

## The Use of Information System Development Methodology in Malaysia

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### ABSTRACT

*Information Systems Development Methodology (ISDM) has always been perceived to be useful and helpful to the Information Systems developers. Many researches have been carried out on ISDM to discover its usefulness as well as other aspects including its failure. However, the empirical study on the use of ISDM is still limited. Thus this research is aimed to look at the usage of ISDM in private and public sectors in Malaysia. A survey using questionnaire was carried out to obtain the findings. The result of this research had laid out a few important notes regarding the usage of ISDM in Malaysia.*

### ABSTRAK

*Metodologi Pembangunan Sistem Maklumat (MPSM) dilihat sebagai sesuatu yang membantu dan berguna kepada pembangun Sistem Maklumat. Banyak kajian dijalankan terhadap MPSM untuk mengenalpasti faedahnya serta beberapa aspek lain termasuk kegagalannya. Namun demikian, kajian empirikal mengenai penggunaan MPSM masih terhad. Oleh itu, kajian ini dijalankan untuk melihat penggunaan MPSM dalam sektor awam dan swasta di Malaysia. Satu tinjauan menggunakan soal selidik dijalankan untuk memperolehi maklumat yang berkenaan. Beberapa penemuan penting mengenai penggunaan MPSM di Malaysia dikemukakan.*

### INTRODUCTION

Systems development appears to be the main issue in the Information Systems area (Cotterman and Senn 1992). This explains why many researchers focus on the system development methodology (SDM) in their study. The use of SDM is always considered to improve the quality and productivity of systems development. Nevertheless, there is only little empirical evidence that can support this assumption (Russo et al. 1995). Researchers have

different views on SDM. For instance, by using the right methodology, the risk and uncertainty in the information system development process will be reduced (Avison 1995; Floyd 1987). Fitzgerald (1996a) cited that literature has traditionally saw that it will help to improve the process and product of system development while the general view was that methodologies were always troublesome and could use up resources and time, which were limited. However, despite the benefits, the usage of information system development methodology (ISDM) is still very unsatisfactory (Fitzgerald 1996a; Ward 1991; Chikofsky 1989; Russo et al. 1995). The scarcity of empirical research in the extended nature of usage of ISDM prevents knowledge of how ISDM are used (Wynekoop & Russo 1997).

Most of the researches regarding the usage of ISDM have been carried out in the developing countries such as US, UK and Europe (Hardy 1995; Fitzgerald. 1998; Fitzgerald. 1996b; Jenkins et al. 1984; Necco et al., 1987). However, little was reported in the usage of methodology in Asia (Rahim et al. 1997) and Malaysia particularly. Thus, a study is carried out to look at the usage of ISDM both in the public and private sector in Malaysia. This paper discusses the use of ISDM in the public and private sector in Malaysia, the types of ISDM used in the organisations, the impact of methodology application on the information system development and issues in the methodology application.

#### DEFINITION

Although most of the ISDM in use today have their grounds in a set of conception from about 1967 to 1977, the term methodology itself is not well defined either in literature or by practitioners (Fitzgerald 1999; Wynekoop & Russo 1997). Often it is used interchangeably with terms such as method, software development methodology, process models, technique and tools. There is very little agreement as to what it means (Avison 1995). The definition abounds:

*“ISDM is a recommended collection of philosophies, phases, procedures, rules technique, tools, documentation, management and training for developers of information systems”* (Madison 1983).

*“Methodology refer to all aspects of development from initial problem identification to the design of alternative solutions”* (Bentleman 1984)

To avoid confusion, one working definition for methodology in this study which is adapted from Avison (1995) is: *“A collection of procedure, techniques, tools and documentation aids which will help the system developers in their efforts to implement a new information system. A methodology will*

*consist of phases, themselves consisting of sub-phases, which will guide the systems developers in their choice of the techniques that might be appropriate at each stage of the project and also help them plan, manage, control and evaluate information systems projects."*

## PREVIOUS STUDIES

There are various types of research being carried out in the field of information system development methodology. It ranges from the application of methodologies (Sakthivel 1992; Avison et al. 1992), movement of methodologies (Fitzgerald 1999; Avgerou 1993; Lycett et al. 1997), the use of methodologies (Westrup 1993), application of in-house software development methodologies (SDM's) and commercial SDM's (Hardy et al. 1995; Jenkins et al. 1984) and issues in methodologies (i.e. the influences, problems, unanswered questions) (Fitzgerald 1995; Livari 1998; Wynekoop et al. 1995). There are also researches being carried out concerning the methodology itself and the changes in methodology (Wynekoop et al. 1997).

