencapai masyarakat yang berdisiplin dan bermotivasi. Cara yang dikemukakan itu melalui pelajaran formal, bukan formal dan kurikulum. Yang dimaksudkan berdisiplin itu, contoh yang diberikan yang pertama...beratur semasa menjalankan aktiviti, hormat kepada orang tua, ibu bapa, kawan dan sebagainya. Yang tidak berdisiplin yang diberikan itu seperti menelefon pihak bomba mengatakan ada kebakaran (tetapi kebakaran tidak berlaku). Itu saja. (S 27, m.s. 825)

Demikianlah, lima kategori jawapan yang bemula dari kategori A hingga E yang disusun menurut kefahaman subjek mengenai maksud teks. Kategori A adalah kategori yang paling menghampiri maksud teks, manakala kategori E, paling jauh daripadanya. Walau bagaimanapun jarak kefahaman di antara satu kategori dengan yang lain adalah tidak sama. Misalnya, kategori A dan B lebih hampir di antara satu dengan yang lain jika dibandingkan dengan kategori B dan C. Perbezaan ini wujud kerana data tidak dianalisis untuk membezakan setiap kategori dalam satu jarak yang sama.

Bagi penyelidikan ini, kategori A dan B digolongkan sebagai jawapan yang berkualiti tinggi kerana ciri-cirinya yang tidak menonjolkan aspek kefahaman yang cetek dan aktiviti memetik dan meluahkan semula pernyataan penulis seperti yang terdapat dalam kategori C, D dan F. Taburan bilangan dan peratusan subjek bagi setiap kategori kefahaman terdapat dalam Jadual 2.

JADUAL 2  
Taburan bilangan dan peratusan subjek bagi setiap kategori kefahaman

Kategori Kefahaman	Bilangan Subjek	Peratusan (%)
A	1	3
B	7	23
C	8	27
D	9	30
E	5	17
Jumlah	30	100

jawapan pelajar dapat dikesan. Penyelidikan ini berjaya mengesan perbezaan kualitatif yang wujud dalam kefahaman dan corak jawapan subjek. Dari segi kefahaman, ternyata subjek mempunyai tafsiran tersendiri terhadap maksud teks. Tafsiran-tafsiran tersebut telah berjaya dikategorikan ke dalam lima kategori. Kategori ini boleh disusun menurut suatu hirarki, yakni didahului dengan kategori yang paling menghampiri maksud teks yang sebenar dan diakhiri dengan kategori yang paling jauh daripadanya (maksud teks). Jelasnya, setiap kategori mempunyai ciri-ciri yang tertentu dan berbeza dengan kategori yang lain. Justeru itu, dapatan penyelidikan ini telah dapat memaparkan kefahaman pelajar secara terperinci.

Apabila jawapan subjek ditinjau dari sudut kuantitatif, hanya segelintir subjek berjaya memberi tafsiran yang menghampiri maksud penulis asal, manakala majoritinya gagal berbuat demikian. Apa yang lebih mendukacitakan, tidak seorang pun yang dapat membaca secara tepat fikiran penulis teks tersebut. Dapatan ini menggambarkan bahawa kebanyakan subjek menghadapi masalah dalam memahami maksud teks. Penyelidikan ini mendapati masalah ini berkait rapat dengan pendekatan yang diambil oleh pelajar ketika mempelajari teks.

Pendekatan tersebut tergambar pada corak jawapan yang diberikan oleh subjek. Penyelidikan ini mendapati dua corak jawapan yang amat berbeza, iaitu jawapan yang bercorak membuat rumusan dan meluahkan semula. Jawapan yang bercorak membuat rumusan mengandungi elemen yang menunjukkan subjek menumpukan perhatiannya ke arah memahami teks, yakni teks dilihat secara keseluruhan, isi-isi utama ditonjolkan dan dikaitkan, maksudnya dicerna secara kritis sehingga berjaya memberikan pandangan sendiri terhadap perbincangan teks.

Jawapan yang bercorak meluahkan semula menggambarkan subjek cuba memetik seberapa banyak isi-isi teks secara terpisah, tanpa mengira yang manakah yang penting dan yang kurang penting. Isi-isi ini pula tidak dikaitkan. Ia ditelan bulat-bulat dan dihafal. Soal memahami tidak dititikberatkan.

Subjek yang mencapai kefahaman yang tinggi didapati memiliki corak jawapan yang berorientasikan membuat rumusan, manakala subjek yang mencapai tahap kefahaman yang

rendah mempunyai corak jawapan yang berorientasikan reproduksi, yakni menyatakan kembali fakta-fakta teks. Ini bermakna, subjek yang menumpukan perhatiannya ke arah memahami akan berjaya untuk memahami sebahagian besar kandungan teks, sebaliknya subjek yang menumpukan ke arah mengingat dan menghafal semata-mata gagal berbuat demikian. Dua jenis pendekatan yang ditonjolkan oleh subjek dalam kajian ini bersesuaian dengan ciri-ciri pendekatan mendalam dan pendekatan permukaan yang dikemukakan oleh Marton dan Saljo (1976).

Berhubung dengan kegagalan semua subjek untuk memahami dengan tepat maksud teks, termasuk mereka yang menumpukan perhatian ke arah memahami, penyelidik berpendapat perkara ini mungkin berpunca daripada pengetahuan sedia subjek yang kurang dalam soal-soal pendidikan. Hampir kesemua subjek tidak ada pengalaman mengajar di sekolah. Tambahan lagi, mereka datang daripada aliran sains dan baru sahaja didedahkan dengan bidang pendidikan. Menurut Morgan *et al.* (1982) dan Tan (1990), pengetahuan sedia yang mencukupi amat penting bagi seseorang pelajar memahami bahan yang sedang dipelajari. Bahkan, menurut Svensson (1984), pelajar boleh menjadi pakar dalam pembelajaran jika mereka dapat menyusun pengetahuan sedia dan mengaitkannya dengan pengetahuan baru, kerana dari sinilah terbitnya pemahaman yang bersifat "personal".

Dengan itu, mungkin dapat dirumuskan bahawa penggunaan pendekatan mendalam sahaja belum memadai bagi seseorang itu memahami sepenuhnya kandungan sesebuah teks. Ia perlu disertakan dengan pengetahuan sedia yang cukup. Dapatan ini menyokong dapatan Entwistle dan Marton (1984).

#### *Implikasi*

Perbincangan di atas menunjukkan dengan jelas bahawa penyelidikan fenomenografi telah membuka lembaran yang lebih bermakna kepada pendidik. Hasil pembelajaran yang dikaji secara ini membolehkan pendidik mengenalpasti apakah yang difahami atau yang dipelajari oleh pelajar dan mengapa kefahaman demikian mereka tunjukkan. Maklumat ini amat penting dalam usaha meningkatkan kualiti pembelajaran pelajar. Misalnya, dalam penyelidikan di atas, pendidik dapat mengenalpasti secara terperinci apakah yang difahami oleh subjek dan aspek



manakah yang menjadi tumpuan mereka semasa mempelajari teks. Dengan itu, pendidik ini dapat merancang suatu langkah yang benar-benar sesuai dengan masalah yang dihadapinya. Salah satu cara mungkin dengan meneliti kembali pengajarannya. Apakah pengajarannya kurang memasukkan elemen kefahaman, atau penjelasan yang dibuat belum cukup padat sehingga pelajar menjadi keliru? Jadi, apa yang dilakukan ialah menjelaskan kembali mana-mana bahagian yang disalaherti oleh pelajar dengan mengemukakan contoh-contoh yang sesuai dengan pengetahuan sedia pelajar.

Pada masa yang sama, pendidik dapat memperbaiki pembelajaran pelajar berdasarkan jawapan yang mereka beri yang membayangkan bagaimana pelajar itu belajar. Contohnya, pelajar yang belajar secara permukaan dapat dibimbing ke arah pembelajaran yang lebih berkualiti. Ini dapat dilakukan dengan mewujudkan persekitaran pembelajaran yang sesuai seperti menggalakkan pelajar berhujah, berfikir dan sebagainya.

### KESIMPULAN

Penyelidikan fenomenografi berusaha ke arah memaparkan erti pemelajaran menurut kaca mata pelajar kerana dunia pemelajaran itu, menurut penyelidikan ini, tidak boleh dipisahkan daripada realiti kehidupan pelajar seharian. Ia bukan sebuah dunia yang tersendiri, terasing daripada unsur kemanusiaan. Maka, tentunya wajar bagi seseorang pendidik itu menjenguk ke alam realiti ini dan cuba memahaminya sebelum melakar pelan bagi membantu pelajar mempertingkatkan.

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## Price Changes and Trading Volume Relationship: Some Preliminary Evidence from the Kuala Lumpur Stock Exchange

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### ABSTRACT

This study provides evidence the relationship between price changes and volume of trading of firms listed on the KLSE. Absolute price changes were found to have a strong relationship with trading volume compared to price changes *per se*. Transaction volume associated with a price upturn was, on average, larger than the transaction volume associated with a price downturn, which probably explained the positive correlation between price changes and trading volume. Causality tests indicated that price changes cause volume changes but not vice versa. The interaction test showed that large transaction volume coupled with an increasing trend in price will further gather momentum and result in a further increase in price. This finding, however, does not suggest that the KLSE is weak-form inefficient. The findings defy the basic tenet of technical analysis that past price volume data can be consistently used to design profitable investment strategies.

### ABSTRAK

This study provides evidence regarding the relationship between price changes and volume of trading of firms listed on the KLSE. Absolute price changes were found to have a strong relationship with trading volume compared to price changes. Transaction volume associated with a price upturn was, on average, larger than the transaction volume associated with a price downturn which probably explained the positive correlation between price changes and trading volume. Causality tests indicated that price changes cause volume changes but not vice versa. The interaction test showed that large transaction volume coupled with an increasing trend in price will further gather momentum and result in a further increase in price. This finding, however, does not suggest that the KLSE is weak-form inefficient which provides an opportunity to investors to devise strategies as there is evidence that the KLSE is weak-form efficient and pockets of inefficiencies observed are not economically viable. The findings defy the basic tenet of technical analysis that past price volume data can be consistently used to design profitable investment strategies.

### INTRODUCTION

There is copious evidence (Karpoff 1987) of the relationship between price changes and trading volume from developed markets, which provides an insight into the structure of their financial markets. The price-volume relationship depends on the rate of information flow to the market, how the information is disseminated, the extent to which market prices convey the information, the size of the market and the existence of short sales constraints. Empirical relations between prices and volume can help discriminate between differing hypotheses about market structure.

Volume, together with price changes, reflects two things: a lack of consensus, or agreement,

about how a newly disclosed piece of (public) information should be interpreted, and the extent to which that information changes individual investor expectations (Beaver 1968).

The most notable relationship between price changes and trading volume is that absolute price changes and price changes *per se* are positively correlated with trading volume, though it is recognised that this relationship is generally weaker for the latter. This is probably due to the asymmetric volume, and price change is greater when the price moves up than when it moves down. Such an asymmetric relationship may be due to the differences in the costs of holding equity and short-selling stocks. A lagged

relationship between trading volume and price change is generally found to be not significant (Rogalski 1978). This is inconsistent with the inveterate belief of most technical analysts that movement of prices in one direction coupled with increasing trading volume repeats itself over time. There is no published evidence regarding the relationships between trading volumes and price changes of firms listed on the Kuala Lumpur Stock Exchange (KLSE). This study provides some evidence on the relationship.

Theoretical treatment of trading volume arises in the literature in at least three settings: its relation to the bid-ask spread, its relation to price changes and its relation to information. Empirical evidence suggests that volume is negatively related to the bid-ask spread (Karpoff 1987). Studies on price-volume relation were first conducted indirectly by Osborne (1959, 1962), who attempted to model the stock price change as a diffusion process with variance dependent on the number of transactions, implying a positive correlation between absolute price change and trading volume. Assuming transactions are uniformly distributed in time, he expressed the price process in terms of time intervals but did not directly address the volume-price issue. Osborne's work was later developed with various modifications (Tauchen and Pitts 1983).

Stock price series and the series of sales of stock are wholly unrelated (Crouch 1970), and in the same vein, no connection could be found between the price series and the corresponding volume of transaction series. Their failure to detect significant correspondence between price and volume led to questions on the applicability of existing theory (Godfrey *et al.* 1964). The failure to uncover (Ying 1966) a price-volume relation motivated further analysis (Ying 1966) by applying a series of chi-square tests, analyses of variance and cross-spectral methods to six-year, daily series of price and volume. The findings were consistent with the literature (Karpoff 1987), but his empirical methods were criticised.<sup>1</sup> Nevertheless, Ying was the first to document both price-volume correlations in the same data set.

Trading volume is also important in the "mixture of distributions" models (Tauchen and Pitts 1983) which provide explanations of the leptokurtosis in the empirical distributions of speculative prices. These models predict that volume is positively related to the size of the corresponding price change over fixed intervals or on a given transaction. The model (Pfleiderer 1984) considers price and volume in a noisy rational expectations equilibrium. The magnitude of the price change is not correlated with trading by speculators with private information but is positively related to trading by liquidity-motivated investors. So the strength of the correlation between absolute price changes and volume is negatively related to the existence of private information.

The lack of consensus (Beaver 1968), could be induced by a new piece of information, e.g. the earnings report. Since investors may differ in the way they interpret the report, some time may elapse before consensus is reached, during which time increased volume would be observed. If consensus were reached on the first transaction, there would be a price reaction but no volume reaction, assuming homogeneous risk preferences among investors. If risk preferences differ, there still could be a volume reaction, even after the equilibrium price had been reached (Verrecchia 1981).

Several theoretical models have been developed to detect the relation of trading volume to price changes. A new model in which a common bit of information arrives sequentially to investors is also tested (Epps 1975). Using simulations, he shows that volume, after all investors receive the information, is positively related to the magnitude of the price change. This model was extended (Jennings *et al.* 1981), to include real-world margin constraints and the possibility of short sales and come up with the additional prediction that volume is relatively heavy on transaction when price moves up. However, a significant feature of each of these models is a dependence on behavioural distinctions between groups of market participants, e.g. "bulls" vs. "bears" or "optimists" vs. "pessimists".

<sup>1</sup> One problem arises because the S&P 500 price and the NYSE percentage volume series used in this study are not necessarily comparable. Secondly, there was a problem in adjustment of data, the price series was adjusted by quarterly dividends data and the volume series was adjusted by monthly data on the number of outstanding shares. Several findings reported in this study are inconsistent with weak-form efficiency.



**MATERIALS AND METHODS**

The study covers the daily activities in the KLSE from January 1985 to December 1992. Daily data of the Composite Index (CI) and total market volumes were collected from the Daily Diary at the KLSE library. The changes in the logarithms of the daily closing Composite Index values are used as a measure of the market performance or price changes of the market as a whole:

$$\text{Inci}_{it} = \text{Inci}_{it} - \text{Inci}_{it-1}$$

The changes in the logarithms of the KLSE Composite Index  $\text{Inci}_{it}$  (denoted as CI, hereafter) were regarded to be the price changes of the market as a whole. The daily total market turnover divided by the closing index was used as a proxy of volume transacted in the whole market (denoted as V, hereafter) (Lam *et al.* 1989).

