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## THESIS

ASPECTS ON THE DEVELOPMENT  
OF THE NEW COMPUTER TECHNOLOGY  
IN INDONESIA AS A DEVELOPING COUNTRY

by

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September 1984

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This thesis will try to discuss the problems that accompany the acceptance of the computer as a new tool in Indonesia.

A brief review of the historical, psychological and sociological background of the Indonesian people, its society and its way of life, in relation to the world outside is presented.

An analysis is made of the perceptions of Indonesian workers, directors and managers, with recommendations as to how the usage of computers can be accelerated with minimum friction to the organization.

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Aspects on the Development of the New Computer  
Technology in Indonesia as a  
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## ABSTRACT

Indonesia is relatively new as an independent country. Indonesia obtained its independence right after World War II at the same time that the computer entered its developing stage. Meanwhile the development of computer technology has been advancing faster than that of Indonesia as a new nation. This fast advancement of computer technology resulted in the realization today, that the acceptance of the computer is critical to survival. Indonesia faces several problems that are sometimes difficult to overcome due to cultural and economic factors that are common to developing countries. This thesis will try to discuss the problems that accompany the acceptance of the computer as a new tool in Indonesia. A brief review of the historical, psychological and sociological background of the Indonesian people, its society and its way of life, in relation to the world outside is presented. An analysis is made of the perceptions of Indonesian workers, directors and managers, with recommendations as to how the usage of computers can be accelerated with minimum friction to the organization.

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## I. INTRODUCTION

Change is now a part of life in every country in the world - continuous, rapid, all-pervading change. It will cause the social change which is referred generally to alternatives in social structures and social processes which take place through time.

Continuously social change provides unsettling situations which ultimately cause the explosion of science : factual knowledge doubles every decade or so. Its direct cause is the technological revolution, new knowledge is put to practical use about as rapidly as knowledge itself expands.

The impact of technology on individuals and on society at large is profoundly affected by the attitude of the public and of its leaders toward technology, that is, by the prevailing concepts of what technology is and what purpose it should serve. In other words, technology has created an interdependent world. With the technological advance villages grow to cities. With the parallel rise of industry and transportation city states are developed into nation states etc.

Computers as a part of the development of technology are also affecting the society in such a manner when it is viewed humanistically as a means to human ends. They can be made to produce maximum benefit and to minimize harm to human beings and to the values that make for civilized living.

This discussion will start with the ideas behind the meaning of what computer technology is and how it can affect society.

The following definitions are deemed important :

### 1. Technology

Technology has been defined as "covering the field or how things are commonly done or made", and somewhat broadly, as "what things are done or made". Technology is also tools, techniques, procedures, things; the artefacts fashioned by modern industrial man to increase his powers of mind and body [Ref. 1].

### 2. Automation/Computerization

Automatic/computerization<sup>1</sup> implies the use of any technique to make a system or process more automatic - i.e. more self-acting and self-regulating and, hence, less dependent on human intervention for proper operation.

Recently, however, the word has come to be associated with the use of computers to attain these functions. And the word "computerization" can be used as a synonym for automation and to think in terms of the application of computer not only for the handling of information associated with a process, but also for the actual control and actuation of mechanisms that facilitate or completely accomplish that process with minimal guidance.

From these two definitions, the definition of computer technology can be generated as :

### 3. Computer Technology

Computer technology is tools, techniques, procedures and things used to achieve any task or number of tasks by means of a computer system.

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<sup>1</sup>See Encyclopedia of Computer Science and Engineering, A. Ralston & E. Rilley, Jr. (Editors) page 151.

Indonesia as a developing country is also affected by the development of computer technology. This discussion will try to find the problems according to these new developments and how they affect the Indonesian society and its environments.

There is no specific definition to follow the meaning of a developing country. Several publications identify the developing country as being equal to the less developed country. The idea to be stated that the less developed countries are a group of countries which are not strong or have an unstable central government. Economic problems are highlighted. Level of development can be measured in many ways: GNP per capita, industrial output, extent of illiteracy, unemployment and underemployment, proportion of the population living outside the money economy, rate of fixed capital formation and so on.

There are several characteristics<sup>2</sup> to include a high degree of political visibility : their citizens (at least influential segments of them) reflect their desires for improvement of their socioeconomic condition in intense and often radical political activism, and their governmental leaders are equally active in their insistence on international acceptance of their political objectives and, frequently, of international responsibility for solving their problems.