Although literature abounds with the focus on the development of new methodologies and framework for the selection and comparison of methodologies, methodologies are still extensively untested, despite their growth (Russo et al. 1995). Nevertheless, there are a handful of research, which consolidate on the empirical study of the use of methodologies in specific countries (Rahim et al. 1997; Edward 1989a; Edward 1989b; Edward 1989c; Selamat et al. 1994; Fitzgerald 1997; Fitzgerald 1996b, Russo et al. 1995). However all of these researches tend to focus on the usage of methodologies outside of Asia. Most of these researches were carried out in the UK and US region, while only one was carried out in Brunei.

The research carried out by Rahim (1997), focuses on the use of software systems development methods in Brunei Darussalam. It also gives emphasis on comparison of the findings with the US, UK and Australian studies. The method used to carry out the research is by using questionnaire, which were distributed to the public and private organisations in Brunei. The survey indicates that the adoption of software development methods is related with the nature of business of the organisation. It was also discovered that there is a difference in method use by the private and public sector, matured and novice organisations.

Research accomplished by Edward (1989a, b, c) had emphasised on the usage of SSADM in the private and public sectors in UK. The research concentrate on discovering whether the users of SSADM feel that the requirements of the methodology had been fulfilled. It had also determines whether the practitioners of methodology had welcome SSADM. As a result it was found that SSADM is a methodology that provides guidelines and rule for the

development of systems and it had been used in a few of the public and private sectors in UK.

The research carried out by Selamat (1994) had looked at the use of CASE tools in Malaysia. It had looked into the reasons why CASE tool was not being used in the organisations in Malaysia. The reasons appear to be a lack of managerial approach in undertaking the technology and minimum commitment between the CASE users, software managers and CASE vendors.

A research rendered by Fitzgerald (1997) had investigated the usage of software development methodologies (SDM) in eight organisations such as banks, pharmacies and education department. The studied was carried out based on the usage of methodology in the organisations. The studies show that the users might modify and eliminate certain aspects of methodologies in order to adopt it to a particular situation. It was also found that experience developers only use tailored methodologies.

Another research attained by Fitzgerald (1996) had used a postal survey technique to explore the extent to which SDM is used in practise. It had also investigated the profile of the development environment currently faced (in-house development vs. outsourcing and customisation of packages). The results shows that 60 percent of respondents were not using methodologies, 26 percent were using internal methodologies, and only 14 percent were using a third party commercial methodology. Also, 78 percent of those not using methodology testified that they did not intend to use one.

Russo (1995) had carried out a research regarding the use and adaptation of SDM. The study shows that most organisations have a formal SDM in policy but in practise, the methodology is not fully applied, and the level of the application varies according to system or project. In many cases, there are no formal procedures or guidelines for modifying or adapting the methodology and if there is any, it is not followed religiously. It was also found that there is no strong empirical practise to support the assumption that the use of SDM will enhance software development productivity and quality.

## RESEARCH METHODOLOGY

The research methodology was based on Browne and Shaw (1981). The methodology was used because the steps involved are relevant to the study. The methodology adopted is in figure 1.

In phase one the methodology chosen are Structured System Analysis And Design Methodology (SSADM), Formal Specification, Information Engineering (IE), Effective Technical and Human Implementation Of Computer Based Systems (ETHICS), Soft System Methodology (SSM), System Development Life Cycle (SDLC), Rapid Application Development (RAD), Information Systems Work and Analysis of Change (ISAC), Structured Design By Yourdon,

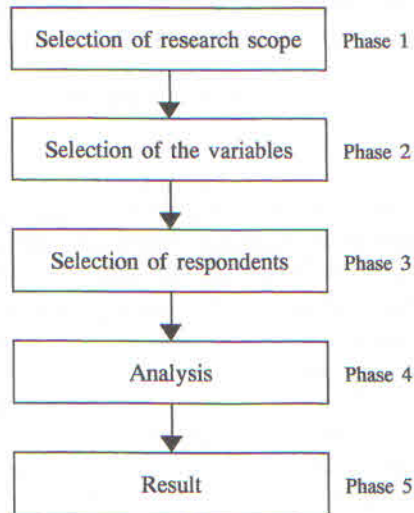


FIGURE 1. Methodology Model

Structured Analysis By De Marco, Jackson System Design, Object Oriented Design (OOD), System Requirement Engineering and In-house methods.

Phase 2 involves the selection of variables for the project profiles. The variables chosen are nature of business, size of organisation, size of IT department, expertise in terms of IT, knowledge level of methodology, training given and types of organisation. The next phase is the selection of respondents in the respective organisation. The fourth phase involve with the statistical analysis such as mean comparison, frequency, cross tabulation, correlation and variance analysis. Based on the analysis the results are obtained.