*Method*

**Test 1A:** The daily absolute price change of CI was correlated against the daily volume (V) to observe any significant correlation between them. Statistical analyses in this test are performed on a yearly basis to bypass the possible non-stationarity of the time series CI and V.

**Test 1B:** The measure of the effect of volume on the magnitude of price changes was quantified by dividing the days in a year into three equal groups with small, medium and high volume of transaction (V). Then the analysis of variance test was performed to ascertain any significant differences in the absolute price changes for the three groups (Chan 1989). The results were thought likely to substantiate the findings in Test 1A.

**Test 2A & 2B:** Test 1A and 1B are repeated using the change in price ( $\Delta CI$ ) and volume. Any statistical difference in results using the change in price and absolute price change, CI, is observed.

**Test 3:** Here we will test if there is any difference in the  $\Delta CI$  and V relationship in a "bull" and "bear" market. The asymmetric relationship between  $\Delta CI$  and V is tested with regressions, where  $\Delta CI$  is an independent variable and V is the dependent variable, expressed as follows:

$$V = \alpha + \beta \Delta CI = \gamma (D_i) (\Delta CI) + \epsilon_i$$

where  $D_i$  is a dummy variable introduced to indicate a positive price movement ( $D_i = 1$ ) or a negative price movement ( $D_i = 0$ ). The CI and V relationship will have slope  $\beta + \gamma$  on positive price movements and slope  $\beta - \gamma$  on negative price movements. The hypothesis of symmetry is  $H_0: \beta = \gamma = \beta - \gamma$  and the asymmetric alternative is  $H_1: \beta + \gamma > \beta - \gamma$ . The number of years with or without asymmetric relationship are observed.

**Test 4A & 4B:** Instead of looking at an individual lagged or leading relationship, we are proposing here to study the causality relationship between price changes ( $\Delta CI$ ) and trading volume (V). To ascertain the causality between trading volume and price changes, that is whether trading volume causes price changes or vice versa, a causality test is carried out by using Granger and Newbold's approach (1986) with the following linear models tested on 4 lags:

$$CI = c + \sum \alpha_i \Delta CI_{t-i} + \sum \beta_i V_{t-i} + \epsilon_i$$

In the first direction, the CI is taken as the dependent variable and lagged V (up to 4 lags as  $k$  is 4) is the independent variable. For the second direction, the roles are reversed as V is the dependent variable and lagged CI (4 lags) is treated as the independent variable.

To test for causality, one can test for the null hypothesis

$$H_0: \beta_1 = \dots = \beta_k = 0.$$

In testing the causality between V and  $\Delta CI$ , a one-way Granger causality test as suggested (Geweke 1984) was applied. This test uses the ordinary least squares regression and the following specification is used to test causality between X (V) and Y ( $\Delta CI$ ) and vice versa:

$$Y_t = \alpha_0 + \sum \alpha_i Y_{t-i} + \epsilon_t \tag{1}$$

$$Y_t = \beta_0 + \sum \beta_i Y_{t-i} + \sum \beta_k X_{t-k} + \mu_t \tag{2}$$

where  $\epsilon_t$  and  $\mu_t$  are disturbance terms,  $\alpha_i$  and  $\beta_i$  are parameters relating  $Y_t$  and its lagged values, and  $\beta_k$  are parameters relating  $X_k$  and its lagged variables. As a rule of thumb applied in most causality studies, four lags of  $X_t$  were used in this study. A null hypothesis test that X does not cause Y based on equation (1) and (2) is carried out with the F-statistic estimated as follows:

$$F = \frac{[(SSE_1 - SSE_2)/N]}{[(SSE_2)/(T-M-N-1)]}$$

where  $SSE_1$  and  $SSE_2$  are the sum of squared errors from the OLS regression on equation (1) and (2) respectively.  $T$  is the number of time series observations on  $Y_t$  and under the null hypothesis,  $F$  is distributed with  $(N, T-M-N-1)$  degrees of freedom.  $M$  and  $N$  are the number of lags in the  $Y$  and  $X$  variables respectively.

The first direction of causality is whether trading volume causes price changes and the second direction is whether price changes affect trading volume.

**FINDINGS**

*Test 1A:- Relationship between Absolute Price Change and Trading Volume*

Much research has been done to verify an old Wall Street adage which purports that "It takes volume to move prices". The findings suggest that absolute price changes and trading volume are positively correlated (Ying 1966; Tauchen and Pitts 1983).

Table 1 shows the correlation coefficient (CORR.COEFF) of absolute change in price and trading volume of stocks traded on the KLSE. It shows that absolute price change and trading

TABLE 1  
Correlation coefficient of absolute price change in CI and Volume

Year	Correlation Coefficient	Calculated F	0.05* @ 3.84	0.01* @ 6.63
1985	0.256	15.06	S	S
1986	0.240	15.05	S	S
1987	0.092	2.11	NS	NS
1988	0.193	9.40	S	S
1989	0.163	6.57	S	NS
1990	0.174	7.52	S	S
1991	0.243	15.53	S	S
1992	0.064	1.005	NS	NS
Average:	0.178			
Range:	0.064	-0.256		

\*S-significant; NS-not significant

volume are significantly positively correlated at the 0.05 level for 6 years and significant at the 0.01 level for 5 years. The correlation coefficient ranges from 0.064 to 0.256. The average correlation coefficient is 0.178. These findings suggest a significant positive relationship between absolute price change and trading volume.

*Test 1B:- Percentage Price Change and Trading Volume*  
Table 2 presents the level of volume of trading and the respective changes in prices. For days with high transaction volume, CI, the average magnitude of percentage changes in price is 41.02%. The corresponding percentage changes for medium and low volume of transactions are 33.67% and 17.76% respectively. These results are consistent with the findings in Table 1.

TABLE 2  
Returns of absolute change in CI

Year	High Vol.	Medium Vol.	Low Vol.
1985	0.3420397	0.2248928	-0.0259892
1986	0.3772001	0.2266355	0.0038502
1987	0.4818671	0.4702048	0.4105656
1988	0.3408360	0.2442127	0.1017804
1989	0.2596216	0.2359643	0.1602895
1990	0.6417344	0.4748443	0.2975938
1991	0.4591374	0.4420092	0.1864945
1992	0.3788542	0.3746953	0.2859335
Average	0.4101638	0.3366824	0.1775648

Magnitude of the percentage price changes represents risk on the part of investors. Findings in Table 2 are consistent with the belief that risk is higher on days with higher volume transactions. The percentage price change for the high volume category is on average 23.26% higher than the low volume category. However, the analysis is not totally satisfactory as the classification into low, medium or high volume is arbitrary. The relationship between risk involved and volume transacted is investigated further and reported in a later section.



Table 2A + 2B:- Relationship Between Price Change and Trading Volume

There is evidence of a positive relationship between price changes and trading volume, though there is no consensus on the theoretical explanation of this phenomenon. The findings in the study reported in Table 3 show the correlation coefficients of price changes and volume for KLSE are significant and positively related with an average yearly correlation coefficient (Richardson *et al.* 1986) of 0.151.

These findings suggest a positive relationship between price changes and trading volume. However, there is no clear relationship between price changes during different levels of trading volume (Table 4).

TABLE 3  
Correlation coefficient of price change *per se* in CI and Volume

Year	Correlation Coefficient	Calculated F	0.05* @	0.01* @
			3.84	6.63
1985	0.183	7.40	S	S
1986	0.230	13.70	S	S
1987	0.077	1.48	NS	NS
1988	0.100	2.47	NS	NS
1989	0.047	0.53	NS	NS
1990	0.187	8.78	S	S
1991	0.304	25.07	S	S
1992	0.081	1.62	NS	NS
Average:	0.151			

Range: 0.047 to 0.304

\*S- significant; NS- not significant

TABLE 4  
Returns of price change in CI

Year	High Vol.	Medium Vol.	Low Vol.
1985	0.0004357	-0.0011440	-0.0007786
1986	0.0027643	-0.0008770	-0.0015030
1987	0.0008233	-0.0003083	-0.0003374
1988	0.0007868	0.0008865	-0.0000136
1989	0.0012246	0.0009588	0.0002321
1990	0.0009452	-0.0008133	-0.0007094
1991	0.0018570	-0.0003661	-0.0009933
1992	0.0010465	0.0001060	-0.0003904
Average	0.0012354	-0.0001947	-0.0005617

The average value of price changes for days with high volume is 0.124%. The equivalent figure for medium and low volume is negative 0.195% and 0.0562% respectively. The average daily changes were negative when transaction volume was medium or low.

The literature suggests that although there is a positive correlation between  $\Delta CI$  and  $V$ , it is generally weaker than that between  $CI$  and  $V$ . The findings in this study (Table 5) are consistent with the literature.

TABLE 5  
Absolute price change and price correlation coefficient

Year	Corr. Coeff Absolute	Corr. Coeff. $\Delta CI$	Accept ABD or $\Delta CI$
1985	0.256	0.183	ABS
1986	0.240	0.230	ABS
1987	0.092	0.077	ABS
1988	0.193	0.100	ABS
1989	0.163	0.047	ABS
1990	0.174	0.187	$\Delta CI$
1991	0.243	0.304	$\Delta CI$
1992	0.064	0.081	$\Delta CI$
Average:	0.178	0.151	ABS

A theoretical explanation of the positive relationship between  $\Delta CI$  and  $V$  is that there is an asymmetry in the relationship when  $\Delta CI$  is positive and negative. Note that if the relationship were symmetrical, there would be no correlation between  $\Delta CI$  and  $V$ . This is further investigated in the next section.

Test 3:- Asymmetry in the price and Trading Volume Relationship

A model was developed (Beaver 1968) to show that the trading volume and price changes relationship is steeper for positive returns than for non-positive returns. The findings suggest that days with general price increase were found to have a larger transaction volume than days with equivalent price decrease. Their model relies on a behavioural distinction between two types of investors, "bulls" and "bears". However, there is evidence (Karpoff 1987) that the asymmetry is not to behavioural distinction, but to the institutional rules which raise the cost of selling short, and observed that in some futures markets, the relationship between price changes and

volume is not significant as no asymmetry can be found. In such markets, the costs of going long and short are the same and hence no asymmetry can be observed.

Short selling is illegal in Malaysia. The cost of selling short can be regarded as much higher than of buying, therefore asymmetric relationships between price changes and volume are expected on the KLSE.

*Test 4:- Causality Relationship between Price Changes and Trading Volume*

Karpoff (1987) suggested that the relationship between price changes and trading volume was almost entirely contemporaneous, as most leading and lagged relations were statistically insignificant. In this study, causality tests were carried out to determine (1) whether trading volume causes price changes and/or (2) whether price changes affect trading volume.

The first direction of causality is whether trading volume causes price changes, which interest investors and/or speculators because if there is a significant causality relationship, then past volume data can be used to devise investment strategies. If their strategies are economically viable, this would imply weak-form inefficiency. Contrary to the belief of technical analysts, in a weak-form efficient market, past information (including data on trading volume) is already fully reflected in the current price and would not be useful for predicting future prices.

Findings in Table 6 show that there is no causality between trading volume and price changes. This implies that linear relationship between V and ΔCI cannot be used to predict

future price changes. However, it does not preclude the possibility of a non-linear relationship between V and ΔCI which can give better prediction of price changes. There is some evidence (Table 7) which suggests that the lagged relationship between trading volume and price changes is interactive. This arises from the observation of large transaction volume with an increasing trend in prices, which implies that the market is gathering momentum and the

TABLE 7  
Causality between price changes and trading volume

Year	$\beta$	$\gamma$	Accept HO or H1
1985	0.0087679	-0.5941733	H1
1986	0.0040950	0.4551683	H1
1987	0.0019589	0.9551814	H1
1988	-0.0004767	-0.1726059	H1
1989	0.0059158	-1.3397898	H1
1990	0.0027263	0.39551411	H1
1991	0.0022803	-0.8732490	H1
1992	0.0014456	-0.6732561	H1

price will increase further. However, the economic viability of such a relationship in designing profitable investment strategies is not ascertained. The earlier findings of no causality between volume and price changes suggest that at best this interaction is weak.

TABLE 6  
Causality between price changes and trading volume. Direction: trading volume causes price changes

Dependent Variable	Lag	Calculated F	0.05* @	0.01* @
			2.37	3.32
ΔCI	1	0.0600	NS	NS
ΔCI	2	0.0059	NS	NS
ΔCI	3	0.0298	NS	NS
ΔCI	4	0.0238	NS	NS

\* Key: S - significant; NS - not significant

TABLE 8  
Causality between price changes and trading volume. Direction: Price changes trading volume

Dependent Variable	Lag	Calculated F	0.05* @	0.01* @
			2.37	3.32
V	1	13.30	S	S
V	2	7.690	S	S
V	3	2.807	S	NS
V	4	1.904	NS	NS

\* Key : S - significant; NS - not significant



The second direction of causality is whether price changes affect trading volume. Findings in Table 8 suggest that at the 0.05 level 3 lags are significant, while at the 0.01 level, only 2 lags are significant. Therefore, the alternative hypothesis that price change drives trading volume cannot be rejected.

### CONCLUSION

This study provides evidence regarding the relationship between price changes and volume of trading. Absolute price changes are found to have a strong relationship with trading volume compared to price changes *per se*. Days with high volume are found to be associated with greater price changes than days with low volume. Asymmetric flow of information is a possible reason for these simultaneous large volumes and large price changes (either positive or negative). Investors should be wary that risks are higher on days with high volumes.

For the KLSE, transaction volume associated with a price upturn is, on average, larger than the transaction volume associated with a price downturn. This asymmetry is suspected to be the reason behind the positive correlation between price changes and trading volume. If changes in prices are a reflection of risk, the findings show that risk on days with high volume is higher than on days with a lower volume of trading. This could be attributed to the highly speculative mode of trading in the KLSE.

Causality tests indicate that there is a two-way (direction of causality) relationship between price changes and trading volume. The test indicates that price changes affect volume but volume does not cause price changes. The interaction test implies that large transaction volume coupled with an increasing trend in price will further gather momentum and result in a further increase in price. This finding, however, does not suggest that the KLSE is weak-form inefficient and therefore provides an opportunity for investors to devise strategies as there is evidence (Annuar *et al.* 1991) that the KLSE is weak-form efficient and pockets of inefficiencies observed are not economically viable.

The above preliminary findings on the price-volume relationship in the KLSE are consistent with the findings in developed markets. This implies that investors and the regulating agencies should not be unduly alarmed at occasional

temporary price-volume irregularities. The market is fairly efficient, and is capable of weeding out irregularities over time.