Commonly there are four features in less developed countries :

1. A deep and widening gap between the actual standard of living and the conscious aspirations of the people.

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<sup>2</sup>See Technology and International Relation, by John V. Granger, W.H. Freeman and Company, San Fransisco, 1979, page 92 - 95.

2. A narrow economic base. Their societies and economies are, for the most part, static, predominantly agricultural, and dependent for foreign currency earnings on the export of one or two staple commodities, sometimes augmented with simple manufactured goods that cannot command a high profitability.
3. A chronic shortage of indigeneous investment capital.
4. These three factors are reinforced by a low level of general education and technical training, a shortage of entrepreneurs, and a general lack of economically exploitable skills.

#### A. RESEARCH QUESTIONS

With this abbreviated background of the subject of this thesis it is appropriate to detail more specifically the particular questions which the thesis will address.

The role of the computer as a tool can improve the development of the Indonesian society, but it cannot be separated from its background. Therefore :

1. What is the psycho-sociological background of the Indonesian people ?

Certainly, the psycho-sociological background of nations will affect their opinions according to the arrival of technology. Can it be helpful in using the new technology ?

2. What perceptions do Indonesians have of the development of the new technology ?

This thesis, will try to examine the first question and the correlation between the psycho-sociological background to these perceptions. However, this thesis will also deal with the informational-society and its characteristics.

3. What are the effects of computer upon the social-life of the Indonesian people ?

This thesis will also observe implicitly a number of problems involved with computers and its effects on the society.

#### B. SCOPE OF THE STUDY

The scope of this study is chronologically limited to the time frame 1965 through 1984. The early boundary is established by the first arrival of computer in the Indonesian society. The closing year is established because of the survey which has been done to poll opinions and perceptions of the new computer technology.

#### C. PURPOSE AND ORGANIZATION OF STUDY :

This thesis also has a purpose of tracing the development of computer technology through early implementation, showing where possible the major problems and indicating how they can be overcome.

This study is organized in such a manner as to flow from the conceptual to the specific. After the presentation of necessary background material in Chapter II greater specification occurs in Chapter III in dealing with the social structure, its psychological background, and its relationship to the perceptions in receiving the new computer technology. Chapter IV deals with the problem analysis using statistical approaches and factor analysis. Chapter V predicts the impact of computer technology in Indonesia in the future. Chapter VI includes the conclusion and recommendations. This study relies heavily on the research/survey that has been done by the authors in Indonesia.



#### D. SUMMARY

This study will present some suggestions in order to solve the problems which are caused by the arrival of the new computer technology, concerning with the research questions above.

## II. PSYCHOLOGICAL AND SOCIOLOGICAL BACKGROUND OF THE INDONESIAN PEOPLE.

The attitude and characteristics of the Indonesian people can be better understood from a psychological and sociological background.

### A. PSYCHOLOGICAL BACKGROUND

#### 1. Early Historic of Indonesia.

From the earliest historical times the archipelago nation of Indonesia has been a strategic passage between two oceans - the Pacific and the Indian - and a link between two continents - Asia and Australia.

The ancestors of the Indonesians came from continental Southeast Asia, namely Champa, Cochin China and Khmer. Initially, our ancestors lived in an archaic society. But in the 7th century when Sriwijaya had declined, a new empire arose comprising also the whole territory of Indonesia, namely the Empire of Majapahit.

This Empire became the most powerful Hindu Kingdom ever known in Indonesia under the reign of Raja Hayam Wuruk. He appointed his successful prime minister, Gadjah Mada, who succeeded in gradually uniting the whole Indonesian archipelago under the name "Dwipantara". During that golden period many literary works were produced such as "Nagara Krtagama" by the famous author, Prapancha (1335 - 1380) in which some parts described the diplomatic and economic ties with the existing South-East Asian countries like Burma, Thailand, Tonkin, Annam, Cambodia and even with India and China.

## 2. The Islamic Religion.

Gujarati and Persian merchants who embraced the Islam religion started to visit Indonesia in the 13th century and established trade links with Persia and India. Along with the trade, they also propagated the Islam religion among the Indonesian Hindus, particularly in the coastal areas of Java, such as in Demak. At a later stage they succeeded in influencing and even converting Hindu ruling Rajas to Islam.