#### SURVEY of ISDM

The survey carried out is a part of a university project at Universiti Kebangsaan Malaysia. The main objectives of the survey were:

1. to look at the usage of ISDM in private and public sectors in Malaysia
2. to look at the types of methodologies being used in the organisations
3. to look at factors affecting the usage of methodologies in the organisations.

The survey was carried out in 90 organisations where 500 sets of questionnaires had been distributed. Out of this amount, 232 were returned and only 152 sets were answered completely. The 152 sets were received from 60 organisations and these sets had been used for the analysis. This

paper discusses the findings of the survey and conclusions are drawn concerning the use of the methodologies.

#### QUESTIONNAIRE FORMAT

The questionnaire was divided into six sections, which are:

1. Organisation profile: This section covers the general information of the organisation such as the types of the organisation, experiences in information system development, number of staff in the organisation and the staff's experience in information system development.
2. Project profile: It solicits information regarding projects carried out by the organisations such as the number of projects carried out, implementation and the size of the projects.
3. ISD practises: This section seeks information regarding the use of methodologies in the organisation such as the types of methodologies used, knowledge related to the methodologies used, usage of the methodology and the tools provided in the methodology.
4. Impact of the methodology.
5. Issues: Related issues and problems occur while using the methodology.
6. Other features: This last section looks at features that should accompany ISDM and contributing factors that produce high quality information system.

The sections mentioned above are believed to be the main criteria that affect the usage and effectiveness of information systems. The relationship between ISDM and the criteria are shown in figure 2.

#### DATA ANALYSIS

The results of the survey have been analysed using basic statistical measures such as mean comparison, frequency, cross tabulations, correlation and variance analyses. However the detailed analysis is not presented here. The results are shown in the forms of tables and followed by the discussion.

#### ORGANISATION PROFILE

The questionnaire was sent to 16 public, 38 private and six multinational organisations. These organisations are involved in various types of business such as banking, education, consultation, etc. The types of business are shown below:

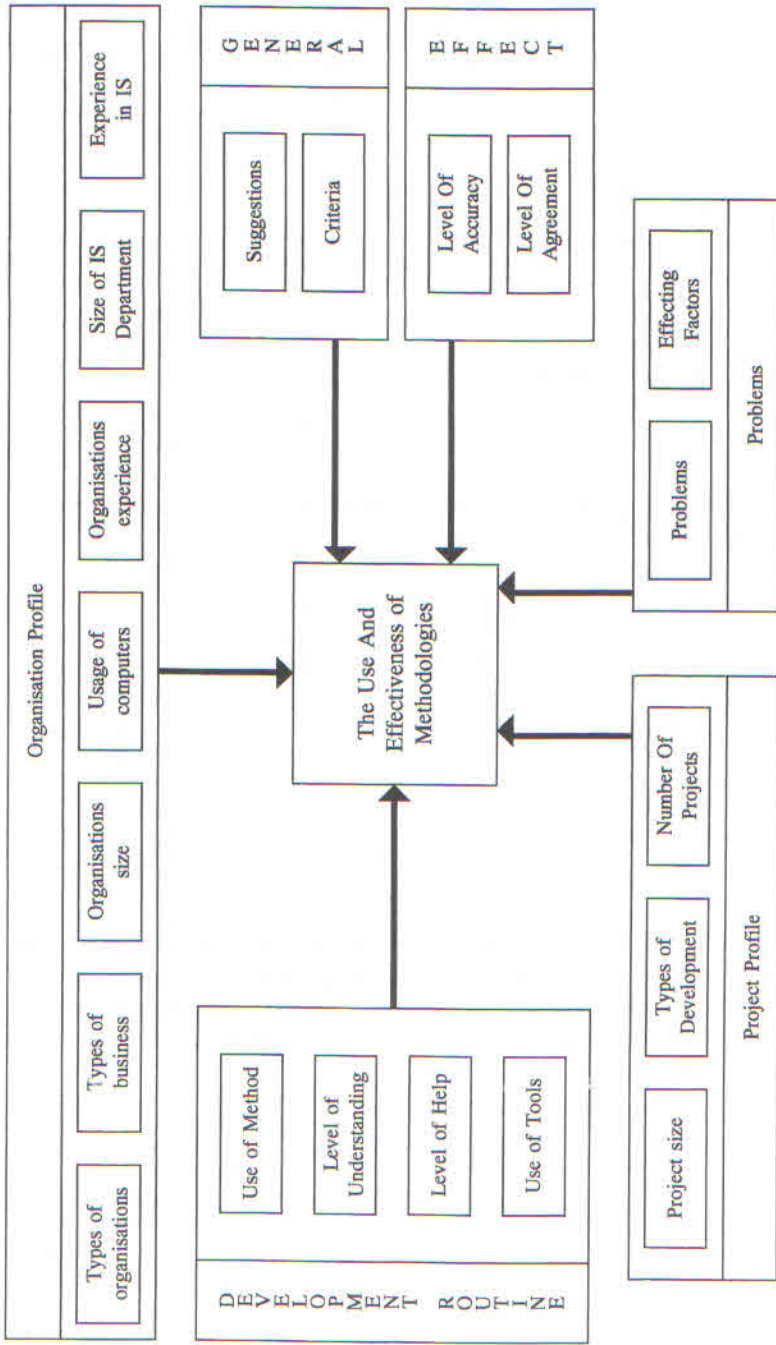


FIGURE 2. Research Model

TABLE 1. Business Sectors

Types Of Business	Numbers Of Organisation	Percentage (%)
Consulting	3	5
System Development	14	23.3
Services	16	26.7
Banking, Finance, Investment, Insurance	1	1.7
Communications	1	1.7
Petroleum	2	3.3
Computer Vendors	2	3.3
Hotel, Tourism	0	0.0
Transport	0	0.0
Education, Health	6	10.0
Others	15	25.0
Total	60	100.0

Most of the organisations visited are medium class organisations where the number of staff employed is around 100.

TABLE 2. Number of Staff

Number Of Staff	Numbers Of Organisation	Percentage (%)
1 – 99	41	68.3
100 – 499	8	13.3
500 – 999	4	6.7
More than 1000	6	10.0
Not related	0	0
unanswered	1	1.7
Total	60	100.0

Out of the 60 organisations, 58 organisations had use computer applications, while the other two did not. From the 60 organisations, 152 respondents had replied to the questionnaire. Most of these respondents had one to five years of experience in information system development. The summary is as below:

TABLE 3: Experience Skills

Experience Skills (years)	Numbers Of Respondents	Percentage (%)
1 - 5	89	58.6
6 – 10	23	15.1
> 10	24	15.8
No answer	16	10.5
Total	152	100.0



From the results obtained, most of the staffs in the organisations have the range from one to five years of experience. Most of these staffs are classified as expert staff and almost all of the organisations have programmer, system analyst, system administrator, head of IT department and staff support in their organisations.

#### PROJECT PROFILE

This section will try to extract information regarding the project undertaken by the organisation and use it to look at the relationship with the use of methodology. From the response received, it was discovered that about one third of the organisations had one to five numbers of project handles during the year. The results obtained are as below:

TABLE 4: Number of Projects Handled

Number Of Project Skills	Numbers Of Organisation	Percentage (%)
1 – 5	22	36.7
6 – 10	15	25
11 – 15	5	8.3
16 – 20	4	6.7
> 20	9	15
No answer	5	8.3
Total	60	100.0

From the results acquired, most of the organisations had carried out the projects internally by using the internal resources. 4 had outsourced their projects, while 23 had used other types of implementation such as consultation, both in-house and outsource. The projects handled are mostly medium size projects and medium large projects. Below is the table indicating the project size.

TABLE 5: Project size

Project size	Numbers Of Organisation	Percentage (%)
Very small	0	0.0
Small	6	10.0
Medium	27	45.0
Medium large	21	35.0
Extremely large	1	1.7
No answer	1	8.3
Total	60	100.0

The medium size projects are mostly built in-house. Meanwhile, medium large size projects are built in-house through joint venture and consultation.

#### INFORMATION SYSTEM DEVELOPMENT PRACTISES

From the results attained, it was perceived that out of 152 respondents, 74 are using methodology and the rest did not use any methodology while developing a system (Table 6). This is due to the factor such as there is no expertise in the area of methodology in the organisation and there are too many deliverables that needs to be derived from the methodology. Below are the reasons why methodology is not being used in the organisations.

TABLE 6. Methodology Used

Methodology Used	Total	Percentage (%)
Yes	74	48.7
No	50	32.9
No answer	28	18.4
Total	152	100

TABLE 7. Factors for Not Using Methodology

Factors	Numbers Of Respondents	Percentage (%)
No expertise	10	20.0
No knowledge	6	12.0
Cause difficulty	9	18.0
Cause delay	8	16.0
So many deliverables to be generated from the methodology	10	20.0
No answer	3	6.0
Others	4	8.0
Total	50	100.0

Other factors mentioned are the organisation itself did not adopt any methodology as a standard methodology to be used in any projects and some organisations would prefer to start implementation right away. It was also mentioned that the existing methodologies are not applicable to the projects and sometimes it is upon the user's requirements who does not want to use any methodology.

For those who used methodologies, the type of methodologies varies from one project to another. This means each respondent may use more than one methodology for several projects. Below are the types of methodology used by the respondents.