These findings are inconsistent with the basic tenet of technical analysis that past price volume data can be consistently used to design profitable investment strategies. KLSE is a weak-form economically efficient market. Any profitable investment strategy based on past price volume data will not be able to generate profits consistently.

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## Estimating the Benefits of Beach Recreation: An Application of the Contingent Valuation Method

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**Keywords:** benefit, beach recreation, contingent valuation method, dichotomous choice, logit, probit, willingness-to-pay

### ABSTRAK

Kajian ini melaporkan penggunaan kaedah penilaian kontingen pilihan dua aliran untuk menganggar faedah daripada rekreasi pantai di Port Dickson. Model logit dan probit digunakan untuk menganalisis data dan nilai kesanggupan membayar telah dikira daripada anggaran kebarangkalian maksimum. Nilai median kesanggupan membayar untuk rekreasi pantai di Port Dickson berkisar di antara RM55.01 dan RM534.80 masing-masing untuk purata pendapatan di antara RM404.56 hingga RM3933.50. Nilai ini boleh digunakan oleh penggubal dasar untuk mengira jumlah faedah tahunan yang diperolehi oleh sumber pelbagaiguna ini.

### ABSTRACT

This study presents an application of the dichotomous choice contingent valuation method to estimate the benefits of beach recreation in Port Dickson. The logit and probit models were used to analyse the data and the willingness-to-pay values were computed from the maximum likelihood estimates. The median willingness-to-pay value for beach recreation in Port Dickson ranged from RM55.01 to RM534.80 for mean income of RM404.56 to RM3933.30, respectively. These values can be used by policy-makers to compute the annual total benefits obtainable from this multiple-use resource.

### INTRODUCTION

Research in outdoor recreation has generated a lot of interest to economists as it provides tools for the economic evaluation of natural resources in recreational use. These tools were developed in response to problems which arise in the management of natural resources. Despite considerable work on the economics of outdoor recreation to measure benefits of national parks (Clawson 1959), sport fisheries (Brown *et al.* 1965), lakes (Burt and Brewer 1971), endangered species (Bowker and Stoll 1988) and other types of natural resources, there is a paucity of literature on measuring benefits of recreational beach resources. Beach renourishment, public acquisition of beachfront and beach carrying capacity have become important policy issues in

practically all coastal states. Critical to these policy issues is the evaluation of these beach recreational resources.

The most popular method of measuring the benefits of outdoor recreational resources is the travel cost method (TCM). It occupies a major place in the applied research programmes of resource and environmental economists (Smith 1993). Some of the works utilizing this technique on Malaysian data are by Wan Sabri (1987) and Ahmad Shuib (1993). However, no research carried out in this region has ever applied the alternative technique of non-market valuation - the contingent valuation method (CVM) to value outdoor recreational resources. Research to measure the benefits of beach recreation using either technique is almost nonexistence in this country.

Although some authors have utilized TCM to evaluate beach recreational demand in Florida, the results obtained mixed responses from economic studies (Bell and Leeworthy 1990; Shaw 1991; Hof and King 1992). The purpose of this study is to make the first attempt of the estimation of benefits from beach recreation in Port Dickson using the contingent valuation method. A dichotomous choice form of contingent valuation is applied to quantify individual economic surplus associated with the preservation of beach recreation in Telok Kemang, Port Dickson.

#### *The Contingent Valuation Method*

The contingent valuation method has been in use for over 30 years and is now the most frequently used approach to estimate nonmarket economic values. It is a highly developed survey approach to nonmarket valuation. The survey tries to elicit how people would respond to certain hypothetical changes in environmental resources. It is a powerful tool for valuing nonmarket goods, so much so that a panel established by the National Oceanic Atmospheric Administration (NOAA) in the United States co-chaired by Professors Kenneth Arrow and Robert Solow issued a report which concluded that "CV studies can produce estimates reliable enough to be the starting point for a judicial or administrative determination of natural resource damages - including loss of passive-use value" (Carson *et al.* 1993a).

Considerable research has been carried out using CVM for estimating values for public decisions. Some of the more popular studies are by Randall *et al.* (1974); Bishop and Heberlein (1979); Hanemann (1984); Seller *et al.* (1986); Bowker and Stoll (1988); and McConnell (1990). The different kinds of work done using CVM can be found in Mitchell and Carson (1989). A recent bibliography (Carson *et al.* 1993b) lists over 1400 contingent valuation studies and papers from over 40 countries covering a highly varied empirical applications of contingent valuation.

There are several forms of the contingent valuation method. In this study the dichotomous choice technique for CVM is used. The respondents were asked to pay a certain level of membership fee in order to use the recreational

resources. They were then asked to accept or reject the offer to pay for the use of these facilities. The dichotomous choice CVM has several advantages over other forms. It is simple to administer and respondents are not faced with intricate bidding schemes and do not have to contemplate exact values for the resource. The respondents have to respond "yes" or "no" to the dollar offer. In addition, this approach provides analysis which is consistent with utility theory (Hanemann 1984).

However, the dichotomous choice model provides researchers with limited information from the respondents and therefore requires more sophisticated statistical and estimation techniques to analyse the qualitative responses. In addition, this technique requires the appropriate range of offer levels of the goods being valued and this has to be determined in advance in order to capture it in the data for analysis. In most cases these offers are arbitrarily set and usually done in an *ad hoc* manner. Although CVM is argued to suffer from theoretical biases such as strategic and selection bias (Cummings *et al.* 1986), but interviewer bias and starting point bias common to iterative bidding are minimized in this dichotomous choice approach (Bowker and Stoll 1988).

#### METHODOLOGY

Hanemann (1984) has proposed the theoretical model from which Hicksian compensating and equivalent surplus measures are obtained from dichotomous choice, discrete response data. In this paper Hanemann's approach is followed in a willingness-to-pay framework to obtain a measure of individual's equivalent surplus. It is assumed that the individual derives utility from participation in beach recreation and money income. Variable  $r$  represents recreation, where  $r=1$  if the individual is able to recreate and  $r=0$  if he is not. Income is represented by  $Y$  and other attributes of the individual which may affect his preferences are denoted by vector  $d$ . If he can use recreational facilities the individual's utility is  $U_1 = U(1, Y, d)$ ; if he cannot, his utility is  $U_0 = U(0, Y, d)$ . Since there are unobservable random components to an individual's utility function, utility is treated as a random variable with a parametric probability distribution with means  $\nu(O, Y, d)$  and  $\nu(1, Y, d)$ , and the



stochastic components  $\epsilon_r$ , which are independent and identically distributed (i.i.d) random variables with zero means.

When confronted with a price, \$A, to enter and use the recreation area, an individual will pay the amount only if

$$v(1, Y-A; d) + \epsilon_1 > (0, Y; d) + \epsilon_0 \quad (1)$$

The willingness-to-pay probability may be written as:

$$P_1 = F\eta(\Delta v) \quad (2)$$

where  $\Delta v = v(1, Y-A; d) - v(0, Y; d)$  and  $F\eta$  is the probability function for the error. If the argument  $\Delta v$  is a utility difference, then the binary response model can be interpreted as the outcome of a utility-maximizing choice (Hanemann 1984).

Hanemann (1984) also suggested explicit specification of the non-random component of the indirect utility function to be:

$$v(j, Y; d) = \alpha_j + \beta Y, \alpha > 0; j = 0, 1 \quad (3)$$

where the vector  $d$  has been suppressed, then

$$\Delta v = (\alpha_0 - \alpha_1) + \beta A \quad (4)$$

and the statistical discrete choice model becomes  $P_1 = F\eta(\alpha + \beta A)$  where  $\alpha = (\alpha_0 - \alpha_1)$ . The other suggested functional form is

$$v(j, Y; d) = \alpha_j + \beta \ln Y, \beta > 0; j = 0, 1 \quad (5)$$

which gives

$$\Delta v = (\alpha_0 - \alpha_1) + \beta \ln(1-A/Y) \quad (6)$$

From these specifications and assuming that the equivalent surplus is random with a probability distribution ( $C_E(A)$ ), estimate of equivalent surplus is obtained by using the expected value of  $E, E_{MN}$  where

$$E_{MN} = \int_0^{\infty} F\eta(\Delta v(A)) dA \quad (7)$$

Alternatively, an approximation of equivalent surplus may be obtained by using the median value,  $E_{MD}$ , of the distribution  $G_E(A)$ , where

$$F\eta(E_{MD}) = 0.5 \quad (8)$$

Estimating the parametric probability function  $F\eta(\Delta v(A))$  allow us to obtain estimates of the desired welfare measure.

#### Estimation Procedure

Central to the whole exercise is the estimation of parameters which define the willingness-to-pay probability function ( $F\eta$ ). Several quantitative response models have been used by researchers and this includes the linear probability model (LPM), the logit model (LM) and the probit model (PM) (Judge *et al.* 1980; Amemiya 1981; Maddala 1983). In this paper, a transformation approach using an index variable  $Z_i, \beta$ , representing the utility difference [equations (4) and (6)] is employed. The bigger  $Z_i$  are associated with higher probabilities that the event ( $Y$ ) will occur, i.e.  $Y=1$ . Therefore, there exists a monotonic relationship between the probability of the event occurring and the index variable. Under such circumstances, the true probability function would resemble a distribution function. The two most commonly used distribution functions are the normal and the logistic, resulting in the probit and logit models.

In many economic applications, however, the standard logistic distribution function,

$$\left( 1 + \frac{1}{e^{(-Xi\beta)}} \right) \quad (9)$$

is assumed for  $F\eta$ . The logistic distribution closely approximates the normal and is relatively easier to estimate (Judge 1980). Both the logit and probit models are used in this study. The parameters for the binary response models can either be estimated using generalized least squares (Pindyck and Rubinfeld 1976) or maximum likelihood method (Capps and Kramer 1985; Hanemann 1984). In this study the latter estimation technique is employed. Two different specifications for the index variable  $Z_i = Xi\beta$  for equations (4) and (6) are used here. Each specification is estimated using both logit and probit models.

#### Study Area

This study was carried out in Port Dickson, Negeri Sembilan. The whole district of Port Dickson has an area of 572.63 sq. km and a population of 101707 people. This is the only district in Negeri Sembilan that faces the Straits

of Malacca and has about 54 km of beach stretching from Sungai Sepang in Selangor to Sungai Linggi in Melaka. Telok Kemang beach, 12 km from Port Dickson town, is one of the more popular beach recreation sites in West Malaysia. Its sandy beach has attracted and continues to attract millions of holiday-makers to this area, especially on weekends and public holidays, much more than any other beach resorts elsewhere. As many as 30,000 picnickers flock to this area on a given weekend. It is strategically located between Kuala Lumpur in the north and Singapore in the south, easily accessible from the north-south highway and is well-served with good roads and public transport.

#### Source of Data

The data were collected through on-site surveys in November 1991 using a structured questionnaire. A total of 188 domestic recreationists, all of whom were day-trippers, were interviewed at the beach recreational site and 169 questionnaires were used for further analysis. The statistics of the respondents are shown in Table 1.

About 52.7% of the respondents were government servants. The average monthly income of the respondents was about MR940. The majority of the respondents were 21-39 years, age category and travelled about 75 km to the beach. Each interviewee was informed of the purpose of the study with respect to the club membership, the facilities available in the study area and the format used in the contingent valuation technique. Following the briefing, the respondents (the head of the

group or family) were asked to give a "Yes" or "No" response to the question. Example:

"If the annual membership fee costs RMx in 1991, would you have joined the club so that you could have continued to use the beach recreational area throughout the year?"

where x ranged from RM1 to RM500. These values were arbitrarily selected as they represent a "reasonable" amount of entrance fee to many privately managed recreational areas in this country. Furthermore, there was no comparative value to refer to as this was the first attempt at using CVM in valuing benefits of beach recreation in this region.

## RESULTS

Equation (4), represented by Model 1 and equation (6) in Model 2, were estimated using both the logit and probit models. The likelihood estimates of these two specifications are shown in Table 2.

The estimates of both logit and probit models for the two specifications (Models 1 and 2) did not differ very much in terms of the summary statistics and parameters significance. All variables had the expected results and were significant at 1% level. This finding is consistent with earlier work in the binary dependent variable case (Bowker and Stoll 1988). Model 2, however, had a slight edge over Model 1 in terms of McFadden-R2 and it was argued to be more preferable than the latter model as "income effect" was present, as expected in the

TABLE 1  
Some descriptive statistics of the respondents

Variable	N	Mean	Std. Deviation	Max	Min
Income (RM)	176	939.7	620.42	4800.0	200.0
Group/Family size	188	5.4	3.14	32	2
Distance travelled (km)	171	75	49.7	350	1.0
Expenditure (RM)	183	57.8	108.9	999.0	1.0



utility model. Based on these criteria, model 2 was chosen for the subsequent measure of welfare from the consumers' willingness-to-pay for beach recreation in Port Dickson.

*Welfare Measurement*

From the estimates of Model 2 given in Table 2, the equivalent surplus welfare measures can be computed. The mean values were calculated by numerically integrating the area under each estimated willingness-to-pay function over the range of offer amount. Income was set as its sample mean. The computed mean and median values for income groups are presented in Table 3. The mean for willingness-to-pay ranged from RM63.83 to RM620.58 for a mean income of RM404.56 to RM3933.30 and RM71.74 to RM597.48 for the same mean income in logit and probit models, respectively. The median willingness-to-pay, meanwhile, varied from RM55.01 to RM534.80 for the logit specification and from RM60.54 to RM588.36 for the probit model. For all income groups, the mean

willingness-to-pay was found to be about 15% higher than the median equivalent surplus measures and this is consistent with the finding of Hanemann (1984).

However, the logit specification in Model 2 performed slightly better than the probit model in terms of McFadden-R2 (Table 2). Based purely on this criterion, the mean and the median willingness-to-pay derived from the logit model can be considered as a more reliable measure of welfare. Nevertheless, one has to make a choice between which measure of WTP to use. From an economic point of view, the selection is purely a value judgement. Hanemann and Bowker and Stoll preferred the median WTP as a welfare measure as it is statistically more robust than the mean WTP measure. For this reason the median WTP values will be used in this study to represent the equivalent surplus measure for beach recreation in Port Dickson.