The Hindu Raja of the Kingdom of Demak was the first in Java who was converted to Islam. It was this Islam Sultan who later further spread Islam west of Demak in Cirebon up to Banten and then eastwards along the northern coast of Java to the Kingdom of Gresik and ultimately caused the downfall of the mighty Hindu Kingdom of Majapahit<sup>3</sup> (1513 - 1520).

After the subjugation of Majapahit by Islam rulers, Islam spread further east of the island of Java and established the Bone and Goa Sultanates in Sulawesi, and further east to the northern part of Moluccas (Maluku) where the Sultanates of Ternate and Tidore were established.

North of Java, Islam spread to Banjarmasin in Borneo and further west on the island of Sumatra and converted Palembang, Minangkabau (West Sumatra), Pasai and Perlak to Islam. Meanwhile, Majapahit aristocratic descendants, religious scholars and Hindu Khsatriyas retreated through the East Java peninsula of Blambangan further eastwards to the island of Bali and Lombok. However, in later periods the eastern part of the island of Lombok was converted to Islam which infiltrated the island from Makassar in South Sulawesi.

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<sup>3</sup>INDONESIA, An official handbook - by Department of Information, Jakarta, 1984.

The capital of the Hindu Kingdom of Pajajaran in West Java was Sunda Kelapa (1300 A.D.) which was situated at present Capital of the Republic of Indonesia, Jakarta. This capital of the Sunda Kelapa Kingdom was conquered by an Islamic General, Falatehan of the Sultanate of Demak in 1527, and has since renamed it Jaya-Krta meaning "the city of Victory". Besides conquering Sunda Kelapa, General Falatehan succeeded also to defeat the Portuguese who attempted to conquer mentioned city.

### 3. The Western and Japanese Imperialism

In the 15th century the great Empire began to disintegrate into several kingdoms, and this process was followed by the arrival of western imperialism which was the beginning of the prenational period of decline. These small Indonesian kingdoms tried to resist the onslaught of western imperialism. Well known are the names of Fatahillah or Sunan Gunung Jati who defeated the Portuguese flotilla in the Jakarta bay, Sultan Baabullah who ejected the Portuguese from Ternate, Sultan Iskandar Muda to avert the Portuguese threat against Aceh and also Sultan Hasanuddin of Makassar, Sultan Agung Tirtayasa of Banten and Sultan Nuku of Tidore, who all tried expel the Dutch from their kingdoms.

It so happened that their resistance was futile : in the end the whole of Indonesia was conquered by western imperialism, especially Dutch imperialism. The greater part of Indonesian territory was physically occupied by the Dutch. But the struggle of the Indonesian people continued.

Since the middle 18th century, revolts broke out against Dutch power, led by leaders with various backgrounds : nobility, Moslem theologians and others. All their efforts failed, not because the Indonesians were less courageous, but owing to various causes which can be brought together under one category, namely the lack of "modernity" compared to the Western nations.

The Dutch colonial government's efforts to fill their needs for skilled and trained labour for their enterprises had provided for education for the Indonesians from the elementary up to the University level. Through this western education, western modernism entered Indonesian society and within a short period an elite group was formed who had modern nationalist aspirations and were acquainted with modern methods. It was this modern western educated Indonesian elite which was later to establish and guide the Nationalist Movement to forge national unity and achieve national independence.

During World War II, Indonesia was occupied by the Imperial Japanese forces, and the Indonesian Nationalist Movement faced a new situation. Having to face the militarist-fascist Japanese regime, the most prominent leaders of the Nationalist Movement under the leadership of Sukarno and Hatta cooperated with the Japanese. The Dutch later were to call them collaborators, which was quite a wrong notion, because the Indonesian nationalist leaders could not very well be expected to be loyal to Dutch colonialists. Had not the Dutch colonialists surrendered unconditionally to the Japanese and in so doing handed over the Indonesian people as a piece of inventory to the Japanese militarist-fascist regime to be subjected to their cruelty?

Indonesian national interest demanded cooperation with the Japanese to prepare the people for independence which had been anticipated to arrive at the end of World War II. In the end, the young generation saw that the Japanese no longer had any power and authority since the capitulation of their government in Tokyo. So, the proclamation of Indonesia independence was done completely free of any ties with the Japanese military government and was the culmination of the Indonesian Nationalist Movement.