TABLE 8. Methodologies Used

Methodologies	Numbers Of Methodology Used	Percentage (%)
ETHICS	6	3.1
Formal Specification	26	13.4
IE	8	4.1
ISAC	0	0.0
JSD	1	0.5
OOD	36	18.6
SSADM	16	8.2
RAD	33	17.0
SDLC	23	11.9
SSM	2	1.0
DeMarco	6	3.1
Yourdon	8	4.1
SRE	12	6.2
Others	17	8.8
Total	194	100.0

The other methodologies used are Magian, FBIS Navigator, AIMS Structure Design and a combination of any of the methodologies mentioned above (e.g. SSADM + RAD). Most of these methodologies are probably in house methodologies adopted by the specific organisation only. From the results perceived, only 5.5 % of the respondents had fully understood the methodologies, while almost 45% had a clear understanding of the methodologies used. Below are the results:

TABLE 9. Level of Understanding of the Methodologies Used

Level Of Understanding	Percentage (%)
Totally vague	9.6
Vague	17.7
Clear	44.7
Very clear	22.5
Totally clear	5.5
Total	100.0

While carrying out a project, it is not necessarily to adhere to one particular methodology. A methodology can also be adopted in specific phase of a project. Realising this, four main phases were identified as the most common phases adopted in carrying out a project; they are analysis, design, implementation and maintenance phase. Below are the results gained:

TABLE 10. Usage of Methodologies in ISD Phases

ISD Phase	Percentage (%)
Analysis	21.6
Design	31.5
Implementation	26.8
Maintenance	20.1
Total	100.0

From the above table, it can be concluded that the use of methodologies in the design phase in developing an information system is higher compared to other phases. It was also found that 43.3 % agreed that methodologies are helpful in the ISD phases, while 3.8% had found it very unhelpful. The detail results are shown below:

TABLE 11. Level of Methodologies Help in ISD Phases

Level Of Help	Percentage (%)
Very unhelpful	3.8
Less helpful	6.2
Helpful	43.3
Very helpful	37.3
Extremely helpful	10.8
Total	100.0

Methodologies are helpful in the development of an information system because it involved certain types of tools such as CASE tools, word processing, spreadsheets, graphic tools, presentation software and charting tools. Tools ease the project development. From the results attained, 51.4 % had used the tools included in the methodology, while 48.6% did not use the tools.

#### THE IMPACT /EFFECT OF METHODOLOGY APPLICATION OF THE ISD

From the results procured, 61.1% had agreed that by using methodology, the information system development phase could be completed on schedule or time. Below are the results:

Methodologies are believed to be very helpful if used when carrying out an ISD project. It is also believed to benefit those who adopt a methodology when carrying out the ISD project. Examples of benefits are higher quality of produced documents, increment in the involvement of the computer user and increment in the number of information systems products. Apart from

TABLE 12. Completion of ISD According To Schedule

Level Of Exactness	Percentage (%)
Very inaccurate	1.4
Inaccurate	13.2
Accurate	61.1
Very accurate	21.2
Extremely accurate	3.1
Total	100.0

this, by using methodology, it may help to reduce the maintenance cost, reduce the design error, fulfil the user's requirement and improve the communication between the user and the system developer. It may also help to produce better quality of project control, higher quality of produced system and others. These benefits were laid out in the questionnaire. 57.55% had agreed on the benefits listed, while 9.5% had disagreed. Below are the results obtained:

TABLE 13. Agreement on the Benefits Gained

Level Of Agreement	Percentage (%)
Totally disagree	0.1
Disagree	9.5
Agree	57.5
Very agree	24.3
Totally agree	8.6
Total	100.0

#### ISSUES AND PROBLEMS IN METHODOLOGY APPLICATION

Although benefits can be gained when methodology is used, problems may still occur while using it. Some of the problems identified are (Karam et al. 1993; Kumar et al. 1992; Nielsen 1989):

1. too much time is spent on understanding and learning the methodology
2. complicated methodology
3. the methodology does not cover the entire project development life cycle
4. the methodology is not applicable for the project development
5. there are limited number of skilled staff who are applying the methodology

From the responds received, 37.6% had agreed on the problems listed, while 3.8% did not agree at all. Below are the detailed results:

TABLE 14. Problems Influence on the Usage of Methodology

Level Of Influence	Percentage (%)
Totally disagree	3.8
Disagree	37.3
Agree	37.6
Very agree	18.2
Totally agree	3.1
Total	100.0

## GENERAL

The factors identified as affecting the effectiveness of an information system when a particular methodology is used are as below:

TABLE 15. Factors Affecting the Effectiveness of the Information System

Factor	Percentage (%)
tight schedule (unable to meet deadline)	23.3
unskilled staff	20.5
limited staff experience	28.8
lack of staff	16.9
inappropriate with the nature and the field of business	10.5
Total	100.0

Each methodology has its own existing features, which differentiate it from one another. From the results received, it was clearly shown that there are organisations that are not using any particular methodology due to some reasons. If methodology is to be used in each ISD project, new features have to be included in the methodology. The features identified as significant to the ISDM are as below (Sakthivel 1992):

1. easy to understand and practised
2. covers the entire development life cycle
3. includes tools that assist tasks in each system development phase
4. others

From the consummation, 40% found the factors as very important, but 4.8% had found it unimportant. Below are the detailed results.