The median WTP computed from the logit model varied from RM55.01 for a mean income of RM404.56 to as high as RM534.80

TABLE 2  
Parameter Estimates for Dichotomous Choice CVM Models for Port Dickson Beach

Variable	Model 1		Model 2	
	Logit	Probit	Logit	Probit
Constant	1.1818 (4.372)*	0.7016 (4.363)*	1.1879 (4.388)*	0.6391 (4.130)*
Price	-0.0120 (-6.244)*	-0.0067 (-6.9864)*		
$\log(1 - \frac{\text{price}}{\text{income}})$			0.3181 (5.708)*	4.5834 (6.535)*
McFadden R2	0.336	0.331	0.366	0.344
Log-likelihood ratio	76.18	75.09	83.07	78.08
% of correct prediction	0.83	0.78	0.81	0.81
N	169	169	169	169

Note: t - statistics are given in the parenthesis

\* - significant at 1% level

TABLE 3  
Estimate of mean and median WTP for beach  
recreation in Port Dickson (RM)

Mean Income (RM)	Mean WTP		Median WTP	
	Logit	Probit	Logit	Probit
404.56	63.83	71.74	55.01	60.54
787.84	124.30	139.70	107.12	117.89
1232.70	194.49	218.59	167.60	184.46
1845.0	291.10	327.17	250.86	276.08
2285.0	360.52	405.19	310.68	241.92
3933.30	620.58	597.48	534.80	588.36

for a mean income of RM3933.30. This estimate is, however, for one individual and expressed in an annual basis. Taking a very conservative estimate of RM55 which by no means reflects the average value of WTP, as an individual annual benefit of using beach recreational resources in Port Dickson, the total annual benefit from beach recreation can be very substantial if the total annual visits to this area is taken into account.

Suppose there were 300,000 visitors to the Port Dickson beach in 1993, and using MR55 as an example of a willingness -to-pay measure for this recreational resource, then the annual total economic benefits that can be obtained from this resource comes to about RM1.65 million. This value represents both consumers' consumptive and non-consumptive use of the resource. If for some reason, the beach recreation area is turned into some commercial project or put to other uses, then the annual opportunity cost of this new development will be the total economic benefits that this intangible resource is capable of generating for that particular year. These economic benefits carefully discounted must then be compared with benefits arising from new projects to justify the rational use of the same resource.

### CONCLUSION

Attempts at valuing outdoor recreational resources in Malaysia have been sketchy and on an *ad hoc* basis. Previous works used the indirect valuation technique - the travel cost method to value the economic benefits of the these resources. This study presents an alternative valuation technique, the contingent valuation method (CVM) and is the first attempt at CVM to value beach recreational resources in Malaysia. The dichotomous choice form used in CVM is purported to reduce some inherent biases that occurred in the CVM techniques and it is consistent with consumers' utility maximizing behaviour.

The binary response models estimated by logit and probit specifications and the maximum likelihood estimates were satisfactory and consistent with expectations. The median willingness-to-pay (WTP) measure was chosen to represent the reliable equivalent surplus values for beach recreation in Port Dickson. The median WTP computed from the logit model ranged from RM55 for a mean income of RM404.56 to RM535 for a mean income of RM3933.30. These values represent reasonable estimates of economic benefit per individual per year obtainable from the resource. However, since this is the first attempt to use



CVM in valuing beach recreation in Malaysia, the results and conclusions must be interpreted with caution until further such studies are carried out. Taking a very conservative estimate of median WTP value at RM55, the annual total economic benefits derivable from this resource can be very substantial if one takes into account the total number of visitors to Port Dickson beach for a particular year. This value should reflect the "true" value of the resource as it includes both consumptive and non-consumptive aspects of this multi-purpose resource. From a policy-making point of view, the total economic benefits could be used as a bench mark for alternative development of the area to make it economically attractive and justifiable.

However the shortcomings in using CVM are biases with regards to the responses by those interviewed. Although a lot of effort has been undertaken in past years to minimize these biases, much more refinement is needed to improve this method. More work is needed especially in this part of the world with different cultural settings, before using CVM to get "reasonable" and reliable estimates of value of non market goods for policy uses in this country.

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## Testing the Law of One Price on Exports of Tropical Forest Products: A Co-integration Approach

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**Keywords:** pass-through problem, agricultural products, exchange rates, law of one price

### ABSTRAK

Teori perdagangan selalunya mencadangkan kewujudan satu harga perwakilan, iaitu satu harga yang akan wujud dalam semua pasaran. Ini dikenali sebagai Hukum Satu Harga (law of one price). Dalam kertas ini kesahan empirik LOP diuji dengan menggunakan kaedah "kointegrasi" yang baru diperkenalkan untuk eksport kayu kayan. Data bulanan dari Januari 1985 hingga Disember 1992 digunakan untuk menganalisis hubungan jangka panjang ini. Secara empirik kami dapati laluan kadar pertukaran untuk eksport adalah lengkap untuk semua keluaran dan pasaran. Hasil kajian ini menunjukkan data adalah konsisten dengan hukum satu harga sebagai satu hubungan jangka panjang. Kami merumuskan pasaran untuk hasil hutan tropika adalah bersaing secara umumnya.

### ABSTRACT

Trade theory often postulates the existence of a representative price, that is, a single price that prevails in all markets. This is known as the Law of One Price (LOP). In this paper the empirical validity of LOP was tested using the recently developed co-integration method for timber exports. Monthly data for the period January 1985 to December 1992 were used to analyse the long-run equilibrium relationship. Empirically, we found the exchange rate pass-through on the exports to be complete for all timber products and markets. The results obtained suggest that the data are consistent with the LOP as a long-run relationship. We conclude that the markets for tropical forest products are generally competitive.

### INTRODUCTION

Schuh (1974) demonstrates the strong effect of exchange rates on prices received for U.S. farm exports. Since then much work has been done to see if exchange rate is the key determinant of export performance. However, the substantial trade imbalance in the world economy in 1980s despite substantive changes in exchange rates, both in nominal and real terms, have cast doubt on the ability of exchange rates to bring the necessary adjustment to correct trade imbalance. The failure of exchange rates in bringing the

required adjustment in export (or import) prices is often referred to as the "pass-through" problem.

Most trade analysts maintain the hypothesis that exchange rates pass-through instantaneously to domestic price, that is, the Law of One Price (LOP) prevails.<sup>1</sup> As pointed out by Officer (1986), without this principle the traditional "pure" theory of international trade would not exist. In short, the law asserts the export price of a product should be the same regardless of destination, and import price should be independent of the country of origin.<sup>2</sup> Thus, the

1 According to the extreme version of LOP, domestic and foreign products are characterized by a high degree of substitutability both in production and consumption (that is, they are homogeneous). Under free trade, if products are market competitively, commodity arbitrage is instantaneous so that LOP holds in the short-run. However, the less restrictive version of LOP allows for disparities in prices in the short-run but the law will hold in the long-run.

2 An example of a model that does not appeal to the law of one price is the Armington model. In this type of model a commodity originating from, or destined to, different countries is a distinct product with a distinct price.

world is viewed as a highly integrated closed economy rather than as a set of different national economies. The uniformity between foreign and domestic prices net of transportation cost is established by profit seeking actions of international commodity traders and arbitragers. Under such an assumption, currency realignments should have strong effects on exports and therefore, exchange rate is an important variable in trade models.

In recent years a great deal of work has been done to test empirically the hypothesis of law of one price with mixed results. However the bulk of the evidence seems to reject LOP either at the level of general price indices or at a more disaggregated level.<sup>3</sup> Isard (1977), after comparing U.S. and Germany prices of several commodities, states that "in reality the law of one price is flagrantly and systematically violated by empirical data". In another article, Officer (1990) reported that 70% of the past studies that used disaggregated products rejected the law.<sup>4</sup> The empirical evidence on the LOP for internationally traded commodities is rather limited except for the recent investigation by Jabara and Schwartz (1987), Ardeni (1989), Goodwin *et al.* (1990), Pompelli and Pick (1991), and Ahmad Zubaidi and Muzafar Shah (1993).<sup>5</sup> The reason for the lack of such investigation is that it is commonly believed that primary commodities are traded in flex-price markets. They are likely to possess identical attributes regardless of origin or destination, and therefore perfect and instantaneous arbitrage (that is, LOP holds) is claimed to be a reasonable assumption.

Generally, the results obtained from the above studies are not supportive of the law. They found significant and even persistent deviation from LOP for primary commodities and argued that international traders are unwilling to pass-through the effect of depreciation (or

appreciation) of exchange rates but instead absorbed these changes into profit margins. The failure of prices of traded goods to conform to this principle casts doubts on the role of price linkages in both international market integration and the transmission of economic disturbances across national borders. The presence of other than the purely competitive market structure helps to explain the observed deviation from LOP. The opportunities for complete arbitrage may not exist and costs are involved in changing prices. For instances, the denial of LOP in the export agricultural markets may be due to factors that are outside the arbitrage commodity market, such as national governments' monopoly power on tariffs and other trade restrictions. For example, Officer (1990) argued that governments engaging in price-stabilization schemes by carrying stocks can adversely affect the pass-through problems.

The primary objective of this paper is to test the validity of the law of one price for the Malaysian exports of timber products. The reasons for this study are to gain information on market efficiency and the degree of integration of international markets for tropical timber products. The model considered in this study has two important elements. First, we used disaggregated monthly data in our analysis. Second, the analysis used in this paper is based on the concept of co-integration. We follow Ardeni's (1989) approach to test for this long-run relationship and show that LOP holds for the Malaysian exports of tropical products.

## METHODOLOGY

### *The Law of One Price*

In its strict sense, the LOP states that prices of a commodity expressed in a common currency

3 The literature dealing with aggregate price indexes like the consumer price index or wholesale price index is usually called the absolute purchasing power parity (PPP).

4 Examples of studies that are supportive of the LOP are Protopapadakis and Stoll (1986), Goodwin *et al.* (1990), Pick and Park (1991) and Baffes (1991). In the article by Goodwin *et al.*, the results were obtained by using a model in which agents traded on the basis of rational expectations.

5 All these studies except for Ahmad Zubaidi and Muzafar Shah (1993), were done mainly for the developed economy. The results reported by Ahmad Zubaidi and Muzafar Shah show that the LOP fails to hold for Malaysian agricultural exports, namely: rubber, palm-oil, cocoa and timber. Note that except for Ardeni, an econometric approach was taken to test the LOP.



should be the same in two markets after making the necessary adjustment on transaction costs (transport costs and trade barriers). Perfect commodity arbitrage ensures that a good (define in a common currency unit) traded in different markets has a single price. Should disparity between these prices be detected by international arbitragers, they will actively seek profit by transferring the goods in a lower priced market to the higher priced market. These actions will continue until prices are equalized across markets.

#### *Problems in The Testing of Law of One Price*

Traditionally, studies on LOP assumed a simple relationship of the form  $P=P^*E$  or in the logarithm:

$$p_t = a_0 + a_1 p_t^* + a_2 e_t + u_t \quad (1)$$

where  $u_t$  is the residual factor, assumed to have a zero mean and constant variance. The variables  $p_t$  and  $p_t^*$  are the natural logarithm of prices of a specific commodity in domestic and foreign markets respectively, and  $e_t$  is the exchange rate (unit of domestic currency per unit of foreign currency). The test of LOP in its strong form is usually done by regressing  $p_t$  on  $p_t^*$  and  $e_t$  (with a constant term,  $a_0$ ) and testing the null hypothesis,  $H_0: a_0=0$  and  $a_1=a_2=1$ . If the null hypothesis is not rejected, the conclusion is LOP holds. Alternatively, the weaker form of LOP can be tested by testing the null hypothesis,  $H_0: a_1=a_2=1$  allowing  $a_0$  to be different from zero.<sup>6</sup>

The results from these earlier studies have been criticized on several grounds. Firstly,

distinction should be made between the short-run and long-run. The more recent work indicates that the time for the pass-through of exchange rates to be completed ranges from several months to several years. By not allowing commodity arbitrage to occur instantaneously, Protopapadakis and Stoll (1986) showed that LOP as a short-run relationship may not hold. However, they found supportive evidence for LOP as a long-run relationship.<sup>7</sup>

Others argue that some of the empirical studies on the relationship between prices and exchange rates are based on an aggregative approach and therefore the results may be misleading because of problems associated with indexes and aggregation measurement errors. For example, when using aggregative export price indices the weighting schemes may differ across countries. The relative importance of international goods in each category is often not constant over time. Because of these reasons disaggregated data are used to test LOP (Karvis and Lipsey 1977; Goodwin 1990).

More important, Ardeni (1989) questioned the validity of the results that rely on econometric models to test LOP. Several weaknesses are inherent in the standard approach of testing LOP. First, both prices (domestic and foreign) in a large country case are determined simultaneously.<sup>8</sup> Consequently, applying OLS would yield biased and inconsistent estimates. Secondly, he argued that the validity of the test results is unreliable because the variables used in the analysis are non-stationary.<sup>9</sup> The non-stationary properties of time-series data used in the analysis invalidate the usual estimation

6 Some authors, e.g. Carter *et al.* (1990) and Protopapadakis and Stoll (1983) argue that  $p_t$  and  $p_t^*$  are simultaneously determined and estimated Equation as  $p_t - p_t^* = a_0 + a_2 e_t + u_t$ . The null hypothesis of complete pass-through is then  $H_0: a_2=1$  and  $a_0=0$ .

7 Ahmad Zubaidi and Muzafar Shah (1993) found that the exchange rates pass-through for the Malaysian agricultural export is not completed even in the long-run. The time period for the price adjustment ranges from 9 to 16 months. The results do not support LOP as a long-run relationship.

8 The prices in two trading countries are simultaneously determined regardless of the relative sizes of the countries (Protopapadakis and Stoll 1983), because information is shared across markets and because agents operate in more than one market at a time.

9 In this article the term stationary and I(O) are used interchangeably, although strictly they do not coincide. Note that if all the variables are stationary then it is valid to do regression for equation (1) and do the test on the restrictions of the parameters. However, the validity of the test still depends on the assumption that one of the prices is exogenous.

procedures and may lead to grossly inaccurate statistical inferences.<sup>10</sup> The approach followed in this study overcame these weaknesses by employing the cointegration analysis. It is most useful for analysing long-run relationship of economic variables. Examples of recent studies that used cointegration to test LOP include Baffes (1991) and Ardeni (1989).

*Co-integration and LOP*

The LOP as a long-run equilibrium relationship between prices of Malaysian timber exports to different countries can be empirically verified by using a methodology developed by Granger (1986) and Engle and Granger (1987). Nelson and Plosser (1982) and Baffes (1991) have pointed out that many economic variables (for example, prices) are known to be non-stationary, that is they may be at least I(1). Granger and Newbold (1974) showed that regressing one non-stationary variable on another will usually invalidate the conventional procedure of inferences in regression analysis and frequently leads to the acceptance of spurious regressions (Phillips 1986).

Traditionally, the solution to non-stationarity is applying Box and Jenkins (1970) method of differencing (examples Isard 1977; Richardson 1978). However, this method may result in loss of information about the equilibrium relationships between the levels and also may generate inconsistent parameter estimates. Granger (1981) coined the concept of co-integration as a statistical framework for avoiding "spurious" regression problems while retaining long-run information about the equilibrium in the level forms. Co-integration is a property possessed by some non-stationary time series data. For example, if  $X_t$  and  $Y_t$  are two non-stationary time series then in general it is usually true that a linear combination of  $X_t$  and  $Y_t$ , such as  $X_t - aY_t = u_t$ , will also be non-stationary. However, if there exist some constant  $b$  such that  $X_t - bY_t = w_t$  is stationary (  $I(0)$  ), then the series are said to be co-integrated with a co-integrating vector of  $b$  and the relationship  $X_t - bY_t = w_t$  is called the co-integration regression.

Following Ardeni (1989), the LOP as a long-run equilibrium relationship can be tested by using the following equation :

$$P_{it} = \alpha + \beta P_{jt} + \epsilon_{it} \tag{2}$$

where  $P_{it}$  is the domestic price in Malaysian Ringgit (RM) and  $P_{jt}$  is the foreign price in RM at a given time period  $t$ , say one month. LOP in its strong form implies that  $\alpha=0$  and  $\beta=1$ . In addition, the residual term  $\epsilon_{it}$  should be identically and independently distributed. The relationship under the null hypothesis can be rewritten as:

$$\epsilon_{it} = P_{it} - P_{jt} \tag{3}$$

Equilibrium occurs and the LOP holds when  $P_{it} = P_{jt}$ , otherwise,  $\epsilon_{it}$  would measure the deviation from LOP condition or the disequilibrium error. The disequilibrium error measures the extent of divergence from the long-run equilibrium path. In the present context co-integration means that if both  $P_{it}$  and  $P_{jt}$  are  $\sim I(1)$  and their difference, that is  $\epsilon_{it}$ , should be  $\sim I(0)$ . This implies that the two prices cannot drift apart, that is, they will move together in the long-run. If instead the linear combination of prices is not co-integrated then  $P_{it}$  and  $P_{jt}$  will drift apart without bound from the hypothesized value  $\epsilon_{it} = 0$ .

A weaker form of LOP allows export prices to differ systematically. The possibility may arise because of differences in location of exporters and to differences in transport and handling costs. Thus, weak form of LOP allows for parameters  $\alpha$  and  $\beta$  in Equation 2 to be different from zero and one respectively. This relationship can be written as:

$$w_{it} = P_{it} - \alpha - \beta P_{jt} \tag{4}$$

The weaker form of LOP would be rejected if  $w_{it}$  in Equation 4 had a unit root (or  $\sim I(1)$ ).

The co-integration test proposed by Engle and Granger (1987) requires that the series have unit roots. Thus, the first step in the empirical analysis is to determine the order of

10 The problem is becoming widely recognized in statistical analysis and is commonly referred to as spurious correlation. It arises when two variables that independently drift upwards overtime are regressed upon each other. The issue here is even if the two variables are unrelated, OLS will yield high  $R^2$  and low Durbin-Watson statistic (Granger and Newbold 1974).



integration for the price series. In order to determine if the series has unit roots, we employed a test based on the work of Dickey and Fuller (1979, 1981). All the series were first estimated according to the following relation.

$$\Delta P_t = \alpha + \rho P_{t-1} + \sum_{i=1}^{\tau} \beta_i \Delta P_{t-1} + e_t \quad (5)$$

where  $P_t$  denotes the variable being tested,  $\Delta$  denotes the first difference operator,  $\alpha$ ,  $\rho$  and  $\beta$  are the parameters to be estimated and  $\tau$  is a value chosen so that the residual series,  $e_t$  is approximately white noise. The Dickey-Fuller (DF) test is based on the regression when  $\tau=0$  and Augmented Dickey-Fuller (ADF) test is based on values of  $\tau>0$ , to include some dynamics. Under the null hypothesis  $\rho=0$ , implying  $P_t$  is  $\sim I(0)$ , the t-ratio for the estimated  $\rho$  is distributed according to Fuller's t-like statistic found in Fuller (1976).<sup>11</sup>

Once it has been established that the order of integration is the same for each pair of the price variable, the second step is to show that the deviations from the equilibrium at time  $t$  for all pairs of price series,  $\epsilon_{it}$  in Equation 3 (or  $\omega_{it}$  in Equation 4) are stationary, that is, they are  $\sim I(0)$ . The testing of co-integration will help in determining if these series move together in the long-run. Again we may use the DF and ADF tests to examine the co-integrating relationship. For example, LOP in its strong form is tested using the following equation:

$$\Delta \epsilon_{it} = \theta_1 \epsilon_{it-1} + \sum_{i=1}^p \phi_i \Delta \epsilon_{it-1} + \eta_{it} \quad (6)$$

where  $\epsilon_{it}$  denotes the residual from the co-integration regression and  $\Delta \epsilon_{it}$  their first difference. The test statistic here is the t-statistic of  $\theta_1$ . Critical values for both the DF and ADF are tabulated in Engle and Yoo (1987). The null hypothesis  $H_0$ :  $P_{it}$  and  $P_{jt}$  are not co-integrated is rejected if the estimated  $\theta_1$  in Equation 6 is negative and significantly different from zero. Similarly, the co-integration test may be applied on Equation 4 to test whether the co-integrating residual, ( $\omega_{it}$  is  $\sim I(0)$ ).

In testing for unit roots, the power of the test depends on the lag length  $\tau$  (Equation 5) and  $p$  (Equation 6). The number of lag is chosen such that the residual is a white noise. However, the ADF test lose power if the lag length is longer than necessary (over-parametrization). It will result in accepting the null hypothesis too often when in fact it should be rejected. In this study the approach adopted in determining the optimal lag length follows the method suggested in Engle and Yoo (1987). Briefly, the optimum lag length was chosen such that the Akaike (1969) final prediction error (FPE) criterion is minimized. The FPE value for an optimal lag length  $h$  is given by:  $FPE(h)=[(T+h+1)/(T-h-1)]*RSS(h)/T$ , where  $T$  is the total number of observations and  $RSS$  is the sum of squared residuals.<sup>12</sup>

#### SOURCES OF DATA

In this study, the LOP was tested on three commodities, plywood, sawntimber and wooden moulding. The data used in the analysis are based on a set of monthly data covering the period from January 1985 to December 1992, to cover a recent period of floating exchange rate. The monthly series on domestic and foreign prices were gathered from various issues of the *Maskayu*, a monthly bulletin published by The Malaysian Timber Industry Board (MTIB). These prices were quoted monthly at the domestic and export market location. The bilateral exchange rates figures were gathered from various issues of *International Financial Statistics* published by International Monetary Fund.

#### RESULTS

This section provides the empirical results for the test for LOP in accordance with the theory of co-integration. The LOP was tested for the following timber exports: plywood, sawntimber and wooden moulding. The major importing countries are Singapore (S), United Kingdom (UK), Germany (G), the United States (US), Hong Kong (HK), Japan (J) and Australia (A).

11 The table is also reproduced in Harvey (1990), p. 386.

12 Alternatively, we may use the procedure recommended in Campbell and Perron (1991). In this procedure we may start at some maximum lag length, say 8 periods. The lag length is selected as the largest value of  $\tau$  or  $p$  for which t-statistic on the last included lag is significant at the 10% error level.

The number of observations available for this study ranges from 92 to 96.

The results of the test that export prices have unit roots are given in Table 1. In all cases, the hypothesis that the level of the price series has a unit root cannot be rejected at the 5% confidence level based on either the Dickey-Fuller (DF) or Augmented Dickey-Fuller (ADF) tests. Results of the stationarity tests in first difference of the series are also reported in the table. As shown in Table 1, the results regarding stationarity test for first difference uniformly indicate that the prices are difference-stationary processes based on 5% level of significance. In general, they are consistent with the hypothesis that non-stationarity characterizes the levels of each of the variables used in this study. In other

words, the stationarity test uniformly indicates that all the price series contain a single unit root which cancels out on first difference (that is, I(1) process). Findings of non-stationarity for macroeconomic variables like exchange rates and prices have been presented by many others.

A straightforward application of the co-integration test is allowed here since all prices are integrated of the same order. The results of the co-integration tests as outlined in the previous section are presented in Table 2. Nine different co-integrating bivariate system were estimated in both directions. In addition to the two test statistics discussed above, we also report the co-integration regression Durbin-Watson (CRDW) statistic. The appropriate critical values are provided in Engle and Yoo (1987). Table 2 also

TABLE 1  
Unit root tests on individual price series

$$\Delta P_t = \alpha + \rho P_{t-1} + \sum_{i=1}^k \beta_i \Delta P_{t-1} + \epsilon_t$$

	Level		First-Difference		
	DF	ADF	$\tau$	ADF	$\tau$
<i>Plywood</i>					
PPM	-	- 0.69	2	- 3.25	8
PPS	-	- 0.56	3	- 3.42	3
PPUK	-	- 1.20	7	- 3.61	5
PPHK	-	- 0.82	4	- 3.95	4
<i>Sawntimber</i>					
PSM	-	- 0.95	1	- 3.15	7
PSS	-	- 2.30	4	- 5.59	6
PSN	0.27	-	-	- 2.93	5
PSG	-	- 0.17	2	- 3.03	5
<i>Wooden Moulding</i>					
PWM	-	- 1.64	2	- 3.17	7
PWA	-	1.24	5	- 1.91	6
PWJ	-	- 0.94	2	- 7.55	2
PWUS	-	- 2.09	6	- 4.53	7

- Notes: 1. The first subscript identifies commodity: P is plywood; S is sawntimber; and W is wooden moulding. The second subscript identifies the country: M is Malaysia; S is Singapore; UK is United Kingdom; HK is Hong Kong; N is Netherlands; G is Germany; A is Australia; J is Japan and US is United States. If no lagged difference is significant, no ADF statistic is reported.
2. Critical values for t-statistics are from Fuller(1976);  
 100obs: -3.51(1%); -2.89 (5%); -2.58(10%)  
 50 obs: -3.58 (1%); -2.93(5%); -2.60(10%)



reports the estimated coefficient ( $\beta$ ) and the optimum lag length ( $p$ ) for the ADF test. The slope coefficients of the cointegration are different but in most cases are of the correct sign (that is, positive) and close to unity.

Notice that the Durbin-Watson statistic (CRDW) is always higher than the tabulated critical value of 0.39 in all cases. The CRDW is significantly greater than zero, indicating that the price differential is  $I(0)$ , and therefore rejecting the null hypothesis of no co-integration. However as noted by Engle and Yoo (1987), this is not a powerful test for co-integration.<sup>13</sup> The results of the ADF along with the Box-Pierce statistics  $[Q(k), \text{ where } k=6,12]$  and Breusch-Pagan Lagrange Multiplier (LM) test for autocorrelation are also given in Table 2. The values of Box-Pierce as well as the LM statistics suggest that co-integration regressions are not serially correlated in all except one case. The results of the diagnostic tests for the co-integration relationship between the prices of plywood in Malaysia and Singapore suggest that an addition of 11 additional lagged dependents to Equation 6 are insufficient to induce residual whiteness. A further specification search on higher lag periods did not produce satisfactory results and so we report the 11 period lag model for the  $P_{pm} \rightarrow P_{ps}$  regression. We conclude that the data supported the strong form of LOP for 5 out of 9 pairs of the price series based on the ADF test for co-integration.

Price series that fails the strong form test was also subjected to the weaker form of LOP test. While strong form interpretation requires that the difference between two series be stationary, the weaker form requires only some linear combinations of the two series to be stationary. The results are summarized in Table 3. Again the CRDW tests lead to the conclusion to reject the null hypothesis that the residuals from the co-integration regression is  $I(1)$  at the 5% level of significance. The ADF tests support the weak LOP at the 5% level for wooden moulding. However, the results of the test were ambiguous for sawntimber. The weak form of the law was accepted in only one direction of the co-integration regression, indicating that the

results are invariant to the choice of normalizing variable. As shown in Table 3, the weak law was rejected in two of the sawntimber cases using the ADF test: exports of sawntimber to Singapore and import prices of sawntimber to the Netherlands (i.e.  $P_{SM} \rightarrow P_{SS}$  and  $P_{SN} \rightarrow P_{SM}$ ). No convincing explanation can be provided here for the rejection of the hypothesis of co-integration relationship and hence the rejection of LOP in these two specific cases.

Generally, the findings suggest that contrary to the results reported by, Jabara and Schwartz (1987), Ardeni (1989) and Ahmad Zubaidi and Muzafar Shah (1993) there may be a long-term relationship between domestic and foreign prices for similar products. However, the results of this study are in agreement with those reported by Baffes (1991), Protopapadakis and Stoll (1986) and Goodwin *et al.* (1990) where they reported that international markets are competitive and export prices of the same commodity to be equal across countries. There is no evidence of imperfection in commodity arbitrage and exchange rates are fully transmitted to prices.

## CONCLUSION

In this paper the LOP was tested at the disaggregated level for three timber products using the recently developed techniques of co-integration on non-stationary economic time series. The essence of co-integration is that although the price series may be individually non-stationary, there may exist some linear combination of them which is stationary. In such cases the two variables form a co-integrating system, implying that there is a stable long-run equilibrium relationship between the series and they have the tendency to return to a common "equilibrium" value. However, non-co-integration among time series will tend to drift apart without bound.

Using monthly data from the period January 1985 to December 1992, we showed that commodity prices are non-stationary and that each pair of the price series is co-integrated. Thus the empirical results strongly support the LOP, that is, there is a tendency of prices in separate markets to converge, regardless of any

<sup>13</sup> Stationarity is rejected if the statistic is smaller than the critical values in absolute value. As noted by Engle and Yoo the critical values of the CRDW test are sensitive to parameters within the null hypothesis.

TABLE 2  
Co-integration test (strong-form) :  $P_{it} = \beta P_{jt} + \epsilon_{it}$

$P_{ij}$	$P_{jt}$	$\beta$	$R^2$	CRDW	ADF	$\tau$	Q(6)	Q(12)	LM
PPM	PPS	1.02	0.98	0.98	- 13.92*	11	169.1	189.8	192.9
PPS	PPM	0.98	0.98	0.98	- 2.96*	3	0.2	13.9	20.4
PPM	PPUK	0.97	0.88	1.08	- 3.38*	2	5.9	13.9	23.3
PPUK	PPM	1.03	0.94	1.08	- 3.38*	2	5.9	13.9	23.3
PPM	PPHK	1.00	0.91	0.89	- 2.81*	2	5.9	10.7	19.3
PPHK	PPM	1.01	0.91	0.89	- 2.81*	2	5.9	10.7	19.4
PSM	PSS	1.12	0.32	0.89	- 1.53	3	1.9	6.0	11.4
PSS	PSM	0.89	0.28	0.89	- 1.53	3	1.9	6.0	9.5
PSM	PSN	0.92	0.74	0.49	- 1.69	3	2.1	7.5	9.6
PSN	PSM	1.09	0.85	0.49	- 1.67	3	1.8	7.5	9.1
PSM	PSC	0.91	0.65	0.46	- 2.18**	2	7.2	12.2	
PSC	PSM	1.10	0.80	0.46	- 2.17**	2	7.2	12.2	19.5
PWM	PWA	1.01	0.36	0.72	- 1.38	3	1.9	2.4	13.4
PWA	PWM	0.89	0.71	0.72	- 1.38	3	1.9	2.3	13.4
PWM	PWJ	1.00	0.20	1.41	- 1.50	3	2.1	4.7	11.4
PWJ	PWM	0.98	0.52	1.41	- 1.50	3	2.1	4.8	11.4
PWM	PWUS	1.02	0.90	0.82	- 3.46*	2	8.1	15.6	23.9
PWUS	PWM	0.97	0.20	0.82	- 3.82*	3	4.8	14.1	21.3

Notes: For definitions of variables, see Table 1. Critical values from Engle and Yoo (1987); 100obs: - 2.62(1%); -1.95 (5%); -1.61(10%). 50 obs: -2.60(1%); -1.95(5%); -1.61(10%). Critical values for CRDW test; 100 obs: 0.32 (1%); 0.39(5%) . 50 obs: 0.69(1%); 0.78(5%).

short-term disequilibria which may be due to trade restrictions (tariffs and non-tariff barriers) or other disturbances. In other words, common currency prices of similar products are related internationally in the long-run.