It was mentioned that by using methodology, it might help to produce high quality information system. However there are other criteria which can contribute in producing high quality information system. These criteria are (Catchpole 1986):

1. ISO recognition
2. Business process re-engineering

TABLE 16. Significant Criteria to the ISDM

Level Of Significance	Percentage (%)
Very unimportant	0.0
Unimportant	4.8
Important	36.4
Very important	40.0
Extremely important	18.8
Total	100.0

3. Total quality management
4. Higher level management support
5. Appropriate time frame
6. Sufficient experts

37.7 % agreed that these factors are very important in producing high quality information system, while only 7.1% believe they are not. Below are the results:

TABLE 17. Significant Factors to Produce High Quality IS

Level Of Significance	Percentage (%)
Very unimportant	0.9
Unimportant	7.1
Important	35.3
Very important	37.7
Extremely important	19.0
Total	100.0

To satisfy every user's needs is very difficult, thus organisation should not adhere only one methodology in carrying out the projects. If they were given a choice, the user would probably like to change the methodology that they are currently used. These were the results obtained: 71 respondents wished to change the methodology they are currently used, 35 did not want to and 46 were left with no answer.

## DISCUSSION

It was discovered that most of the respondents had 1-5 years of experience in the information systems development area; number of project handles is around 1-5 and mostly with medium size. These should be looked into when

the result is tabulated. Looking at the respondent profiles with maximum five years experience (Table 3), number of projects handled (Table 4), methodologies should be used extensively. However according to table 6 only 49% had used methodologies in the development of an information system. The figure of methodology usage in this study is among the lowest compared to those reported in previous studies, for instance the usage figures of 87 percent (Jenkins 1984), 82 percent (Hardy 1995), 62 percent (Necco 1987), 50 percent (1992 UK study reported in Lissoni, 1995), 50 percent (Chatzoglou & Macaulay 1996) and 40 percent (Fitzgerald 1996).

The reasons given were due to no expertise and too many deliverables to be derived from the methodology. There are a number of factors that contribute to this scenario. For instance, a survey conducted by Fitzgerald (1996b) indicates that there is a clear relationship between methodology usage and business category. The study shows that consultants/software house category has equal methodology usage/non-usage (25 v. 25 respondents). The use of methodologies appears to be very little in the construction/manufacturing/distribution category (11 v. 47 respondents) while the use of methodologies is higher than non-usage in the finance/insurance/real estate category (13 v. 6 respondents). Further, the use of methodology is also related to the size of organisation. Fitzgerald (1996) discovers that larger organisation (more than 1000 employees and larger IS department (more than 20 personnel) has higher methodology usage. This results is in concert with the research conducted by Zmud (1983) which illustrates that large organisations tend to introduce modern software practices and technical software innovations.

This ironic situation has been questioned in the earlier studies. Kozier's (1989) study showed that developers with more experience tend not to apply a methodology. Further, Lee and Kim (1992) discovered that in older IS departments, the application of methodology as part of procedural formalisation is minor with regard to the growth of system development knowledge among developers.

From the results obtained in table 8, it was discovered that the most used methodology is OOD, followed by RAD. OOD is mostly used due to the moving web based applications which had become more complex and OO helps to construct complex system easily. By using OOD, the software, design and the application framework can be reuse over and over again. However, a field study conducted by Lubars et al. (1992) indicated that OO specifications are not easy for clients to comprehend and are always adapted to make them easier. RAD on the other hand, speeds up the development process so that the system can be completed on time. Formal specification methodology is also popular among the user. According to Avison & Fitzgerald (1988), this type of methodology applies mathematical precision in design and specification. One of the greatest advantage of this methodology is we can prove results to



be correct. In contrast, ISAC is the only methodology, which is not being used by any of the respondents.

When a particular methodology is being used, the user should have a clear understanding concerning the methodology. This will help to mitigate the development process and the system can be developed efficiently. However there are cases where the user had a vague idea concerning the methodology, presumably due to the factor that they are still new to the methodology (Table 9). Another contributing reason is that different projects may use different methodology; hence it takes time to go into deep understanding to perceive the methodology (Fitzgerald 1997)

The development of information systems has common phases, where the main phases, which are usually involved, are the analysis, design, implementation and maintenance phase. From the results obtained in table 10, the percentage of methodologies used in the design phase is the highest. The design phase represents the major segment of a system development project where it represents 31.5% of the whole project. This shows how crucial the design phase is (Jesudason 2002) and methodology had to be used in it.