In this study we showed that the exchange rate changes are fully transmitted to prices, at least in the long-run. There is no evidence of price discrimination among countries and commodity arbitrage is working given that price differential in different geographical markets tend to disappear in the long-run. Our results also support the hypothesis that the international markets for timber products are fully integrated. This suggest that appreciation (or depreciation) of the Malaysian Ringgit can influence the volume of timber exports to United States, United Kingdom, Singapore, Australia and Japan.

Thus, the stronger Malaysian Ringgit (RM) is expected to have some impact on the flows of tropical products to the major consuming countries.

The findings of this study also suggest that in modelling trade flows, models that distinguish commodities by country of origin and destination (Armington-type) are unnecessary. In the long-run the competitive nature of the international market for tropical timber products will ensure that the export prices of the same commodity will be uniform across markets. Finally, for the timber products the LOP assumption can be made safely. To further investigate the validity of the LOP, a wider range of commodities must be examined before this principle can be generally accepted as an empirical truth in analysing trade issues.



TABLE 3  
Co-integration test (weak-form) :  $P_{it} = \beta P_{jt} + \omega_{it}$

$P_{it}$	$P_{jt}$	$\beta$	$R^2$	CRDW	ADF	$\tau$	Q(6)	Q(12)	LM
PSM	PSS	0.90	0.34	0.63	- 1.11	3	1.3	5.5	9.4
PSS	PSM	0.38	0.34	1.73	- 1.37*	4	1.0	5.2	9.4
PSM	PSN	0.65	0.89	1.18	- 2.21*	9	0.4	0.7	7.5
PSN	PSM	1.37	0.89	1.05	- 1.31	3	0.4	7.2	8.5
PWM	PWA	0.58	0.75	1.66	- 5.53*	12	5.5	33.8	4.5
PWA	PWM	1.33	0.75	1.34	- 4.41*	1	5.0	7.12	0.9
PWM	PWJ	0.53	0.52	1.28	- 2.49**	2	0.5	4.6	11.7
PWJ	PWM	0.98	0.52	1.40	- 1.97*	2	2.2	5.0	10.5

Notes: For definitions of variables, see Table 1. Critical values from Engle and Yoo (1987); 100obs: - 2.62(1%); -1.95 (5%); -1.61(10%). 50 obs:-2.60(1%); -1.95(5%); -1.61(10%). Critical values for CRDW test; 100 obs: 0.32 (1%); 0.39(5%). 50 obs; 0.69(1%); 0.78(5%).

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## Government Incentives and Comparative Advantage of the Sheep Industry in Malaysia

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### ABSTRAK

Kajian ini mengira kadar perlindungan dan faedah bandingan pengeluaran bebiri dari sudut persepektif penggantian import. Pada keseluruhannya, penemuan kajian ini mendapati pengeluaran bebiri di Malaysia mendapat perlindungan sebagaimana yang ditunjukkan oleh nilai NPR. Harga tempatan adalah 32% lebih tinggi daripada harga dunia. Nilai EPR pula menunjukkan bahawa pengeluaran bebiri mempunyai galakan. Dari segi faedah bandingan, didapati hanya ladang yang bersaiz > 75 bilangan ternakan mempunyai faedah bandingan yang tipis. Ini menunjukkan bahawa pengeluaran bebiri secara kecilan tidak viable dari segi ekomomi dan sosial.

### ABSTRACT

This study computes the protection rates and comparative advantage of sheep production from an import substitution perspective. The results show that, in general, sheep production in Malaysia is moderately protected as shown by the NPR. Domestic price is about 32% above the world price. The value of ETr, on the other hand, indicates that there is an overall net incentive in sheep production. In terms of comparative advantage, this implies that with a small herd size, sheep production is not viable economically and socially.

### INTRODUCTION

The agricultural sector continues to play a major role in the Malaysian economy through its contribution to GDP, foreign exchange earnings and employment. In 1988, its contribution was about 21.1% to GDP, 22.1% in total exports and 31.3% in employment. The livestock industry contributed about 3.5% to overall GDP in 1988 and its contribution to the agricultural sector increased from 16.27% in 1988 to 19.47% in 1991. The main components of the livestock industry were pigmeat, poultry and eggs, which comprised about 90% of total livestock production. The others were beef, mutton, milk, hide and offal. The small ruminant (sheep and goat) subsector plays a minor role in the livestock industry. For the last three decades, the consumption of mutton has shown an increasing trend, while local production has shown a downward trend. The self-sufficiency level also

shows a downward trend. It was at 38% in 1960 and declined to 25% in 1970. In 1993 the self-sufficiency level was approximately 10% with 90% of the mutton being imported in order to meet the demand. In 1993 the value of imports was approximately RM30 million. Although mutton is less popular than beef and poultry meats, it is acceptable to all races in Malaysia and about 72% of the population in Peninsular Malaysia consume mutton (HOA 1992). Production remains essentially a subsistence activity with herd sizes ranging from 2 to 20. There are few large sheep/goat production units. The future of the sheep industry appears bright with the current interest shown by the plantation sector. In recent years, research and field experience have shown that sheep rearing under immature oil palm and rubber is technically feasible (Wan Mohamed *et al.* 1988; Mohamad *et al.* 1990). The plantation sector, with its large

financial resources, is more likely to make headway in commercial mutton production. The development of the sheep industry in this country will not only significantly increase mutton production but will also provide an alternative income-generating activity for smallholders, thus furthering the diversification of agriculture production. The integration of sheep with plantation crops will reduce the use of weedicides. Research and field trials have shown that the cost of weeding can be reduced by 15-25% (Zakaria 1990). Thus the participation of private companies, such as Guthrie, Sime Darby, and Golden Hope will speed up mutton production in Malaysia.

#### *The Livestock Industry*

The objectives of the Malaysian livestock policy are: (i) to encourage local production of meat to reduce dependence on imports, (ii) to save and foreign exchange, (iii) to provide employment, (iv) to ensure consumers a stable meat supply at affordable prices, and (v) enhance the nutritional adequacy of diets in the rural areas. With the introduction of the New Economic Policy (NEP) in 1970, livestock programmes in the ruminant subsector became a means to increase farm income and thus reduce the incidence of poverty. With the above objectives, the livestock policy was started as an import substitution strategy. Government intervention has contributed significantly to the

development of the livestock sector. The non-ruminant sector (pigs and poultry) has certainly benefited tremendously from the control of diseases, import controls and duties imposed on such products while the ruminant subsector (cattle, buffaloes, sheep and goats) has been the recipient of direct government assistance. As shown in Table 1, more than three-quarters of the expenditure from 1981-1993 was devoted to beef cattle. Milk production received the second largest allocation, while the sheep/goat scheme received least funds. However, in the last few years the sheep/goat scheme has been given priority over the dairy subsector. This indicates that government intervention in the development of the sheep/goat industry has been intensified but whether this is profitable and economically viable is yet to be answered.

Government intervention can distort the operations of the market, producing a set of prices that may differ from 'free' market price. Consequently, relative output and input prices within and across industries are altered, affecting the pattern of production incentives. The purpose of this study is to estimate the magnitude of distortions due to government intervention and the extent to which an import substitution regime can save foreign exchange. An indication of comparative advantage or disadvantage will show the efficiency with which domestic resources are used in such an activity.

TABLE 1  
Livestock development programme in Peninsular Malaysia 1981-1992, (Million \$)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
<b>Beef Cattle</b>													
Allocation	15.000	5.939	1.972	8.000	8.822	5.750	3.520	6.019	6.660	6.000	8.000	7.000*	
Expenditure	14.583	3.563	2.879	7.950	7.125	5.757	2.720	2.657	6.474	6.617	5.495	5.495	8.320
<b>Dairy</b>													
Allocation	4.000	4.150	1.328	1.500	1.800	2.680	0.867	2.210	2.470	1.693	2.00	3.000	2.500*
Expenditure	3.478	5.923	1.327	1.399	1.649	2.419	0.846	NA	2.296	1.416	1.866	1.887	
<b>Sheep/Goat</b>													
Allocation	1.000	0.440	0.081	0.151	0.240	0.760	3.200	3.800	5.000	4.077	2.000	4.000	2.000*
Expenditure	0.472	0.314	0.066	0.139	0.217	0.639	2.910	NA	4.969	3.818	1.919	2.287	

Source: Department of Veterinary Services, Kuala Lumpur

Note: NA = Not Available

\* = Estimate



**METHODOLOGY**

In order to measure the extent of government intervention, in the production of the commodities concerned, two measures will be used. These are nominal protection rate (NRP) and effective protection rate (ERP). The domestic resource cost (DRC) or resource cost ratio (RCR) will also be used to measure competitiveness. These measures have been used widely in comparative advantage studies by authors for various agricultural commodities (Cabanilla 1983; Baldwin 1984; Gonzales 1984; Hoey *et al.* 1989).

*Nominal and Effective Protection Rates*

The nominal protection rate (NPR) measures the rate by which the domestic price of a final product deviates from the world or border price of a comparable product, where such a product is not subject to quantitative restriction. The measure can be stated as follows:

$$NPR = \frac{P_i^d - P_i^b}{P_i^b}$$

where

- NPR = Nominal protection rate for output commodity i
- $P_i^d$  = Domestic (financial) price of commodity i
- $P_i^b$  = Border (economic) price of commodity i for foreign price multiply by the official exchange rate

The magnitude of the direct intervention on a particular commodity is measured by the gap between its domestic ( $P_i^d$ ) and border price ( $P_i^b$ ). Thus interventions such as export tax, quota, levy and import tariff, force market price to deviate from its social value. The effective protection rate (EPR) measures the effects of protective measures not only on traded outputs but also on traded inputs. It therefore views the rate of protection in terms of value added to the commodity concerned. The EPR can be measured by using the following formula:

$$EPR = \frac{Va_i^d - Va_i^b}{Va_i^b}$$

where

- EPR = effective rate of protection of commodity i
- $Va_i^d$  = value-added at domestic price of commodity i
- $Va_i^b$  = value-added at border price of commodity i

*Domestic Resource Cost (DRC)*

The domestic resource cost (DRC) method is widely used in resource allocation studies, especially those which focus on entire sectors of the economy. In countries where import substitution or export promotion is an important objective, it is useful to estimate the cost of domestic currency required to save or earn a unit of foreign exchange for an intended project. Thus, by expressing the cost of saving or earning a unit of foreign exchange as DRC, direct comparison may be made with the official exchange rate and various shadow prices for foreign exchange. Such a comparison is the basis for evaluating the comparative advantage. The DRC can be estimated as:

$$DRC_i = \frac{\sum_j V_j^d a_{ji}}{\left( P_i^b - \sum_j N_j^b a_{ij} \right) 1/OER}$$

- DRC = domestic resource cost per unit of commodity i
- $V_j^d$  = (domestic valuation at accounting price (net of taxes and subsidies) of the opportunity cost of non-traded factors
- $P_i^b$  = border price of commodity i
- $N_j^b$  = the value of imported input
- $a_{ij}$  = input requirement coefficient j per unit output i
- OER = official exchange rate

In DRC estimation, all outputs and inputs are valued in economic price. The denominator in the above equation is value-added in border prices but expressed in dollar rather than domestic currency. Using the DRC measure as defined above, comparative advantage is indicated by expressing the DRC relative to the

shadow exchange rate (SER). This must be or same bageks foot not be.<sup>1</sup> This ratio is also known as the resource cost ratio (RCR). Hence, the economic activity can be determined whether it has comparative advantage for the country, depending on the ratio of DRC/SER. Thus if:

- (i)  $\frac{DRC}{SER} < 1$  denotes comparative advantage
- (ii)  $\frac{DRC}{SER} = 1$  denotes neutral advantage/disadvantage
- (iii)  $\frac{DRC}{SER} > 1$  denotes comparative disadvantage

The first identity implies that the social cost to produce commodity i domestically would be less than import cost. The second identity indicates that it is neutral in comparative advantage, i.e. the social cost of domestic production is exactly equal to import cost, while the third identity is the reverse of the first, i.e. comparative disadvantage. An analysis of comparative advantage could answer either of the following two questions:

- (i) Could the resource employed in broadly defined sectors or subsectors of the economy be put to more profitable use elsewhere?
- (ii) Would the expansion of a particular production activity be profitable?

Project appraisal is concerned with (ii). Thus given the formula to measure government intervention and comparative advantage, one can determine whether a particular country has comparative advantage (Scandizza and Bruce 1980; Gittinger 1982).

*Data and Analysis*

For the purpose of this study, surveys were undertaken at both farm and post-farm level to gather information to compute intervention and comparative advantage indices. A total of 111 farmers were interviewed from all over Peninsular

Malaysia, but 11 farmers had to be dropped from the sample due to insufficient information. A total of 10 processors and traders were interviewed in order to collect information on trading and processing costs. Table 2 shows the breakdown of the sample size for each of the farm size categories.

TABLE 2  
Distribution of sample size for the respective farm size

Farm size	No. of animals	No. of samples
I	< 25	22
II	25 - 50	34
III	51 - 75	21
IV	> 75	23
Total sample		100

The two sets of data collected from the survey are (i) sheep inventory and estimation of farm production cost and (ii) cost profile at each market intermediary (post-farm) of the sheep industry.

The production system is subdivided into their scale of operation, expressed in terms of the number of animals in the farm. In this study, the scale of operation is categorised into farm sizes, as shown in Table 2.

A weighted average procedure has been used to calculate the various indices for a respective farm size and also for the processing and marketing sectors at the post-farm level.

The cost profiles collected from the farm and post-farm surveys were the expenses incurred by private operators. The values were converted into economic values for the calculation of comparative advantage indices. Conversion factors (CF) formulated by Veitch (1986) were used to derive the economic valuation. Table 3 shows the conversion factor to translate financial costs to economic costs. The costs were further broken down into their domestic and foreign components, necessary for the calculation of DRC.<sup>2</sup>

1 SER is equal to the official exchange rate multiplied by 1 plus the foreign exchange premium stated in decimal form.

2 For detailed discussion on this section refer to: Zainalabidin and Mad Nasir (1991).



**RESULTS AND DISCUSSION**

*Protection Rates*

The impact of market intervention policies on production is captured by the two measures, NRP and EPR. A comparison of the observed domestic price with the border related price reveals the impact of the policy which causes a divergence between the two prices. A positive NPR implies that protection is given to domestic producers, while a negative value indicates a penalty or tax is imposed on producers.

The values of NPR and EPR are shown in Table 4. The NPR, which measures the difference between the domestic and border related prices expressed as a percentage of the related price, shows that the domestic price was about 32% above the world price. Although there is no direct intervention by the government on the rate of duty for both import and export of sheep and its by-products there is, however, an implicit quota that has been set by government as an import permit is required. This permit specifies the amount of meat that can be imported. Thus sheep production in Malaysia is moderately protected.

A limitation of NPR is that it measures only the effects of intervention on the price of the livestock products. It does not measure the effects of intervention on the tradable inputs that go into sheep production. The EPR makes up for the deficiency in the NPR by capturing the extent to which policies in the product market cause value-added<sup>4</sup> to differ from what it would be in the absence of such policies. The

**TABLE 3**  
Conversion factor<sup>3</sup> from financial to economic values

Item	Conversion Factor
Intermediate Input	
Feed	0.95
MVS0.88	
Repair & Maintenance	0.78
Water	0.75
Electricity	0.84
Fuel & Oil	0.88
Livestock Purchase	0.95
Office Supplies	0.90
Tax	
Licence	
Primary Input	
Labour	0.82
Depreciation:	
Building	0.86
Equipment	0.90
Transportation	0.70
Interest:	
Building	1.30
Equipment	1.30
Livestock	1.30
Transportation	1.30
Working Capital	1.30
Land Rent	1.00
Losses	1.00

Source: Veitch 1986.

3 The method of project appraisal involves the movement from a private or financial appraisal to an economic or social appraisal. In financial appraisal, costs and benefits are identified and valued solely from the point of view of their impact solely on the project's private profitability. But the impact of the project may be much wider than this, and may have repercussions on the economy in various ways. The incorporation of these wider effects involve an economic or social appraisal. The parameters required for an economic appraisal comprise a set of shadow or accounting prices (AP), which replace conventional market prices (MP) in the appraisal. Thus, a comparison of cost structure at MP with that at AP provides what is called the CONVERSION FACTOR (CF), which may be applied to convert market values to accounting values. The system of appraisal used by Veitch for Malaysia is based on Little-Mirrlees methodology with world prices as the numeraire, hence, CF by definition can be expressed as follows (Veitch 1986):

$$CF = AP/MP$$

4 Value added is measured by the difference between the value of the output of the particular firm and the value of all inputs purchased from outside the firm. Thus, the value of output minus the value of externally purchased input is equal to value added (Gittinger 1982). Since the value added is a residual concept, clearly what is purchased, and hence the value added of any commodity, will vary according to the time period being considered and the level of analysis (Scandizzo and Bruce (1980)).

TABLE 4  
Nominal and effective protection rates

Farm	Domestic Price	Border Related Price	Value of Tradable Input		Value of Value-added		NPR	EPR
			Financial	Economic	Financial	Economic		
I	12.36	9.35	2.67	2.58	9.69	6.77	32.19	43.13
II	12.36	9.35	2.68	2.47	9.68	6.88	32.19	40.70
III	12.36	9.35	2.79	2.58	9.57	6.77	32.19	41.36
IV	12.36	9.35	2.50	2.32	9.86	7.03	32.19	40.26

Note: NPR = Nominal Protection Rates  
EPR = Effective Protection Rates

EPR is thus an indicator of the net incentive or disincentive effects of all commodity policies affecting production costs. The values of EPR indicate that there is an overall net incentive in sheep production where the values show that value-added is at least 40% more than what it would have been in the absence of protection.

The comparative advantage of sheep production in terms of import substitution strategy is measured by the resource cost ratio (RCR) and domestic resource cost (DRC). The computation of RCR and DRC detailed in Table 5. The values of RCR and DRC indicate that only Farm IV has marginal comparative advantage in sheep production. The results illustrate that as the farm size becomes larger, it tends to have comparative advantage. The values of DRC in Farms I, II and III indicate that the social cost of producing 1 kg of mutton domestically is more than the import cost. Thus, DRC computed at RM6.94, RM3.08 and RM2.94 for farms I, II and III respectively exceeded the official exchange rate of RM2.70. For Farm IV, the domestic resource cost is about equal to import cost.

Since the RCR values (i.e. DRC/OER) indicate that Farms I, II and III have no comparative advantage, sensitivity analysis is applied to determine the parity price for the RCR to be equal to 1. The sensitivity analysis, shown in Table 5, indicates that the cif price has to be increased to around RM11.70 in Farm I, RM10.20 in Farm II and RM 9.84 in Farm III for sheep production to have comparative advantage. This represents an increase of around 7.0 - 28.0% above prevailing output prices.

Table 5  
Comparative advantage indicators

Farm Size	I	II	III	IV
Rb	9.63	8.06	7.59	7.13
Rf	0.13	0.13	0.13	0.13
Cif	9.20	9.20	9.20	9.20
a	2.47	2.47	2.58	2.32
e	0.20	0.20	0.20	0.20
RCR	2.57	1.14	1.09	0.99
DRC	6.94	3.08	2.94	2.67
Cif when RCR = 1	11.77	10.20	9.84	9.12

Note: Exchange rate RM2.70 = US\$1.00

- DRC = RCR x OER  
 Rb = domestic resource input to production and marketing  
 Rf = domestic components of transport costs from port to wholesale  
 Cif = import price  
 a = tradables costs component of production and marketing  
 e = traded components of transport from port to wholesale

## CONCLUSION AND POLICY IMPLICATIONS

This study attempted to measure the protection rates and comparative advantage of sheep production because of the interest shown by policy-makers in the prospects of integrating sheep rearing with plantation crops to maximise income from agriculture. The analysis indicates that sheep production is moderately protected and does not have comparative advantage except in farms with more than 75 animals. This implies that, at the current level of production,



i.e. small herd size, sheep production is not economically or socially viable. Thus, if economic efficiency is the main objective, sheep production should not be continued except on a large scale as the social cost of a unit of local mutton from small farms costs more than imported mutton.

Further research and development should be continued, especially in large-scale breeding; adapting the animals to local conditions; and sheep rearing in the plantation sector. Malaysia produces agro-industrial by-products and wastes in abundance which can be used for sheep feed. Research and development should also be continued to overcome the current technical constraints. At present only large-scale sheep production should be encouraged.

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## Linking Research and Consumers through Adult Education Programmes for the Advancement of Small-scale Food Industries in Malaysia

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### ABSTRAK

Kertas kerja ini menerangkan dan mengutarakan ciri-ciri program pendidikan dewasa yang dilaksanakan oleh Bahagian Teknologi Makanan, Institut Pembangunan dan Penyelidikan Pertanian Malaysia (MARDI) dalam usaha mempromosikan industri makanan di Malaysia. Secara khususnya, perbincangan memfokuskan kepada usaha yang dibuat oleh bahagian tersebut untuk mengintegrasikan aktiviti penyelidikan dengan program pengembangan.

Kertas kerja ini adalah berasaskan kepada satu kajian kes yang dibuat ke atas program tersebut. Data kajian telah dikutip melalui temu bual secara mendalam, pemerhatian penyertaan dan analisis kandungan data yang telah didokumentasikan. Program ini merangkumi tiga komponen asas iaitu mencipta teknologi yang sesuai dengan industri kecil makanan, menghubungkan antara inovasi dan pengguna dan membimbing pembelajar untuk memastikan perusahaan yang dijalankan itu berjaya dan dapat dikekalkan. Penelitian ke atas program menunjukkan ianya telah mengintegrasikan penyelidikan dan pengembangan seperti yang disarankan oleh Bennet (1989) dalam Model Kesalingbergantungannya. Kekuatan dan kelemahan pendekatan tersebut juga dibincangkan dalam kertas kerja.

### ABSTRACT

This paper describes and highlights features of an adult education programme implemented by the Food Technology Division of the Malaysian Agriculture Research and Development Institute (MARDI) to promote the food industry in Malaysia. A study on the programme was carried out using indepth interviews, participant observation and content analysis of documented data. The programme encompasses three basic components generating technology appropriate for small food industries, interfacing between innovators and consumers, and coaching learners to ensure the enterprise becomes successful and sustainable.

The discussions focus on the efforts by the division to integrate its research and extension activities. Examination of the programme reveals that it integrates research and extension as suggested by Bennetts (1989) interdependency model. Strengths and weaknesses of this approach are discussed in the paper.

### INTRODUCTION

The food processing industry is gaining ground as an important manufacturing sector in Malaysia. In 1994, the industry provided 8,684 new employment opportunities and generated a gross revenue of RM4 394 543 000 (Department of Statistics 1994). Malaysia's food industry is dominated by small food establishments which make up more than 73% of total food manufacturing enterprises. Small food establishments are those enterprises which have

paid-up capital of less than RM250,000 and fewer than 25 paid employees (Hussin and Adinan 1988). Generally, these establishments are located where the raw material is available. For example, if the products are fish crackers, shrimp paste, or fish sauce the establishments are normally found along the coastal areas. On the other hand, if the products are rice vermicelli, rice noodles or tapioca crackers, the industry is found in the rural areas and small town centres if the manufacturing process depends heavily on



imported materials, such as the production of soya sauce, bean curd or lipo-protein from soya bean milk, such establishments are located in the urban and suburban centres. Due to these variant locations together with related limitations, the small-scale food processing industry suffers a number of setbacks which call for technical management, financial, and market attention.

Sub-standard products, short-lived products, poor product appeal, low grade processing premises, low production efficiency, and storage of raw materials are examples of problems identified in the small food industry (Hussin and Adinan 1988). These problems are directly related to the knowledge, attitude and skills of the entrepreneurs themselves. Investigations in this area indicate that more than 90% of the small-scale food processors are not knowledgeable about the basic aspects of food science and technology. Their practices are based, to a large extent, on trial-and-error and passed-down knowledge (Hussin and Hussein 1988).

Both the New National Development Plan and the Sixth Malaysian Plan include specific statements to promote the growth of small-scale entrepreneurs towards innovation and creative production.

#### *Research and Extension Malaysia*

Research and extension activities in Malaysia are divorced from each other. A number of agencies are responsible for extension while another set of agencies is responsible for research. Extension activities are carried out by multiple agencies which are organized according to commodity or commodity groups. For example, the Agricultural Department in each state is responsible for extension activities concerning all crops except rubber, oil palm, tobacco, and pineapple. The Veterinary Department carries out extension work on livestock and the Fisheries Department is responsible for extension activities on both freshwater and marine fish. All agencies mentioned are under the Ministry of Agriculture. The number of extension agencies operating in each district depends on the type of crops grown and other agricultural activities in the area but research is not found in any of these agencies mentioned. Research on the various commodities in the Malaysian agricultural sector is the responsibility of yet another set of agencies which

do not have any direct linkages with farmers. Research findings are disseminated to other agencies mainly through publications and in-service training. MARDI, for example, disseminates research findings to farmers through the Agriculture Department and the Veterinary Department. Thus the research and the extension functions are carried out by separate agencies. Having multiple agencies doing agricultural research and yet another set of agencies translating and disseminating the research findings to farmers certainly complicates matters for all those involved. Co-ordination between research and extension agencies is the responsibility of special units and committees. The effectiveness of the linkages under this system is described to be "mixed". Part of the problem, note Hashim and Fatt, is that "... each agency tends to jealously guard its responsibilities and tends to view attempts at cooperation and coordination as encroachment into the sanctity of its respective empires" (Hashim and Fatt 1984)

The Food Technology Division of MARDI, the subject of this study, is the exception in the Malaysian research-extension scenario described earlier as it carries out both research and extension activities and has linkages with the other sub-systems in the food industry which makes it exemplary.

#### *The Ideal Research-Extension-User Linkages*

This inquiry uses an "ideal" research-extension-user linkage as its conceptual framework. Added to this model is the view that the actors in each of the sub-systems have multiple roles in the knowledge creation-diffusion-utilization process. This framework guides the data collecting phase as well the analysis phase. Bennett (1989) presents three categories of conceptual models that describe the linkages between the research, extension, and user sub-systems in co-operative extension. The three categories are research-transfer models; adult education models; and interdependency models. The research-transfer models view researchers' activities as the starting point. Extension's activities begin only after there is an output from research. If the output is considered inappropriate, then Extension will conduct development and adaptive research to make the output more suitable to users. Bennett says that Extension's role in identifying and translating users' needs to researchers is regarded

as secondary in these types of models. Among models cited by Bennett that fit the research-transfer category are those by Feller *et al.* (1984) and Havelock (1969).

The adult education models (Bennett 1989) start with an assessment of needs (individuals, community, and societal level) by Extension. The availability of research outputs and other considerations are taken into account during the needs assessment. These models emphasize the role of educating the user over the transfer of technology or information. Models by Boone (1985) and Warner and Christenson (1984) are examples of adult education models given by Bennett.

The interdependency models (Bennett 1989) start with networking between the research, extension, and user sub-systems. In most aspects, this model is similar to the adult education model except that relationships, roles, and actions of both research and extension are considered concurrently and given equal emphasis and importance. These are also seen to be continuously influencing each other. Models by Beal (1982) and Bennett (1988) are examples of interdependency models. The networking role is central in the interdependency model. Below is Bennett's description of networking:

Networking is entering into, building, maintaining and relying upon linkages to assess needs, acquire resources and discharge responsibilities. Networking, helps to achieve communication, awareness, influence, coordination and cooperation among individuals, groups and organizations (Bennett, 1989).

For this inquiry the interdependency model is chosen as having the "ideal" research-extension-user linkages and relationships. The view by Compton (1989) describes the research-extension relationship. Compton (1989) states, "The generation, creation, or discovery (research) of knowledge must be paired with a concern for its dissemination, diffusion, and use (extension)." However, several perspectives need to be stressed here. The main role of the scientists as knowledge producers, subject-matter specialists as knowledge translators, extension agents as knowledge disseminators, and rural public/farmers as knowledge users needs to be

supplemented by a view that each category of actors has multiple roles. For example, scientists need to be viewed also as knowledge users and knowledge disseminators, while farmers/users may also perform the role of knowledge producers and knowledge disseminators.

Thus the study attempts to reveal the roles of the actors within the research-extension-user system in the Food Technology Division of MARDI and identify the strengths and limitations of the system.