It is believed that methodologies will be helpful if it is used. The findings had proved the idea. One of the assumptions made was when a particular methodology is used, the development process of an information system can be completed on schedule. From the result obtained, the assumption has been fortified, where by more than half of the respondents agreed that methodology helps to complete the ISD phases on schedule.

According to the survey, 9.5% had disagreed on the benefits gained when a methodology is used (Table 13). This scenario is similar to the studies conducted by Russo et. al (1995) regarding the negative responds on the overall satisfaction issues of methodology use. Thus, methodologies are not uniformly accepted even though they improve the productivity, quality and communication.

Even though a methodology is used, an information system is not necessarily effective (Table 15). There are other factors, which could affect the information system effectiveness, for instance unskilled staff, limited staff experience in the development area, lack of staff and tight schedule. According to the result, limited staff experience is the main factor causing an information system to be less effective. This is due to the late commencement of IT in Malaysia. IT commenced in Malaysia in 1980s.

Taking the fact that ISDM is not being used widely in the organisations, it is necessary to look at the criteria of the methodology (Table 16). This is because it could be the nature of the methodology (i.e. difficult, too abstract, too many deliverables to be generated) that prevents it from being used. Therefore, for a methodology to be utilised, it should be easy to understand, suitable for any types of cases (complex, big or small systems) and covers the

whole development life cycle. The more experienced methodology user to ease the use of methodology can also conduct training. These are some of the factors, which need to be considered if a new methodology is to be developed.

It is important to note that in order to produce a good quality of IS, other criteria apart from the methodology usage are needed (Table 17). For example, high-level management support is very important (McLeod 2001; Michel 2002). If the top management realise the importance of ISD and the usage of methodology, the system developed will probably be better. Appropriate time frame should be considered, when developing a system. This should be the responsibility of the project manager, to ensure that a methodology is used and used effectively.

#### CONCLUSION

To conclude, the survey had laid out few important notes such as 1) SDM are not fulfilling the requirement of organisation today. 2) Organisations in Malaysia are developing their own methodologies or adapting commercial methodology. 3) Formal methodologies do not apply to every development project. 4) Organisations are not fully satisfied with their methodology although the benefits of using it are justified particularly in the areas of productivity, quality and communication.

#### REFERENCES

- Avgerou, C. & Cornford, T. 1993. A review of the methodologies movement, *Journal of Information Technology*, vol 5: 277-286.
- Avison, D.E. and Fitzgerald, G. 1988. Information Systems Development: *Current themes and future directions*, *Information and Software Technology*, 30(8): 458-466
- Avison, D.E. [et.al.] 1992. Applying methodologies for information systems development. *Journal of Information Technology*, 7: 127-140.
- Bentleman, J.P. 1984. A feature Analysis of the LBMS system development method. In: *Structured Methods, State Of the Art Report*, 12, 1. Maidenhead: Pergamon Infotech.
- Browne, J.C & Shaw, M. 1981. *Towards A Scientific Basis For Software Evaluation*. [s.l.]: Editor Software Metrics.
- Catchpole, P. 1986. Requirements for a successful methodology in information systems design. *Data Processing*, 28(4): 207-210.
- Chatzoglou, P.P. & Macaulay, L.A. 1996. Requirements capture and information systems methodologies. *Information Systems Journal*, 6: 209-225.
- Chikofsky, E. 1989. How to lose productivity with productivity tools. *Proceedings of 3<sup>rd</sup> IFAC/IFIP Workshop, Indiana*: 1-4.
- Cotterman, W. and Senn, J. 1992. *Challenges and strategies for research in systems development*. Chichester: Wiley