## METHODOLOGY

This paper is based on information from three sources, MARDI personnel, food industry entrepreneurs, and documents. In-depth, unstructured interviews were carried out with selected MARDI officers involved in planning and implementing the research and extension programmes and with entrepreneurs involved in the programmes. Informants were selected purposively based on their involvement and their ability to provide insights into the objective and nature of the programmes. Guided by the research question, six officers and four entrepreneurs were interviewed for a total of 23 hours. The interviews were recorded in the form of field notes. Data from interviews were supplemented by documents provided by the informants, including reports and papers related to the programmes carried out by the Food Technology Division. In addition, observations were also made during visits to the MARDI offices and during a visit to a food processing factory. At MARDI, training on food processing, client consultation process and research facilities observed. Visit to the food processing factory provided first-hand information on the operation of the factory and the processing work. From data obtained, descriptions of the programmes were made and the draft of the report was given to MARDI officials for validation.

### *The Programme*

#### *Historical Perspective*

As stated earlier, research and extension activities are generally divorced from one another in Malaysia. The MARDI Act stipulates that MARDI shall carry out only research in agriculture and that research findings be made available to the extension agencies for the purpose of dissemination to, and application by, the target



groups. In line with the act, the Food Technology Division of MARDI (formerly known as Agriculture Product Utilization Division) only conducted research in the utilization of agriculture produce until 1981. The research findings were documented into reports and publications but no formal extension activities were carried out.

However, since 1970, *ad hoc* training and advisory services were provided to those who requested them (Adinan and Hussain 1984). Due to increasing demand for advisory services, a direct communication channel with small food operators was established in 1982 with the creation of the "development" branch to complement the research branch of the Food Technology Division. The development branch carries out the following programmes (MARDI, 1993a):

1. Food Information Development
2. Food Project Development
3. Food Industrial Development
4. Food Extension Services
5. Training for the Food Industry
6. Food Quality Control Services

All six programmes form linkages through which research findings are communicated to consumers. This paper focuses on four of these programmes: Food Extension Services, Food Information Development, and Training for the Food Industry.

#### *Food Extension Services*

The objective of this programme is to provide advisory services to the local food industry towards upgrading of production technology and product quality (MARDI 1992). The services include regular visits (every 3 months) by MARDI officers to selected small food industries. During those visits advice is given on processing-related problems such as processing technology, quality control, machinery layout, product diversification, packaging and labelling, food regulation, hygiene, and sanitation. Services are provided for those entrepreneurs who seek MARDI's advice and who receive some financial assistance from government or semi-governmental agencies. This includes food processing establishments that receive financial assistance under the World Bank Special Project. Most of the advisory services in food processing

are provided by MARDI alone. However, in cases where the entrepreneurs receive financial assistance from other agencies, MARDI collaborates with those agencies in providing the advisory services.

Beside providing advice on a scheduled basis for the entrepreneurs at their production sites, MARDI also responds to inquiries made by both existing and potential entrepreneurs through telephone, letters, and personal visits to the research stations. In order to reach a wider audience, particularly potential entrepreneurs, MARDI often organizes and participates in exhibitions related to the food industry.

#### *Food Information Development*

The major output of this programme includes newsletters, flyers, pamphlets, and booklets on various aspects of food technology. These are disseminated to both potential and existing entrepreneurs. To date more than 80 different publications on completely packaged technologies have been made available to clients.

#### *Training for the Food Industry*

Various courses are developed and offered to potential and existing entrepreneurs in the food industry and also to personnel from extension agencies. The main objective of the programme is to introduce to participants the new technologies in food processing and quality control (MARDI, 1993b). The courses are provided in two forms — scheduled and unscheduled.

##### *1. Scheduled Courses*

Scheduled courses are categorized into either basic or advanced courses (Wan Rahimah 1986). In basic courses, participants are given a complete technology package on the processing of a certain product. This includes processing principles, method of processing, quality control of ingredients, process and product, packaging and presentation, cleanliness and sanitation, cost of production and good manufacturing practices. Advanced courses are designed by discipline or certain processing aspects such as quality control, packaging, and sanitation. The participants for a particular course are normally limited to those who want to learn more on certain aspects of the industry. Some of the advanced courses are carried out in collaboration with agencies that request them for their staff or clients. Certain

advanced courses involve international agencies like Japanese External Trade Organization (JETRO) and United States Food and Drugs Administration (USFDA).

Courses are planned in advance based on projected demand of the clientele. Course schedules are communicated to the public through newspapers, radio, booklets and on individual basis through extension agencies. Usually application surpass available seats. All those above 18 years old are eligible for a course. These courses are self-financed through charges made on the participants. These certificates are viewed favourably by financial institutions for loan approvals.

Courses are conducted by researchers from various specializations. A course usually involves both the theoretical and practical aspects of a process. Participants listen to lectures, observe demonstrations and carry out activities in laboratories.

## 2. *Unscheduled Courses*

As the name implies, these courses are conducted from time to time to meet the clientele's request. They normally deal with subjects not listed in the scheduled courses such as post-harvest handling of fruits, food canning and marketing. They also serve as an introduction to potential entrepreneurs who have not yet decided on the type of industry they would like to operate. After completing this course, participants are encouraged to attend the scheduled course of their choice.

### *Food Industrial Development*

A number of projects are carried out under this programme, including research-oriented projects and projects designed to improve selected food industries. An example of the latter is the "adoption scheme" which deals with small- and medium-scale food industries. The objective of the scheme is to produce successful entrepreneurs who are able to operate efficiently and produce products of consistently high quality. This service is provided through comprehensive and intensive guidance on appropriate and efficient production technology, analytical facilities, quality control system, packaging and marketing of products, and business management.

Generally, this scheme involves three phases which last for approximately three years. Phase

one seeks to assist the entrepreneur in solving his immediate, major problem. It starts with ensuring that the client meets the specified criteria:

- i. Has a registered factory;
- ii. Is currently engaged in food production;
- iii. Has problems with marketing strategy;
- iv. Has some technical problems.

Then it proceeds with identification of major problems faced by the entrepreneur. Based on the problems identified, the entrepreneur is given appropriate recommendations and training. His current products are analysed and recommendation on specific product specifications and requirements will be given. To improve his productivity, proper plant layout and machinery are suggested. Advice on financing opportunities and marketing strategies are also given.

The strategy in phase two is to improve the product and plan for diversification. This is achieved through introduction of new product formulation, equipment, more conducive and hygienic working areas and liaising with machine supplier and financial institutions.

With the utilization of new machinery and the adoption of recommended processing practices, the third phase proceeds with the aim of helping the entrepreneur to enlarge his business into becoming a medium-scale enterprise through production of new products. The entrepreneur is also advised on food regulations and other requirements of the successful food industries.

The adoption scheme is carried out through involvement of a team of researchers from different areas of specialization. Matters related to machinery and the processing line are under the jurisdiction of the engineer. He assigns the layout and equipment and co-ordinates with machine supplier to ensure that the machines meet the specific industry requirements. The food technologist makes recommendations on food formulation, sanitation and quality control. The economist ensures that the recommendations are not only technically feasible but also economically viable. The whole team participates from preparation of the research proposal (which is also used for loan applications) to locating markets for the product. This is carried out through consultation and regular (at least once



a month) visits to the industry. Most of the advice and training take place at the factory which also serves as a site where trials on actual application of recommended machinery and processes are carried out. As such, the adoption scheme serves as a 'learning laboratory' for both researchers and clients.

#### *The Research Programme*

The Food Technology Division conducts both applied and "fundamental" research. The areas of applied research are food handling, storage, processing, packaging, engineering, and food marketing while the fundamental research areas are food science and food safety (MARDI 1990). Identification of research problems may come from three sources. One source is the directions and guidelines formulated at the national level by various ministries. The second source is the demands from related industries or sectors. The third source is the personal and professional interests of MARDI personnel.

Researchers at the Food Technology Division who are operating in the "researcher" mode usually devote about 80% of his/her time to research and the remaining 20% to development work. This may include extension and training activities as well as being "on call" for troubleshooting activities.

### **DISCUSSION AND CONCLUSION**

The Food Technology Division of MARDI integrates research and extension in a manner that resembles the interdependency model discussed earlier. Research officers of the division form extensive linkages with food industry entrepreneurs (including potential entrepreneurs), suppliers of raw materials and machines, loan agencies, and others related to the food industry. The collaboration between these groups occurs at all phases of the research-development process.

In the Food Technology Division, not only are the two functions integrated, but the research officers are actually performing the role of researchers, subject-matter specialists, and extension agents. As stated earlier, the officers in the research branch of the division carry out 80% research activities and 20% development/extension activities while the research and extension work load is reversed for the research officers in the development branch. This multiple role enables officers to keep abreast of

research as well as extension issues and problems in both the laboratory and in the industry. Related to the multiple role is the team approach, with the team of researchers that includes food scientists, engineers and economists and their collaboration with extended agencies.

A brief description of an actual project may illustrate the point mentioned above. A team consisting of food scientists, engineers, and an economist worked with producers of a traditional snack and with officers of a state development agency to set up a commercial production of the traditional snack. Food scientists worked with the local snack producers to adapt the formulation for commercial production. Engineers helped with the factory layout and design of machines. Local machine fabricators participated to produce and install a prototype machine at the factory site. Studies were made on processing, mechanization, and economic aspects. The outcome was a total, comprehensive technological package for the commercial production of the traditional snack. Improvements over the traditional method were shorter processing time, longer shelf-life, better packaging, improved product quality, efficient and hygienic production-site, and higher economic potential.

Participation by the various groups like the one described above helps establish the linkages and interdependent relationships described. By working together at the production site the various groups were able to see beyond the confines of the group's area of specialization. The on-site research by the MARDI officers enables them to see problems in the "real world". It also allows them to evaluate the effectiveness and impact of the package technology in "real world" settings. Where possible, immediate corrections and refinements can be made; the problem would be investigated at the most basic level.

Another strength of the Food Technology Division is that the programmes are targeted at specific groups. The stratification of the clientele is taken into considered. The clientele groups are categorized according to the nature of the enterprise, the size of the operation, and the development stage of the enterprise. For example, budding entrepreneurs are given more "basic" training to help them get established. The established entrepreneurs, on the other hand, are given coaching at their own production

sites. The differing needs between small-scale, medium-scale, and large-scale operators are also taken into account. For example, separate training programmes are designed for each of the three size categories.

Certain suggestions however can still be made to improve the research-extension system in the Food Technology Division. The number of officers with the expertise and experience to effectively carry out both the research and extension functions is relatively low. While they have demonstrated their ability to carry out both functions, this capability is developed through years of experience. The acquisition of this capability can be speeded up in two ways. One is to include an adult education discipline in a more systematic manner.

The advantages of having direct linkages between researchers and other groups in the food industry were discussed earlier. This set up, however, limits the number of clientele that can be reached. To overcome this situation, front-line workers are needed to concentrate on the proven technological packages and in areas where there are relatively few problems. This will ease up some of the demands currently faced by the researchers without affecting the linkages.

This study has demonstrated some actual practices that serve to highlight certain facets of the interdependency model of research-extension-user linkages. By viewing the research-extension-user system through the lenses of this model, more meaningful participation by members from all sub-systems at every phase of the research process can be made. Within this context, the research process is seen as the knowledge creation-diffusion-utilization process.

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The manuscript should be typed double spaced on A4 paper with 4cm margins on all sides. It should be limited to 25 pages including tables, illustrations and references.

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The title of the paper, name of author and full address of the institution where the work was carried out should appear on the title page. A short title not exceeding 60 characters should be provided for the running headlines

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English and Bahasa Melayu abstracts of 200 words each should follow the title page. Papers from outside Malaysia may be submitted with an English abstract only.

### Keywords

About six to ten keywords are required and these should be placed directly above the abstract.

### Tables

Tables should be typed on separate pages and numbered using Arabic numerals. Each table should be referred to in the text, have a brief title and include explanatory notes, if necessary, below it. Vertical rules should not be used. Footnotes in tables should be designated by symbols or superscript small italic letters. Tables should conform to page size.

### Equations

These must be clearly typed triple-spaced. They should be identified by numbers in square brackets placed flush with the right margin.

### Illustrations and Photographs

Illustrations including diagrams and graphs are to be referred to in the text as 'figures' and photographs as 'plates' and numbered consecutively in Arabic numerals. All photographs (glossy black and white prints) should be supplied with appropriate scales.

Illustrations should be of print quality; output from dotmatrix printers is not acceptable. Illustrations should be on separate sheets, about twice the size in print. All letters, numbers and legends must be included on the illustration with the author's name, short title of the paper and figure number written on the verso. A list of captions should be provided on a separate sheet.

### Spelling & Measurements

The Oxford English Dictionary should be consulted for spelling. Metric units must be used for empirical measurements.

### Citations and References

Citations to the literature in the text are to be indicated by the author's name and year of publication in parentheses, e.g. (Barnett and Lewis 1982). If an author is quoted in the text, the year of publication should immediately

follow in parentheses. e.g. Barnett and Lewis (1982) state that "....." Citation of a particular page follows the date and is preceded by a comma, e.g. Humphrey 1990, p. 26-27.

For works with multiple authors, the first author's surname is used followed by *et al.* The full form of citation is used for two authors.

If two or more works by the same author are cited together, the author's name is followed by the various years of publication arranged in chronological order e.g. (Sulaiman 1979, 1980, 1981). In the case of citing an author with several works published in the same year, the works should be distinguished by the addition of a small letter e.g. Choa (1979a); Choa (1979b).

When several authors are cited, they are to be arranged in chronological order and separated by semicolons, e.g. Zaharah 1960; Yong 1980; Lewis 1990.

Serials are to be abbreviated as in the *World List of Scientific Periodicals*. The abbreviation for *Pertanika Journal of Social Science and Humanities* is *Pertanika J. Soc. Sci. Hum.*

The following reference style is to be observed:

#### Book

Shamsher Mohamed, Shamsuddin Ismail & Annuar Mohd. Nassir. 1989. *Asas Belanjawan Modal*. 197p. Serdang: Universiti Pertanian Malaysia Press.

#### Chapter in Edited Book

Zahid Emby. 1990. The Orang Asli Regrouping Scheme - converting swiddeners to commercial farmers. In *Margins and Minorities - The Peripheral Areas and Peoples of Malaysia*, ed. V. T King & M.J.G. Parnwell, p. 94-109. Hull: Hull University Press.

Unpublished Materials (e.g. theses, reports, documents) Shahwahid, H.O. 1989. Price competitiveness and demand behaviour of Malaysian Meranti lumber and hardwood plywood in the United States' import market. Ph.D. Dissertation, State University of New York, Syracuse.

Ministry of National Unity. 1973. A socio-economic survey on the new villages in Perak and Melaka. 67p. Malaysia.

#### Serials

Noran Fauziah Yaakub. 1990. A multivariate analysis of attitude towards teaching. *Pertanika* 13(2): 267-273.

#### Conference Proceedings

Amir Awang. 1992. Counselling, human resources development and counselling services. In *Proceedings of Asia Pacific Conference on Human Resource Development*, ed. Sulaiman M. Yassin, Yahya Mat Hassan Kamariah Abu Bakar, Esah Munji and Sabariah Mohd Rashid, p. 243-246. Serdang: Universiti Pertanian Malaysia.

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