- Edwards, H.M., Thompson, J.B. & Smith, P. 1989a. Results of survey of use of SSADM in commercial and government sectors in United Kingdom. *Journal of Information and Software Technology*, 31,1(January/February): 21-28.
- Edwards, H.M., Thompson, J.B. & Smith, P. 1989b. Experiences in use of SSADM: series of case studies. Part 1: first time users. *Journal of Information and Software Technology*, 31(8)October: 411-419.
- Edwards, H.M. Thompson, J.B. & Smith, P. 1989c. Experiences in use of SSADM: series of case studies. Part 1: experienced users. *Journal of Information and Software Technology*, 31(8)October: 420-428.
- Floyd, C. 1987. *Outline of a paradigm change in software engineering* In: Bjerknes, G., Ehn, P. and King, M. (Eds) *Computer and Democracy*. Avebury Gower, Brookfield: A Scandinavian Challenge Vermont
- Fitzgerald, B. 1995. *A Descriptive Framework for Investigating Problems in the Application of Systems Development Methodologies*, In: Jayaratna, N. et al (Eds). *Proceedings of Third Conference on Information Systems Methodologies*, Swindon: BCS Publications: 27-38. .
- Fitzgerald, B 1996a. Formalised Systems Development Methodologies: A Critical Perspective. *Information Systems Journal*. 6(1): 3-23.
- Fitzgerald, B. 1996b. *An investigation of the use of systems development methodologies in practice*. In: Coelho, J. et al (eds). *Proceedings of the 4<sup>th</sup> European Conference on Information Systems*. Lisbon: [s.n.]: 143-162.
- Fitzgerald, B. 1997. The Use of Systems Development Methodologies in Practice: A Field Study, *The Information Systems Journal*, vol. 7(3): 201-212.
- Hardy, C., Thompson, B. & Edwards, H. 1995. *Problems Associated with the Customisation of Structured Methods*. In: Jayaratna, N., Miles, R., Merali, Y. and Robert, S. (eds.), *Proceedings of Third Conference on Information Systems Methodologies*: [s.l.]:[s.n.]:211-220.
- Jenkins, A., Naumann, J. & Wetherbe, J. 1984. Empirical Investigation of Systems Development Practices and Results. *Information & Management*, 7: 73-82.
- Jesudason, J. 2002. The Philosophy of Software Development. *Stylus System Article*. (dalam talian) [http://stylusinc.com/india/software\\_philosophy.htm](http://stylusinc.com/india/software_philosophy.htm) [16/5/2002]
- Karam, G.M & Casselman, R.S. 1993. A cataloguing framework for software development methods. *IEEE Computer*. 2(93): 34-45
- Kozer, K. 1989. Adopting Systems Development Methods: An Exploratory Study. *Journal of Management Information Systems* 5(4): 73-86.
- Kumar, K & Welke, R.J. 1992. Methodology engineering: a proposal for situation-specific methodology construction. In: Cotterman, W.W and Senn, J.A (ed). *Challenges and Strategies For Research in System Development*, New York: John Wiley: 257-269
- Lee, J. & Kim, S. 1992. The Relationship between procedural formalisation and Management Information Success. *Information & Management*, 22: 89-111.
- Lissoni, C. 1995. BcS (Information Systems Methodology) Newsletter, Issue 2.
- Lubars, M., Potts, C. & Richer, C. 1992. A Review of the State of the Art in Requirements Modelling In: *IEEE International Symposium Requirement Engineering*: 2-15.
- Lycett, M., Kanellis, P. & Paul, R.J. 1997. Philosophical Directions for Information Systems Development. *Association for Information Systems 1997 Americas Conference*, Indianapolis, Indiana, August 15-17: 309-311.

- Madison, R.N. (ed).1983. *Information System Methodologies*. Chichester: Wiley Heyden.
- McLeod, R.J & Schell, G. 2001. *Management Information Systems*. Eighth Edition. London: Prentice Hall: 369-372
- Michel, L.J. 2002. CIO Update: The Expanding Responsibilities. (dalam talian) <http://www/stsc.hill.af.mil/crosstalk/2002/jan/michel.asp> [16/5/2002]
- Nielsen, P. A., 1989. Reflections on Development Methods for Information Systems, A Set of Distinctions Between Methods. *Office: Technology & People*. 5(2): 81-104.
- Necco, C., Gordon, C & Tsai, N. 1987. System Analysis and Design: Current Practices. *MIS Quarterly*.
- Rahim, M.M. [et al.] 1997. Use of software systems development methods: An empirical study in Brunei Darussalam. *Journal of Information and Software Technology*. 39: 949-963.
- Russo, N.L., Wynnekoop, J.L. & Walz, D.B. 1995. The use and adaptation of Systems Development Methodology. International Resources Management Association International Conference, Atlanta, Georgia. May 21-24.
- Sakhtivel, S. 1992. Methodological Requirements For Information System Development. *Journal Of Information Technology*, 7: 141-148.
- Selamat, M.H. et al. 1994. Non-use phenomenon of CASE tools: Malaysian experience. *Journal of Information and Software Technology*. 36(9): 531-537.
- Ward, P. 1991. The evolution of structured analysis: Part I—the early years. *American Programmer*, 4(11): 4-16.
- Westrup, C.\_1993. Information Systems Methodologies in Use. *Journal of Information Technology* 8: 267-275.
- Wynnekoop, J.L & Russo, N. 1997. Studying System Development Methodologies: An Examination of Research Methods. *Information Systems Journal*: 47-66.
- Zmud, R. 1983. The Effectiveness of External Information Channels in Facilitating Innovation within Software Development Groups. *MIS Quarterly*, 7(2): 43-58.

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