The Proclamation was announced on the 17th of August 1945, and the following day the Constitution of the Republic of Indonesia which was thereafter known as the 1945 Constitution had been declared.

Indonesia become independent and the time had arrived when the whole Indonesian people must defend this Independence from the encroachments of the Dutch colonialists. And so the first stage of the National struggle had begun, namely War of Independence.

#### 4. To Establish and Maintain the Independence

Although within 6 weeks after the Proclamation the red and white flag of the Republic was flying atop all public buildings in Java, it was not easy to prevent and maintain the freedom from the outside needs.

At the end of September 1945 the British forces<sup>4</sup> under the Allied Forces Netherlands East Indies Command (AFNES) began to land. They brought with them elements of the Netherlands East Indies Civil Administration (NICA) which was to re-establish a colonial regime in Indonesia. Besides, they also the surrendering Japanese forces to fight the forces of the Republic. So, armed clashes occurred everywhere as the result of a conflict of opinion on who had the "de jure" authority in Indonesia, the Indonesians or the Dutch.

Therefore the Indonesian Army which was formed immediately after the Proclamation, had to confront three armed forces simultaneously, e.g. the Japanese, the British and the Dutch forces. The severest encounter to be known through the world was the Battle of Surabaya, where the inexperienced Indonesians had to fight one veteran British division

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<sup>4</sup>The National Struggle and the Armed Forces in Indonesia -by Brig.Gen. Nugroho Notosusanto, Director, Centre for Armed Forces History - 2nd revised edition, Department of Defence & Security, Jakarta, 1980

reinforced with one brigade. The Battle of Surabaya had very large implications. Because of it Indonesian independence became an international issue and hit the headlines all over the world. Domestically the Battle of Surabaya convinced the whole people of our defense capabilities to confront whoever wants to violate our sovereignty as an independent nation.

After the Battle of Surabaya and several other battles had raged all over the country down till its remotest corners, the national leadership continued its policy and strategy of diplomacy with the backing of an armed force. The objectives of the diplomatic struggle was the "de facto" recognition of the Republic of Indonesia.

There were two famous agreements during the War of Independence which try to make peace between Indonesian government and Dutch. First, Linggajati agreement's draft on November 15th 1946 was ready to be initialized. The essentials of this agreement to include :

- a. The Dutch recognize the "de facto" existence of the Republic of Indonesia with a territory comprising the islands of Sumatra, Java and Madura.
- b. The Republic and the Dutch will cooperate in the efforts to form the Republic of the United States of Indonesia of which later on the Republic will only be a part.
- c. Between the future Republic of the United States of Indonesia and the Kingdom of the Netherlands will be formed an Indonesia-Dutch Union with the Dutch Queen as its chairman.

It looked like the diplomatic policy had met with success, but that was not so in reality. Especially the Dutch still adhered steadfastly to their objectives and aim; the objectives of consolidating their position and their aim to reconquer Indonesia. After feeling themselves strong enough, they considered the time had arrived to unmask

themselves and attack the regions under the control of the Republic of Indonesia.

Under the pretense that the Republic had given its own interpretation to the Linggajati Agreement, the Dutch gave an ultimatum: if until July 20th 1947 the Republic had not concurred with their interpretation of Linggajati (which among others would mean the entering of Dutch forces into the territory of the Republic under the cloak of the joint gendarmerie), then the Dutch would not feel themselves bound any longer to every existing agreement.

The Government of the Republic did not want to submit itself to intimidation, and rejected the ultimatum. According to this rejection, on July 21st 1947 at 00.00 hours the Dutch army launched its first military action against the Republic of Indonesia. They succeeded in breaking through the lines of the Indonesian National Army (TNI), but they were unable to destroy these forces who were still within the territory officially occupied by them; there they formed so called "isolated" pockets of resistance<sup>5</sup>

According to this large-scale attack of the Dutch, the Indonesian case burst upon the International forum, now even more violent than during the Battle of Surabaya. India and Australia raised their voice at the United Nations and tried to return the Dutch army to its base-line by a resolution of the Security Council.

Second, the Renville Agreement was assigned on January 17th 1948, the Republic acknowledged the van Mook line (i.e. the imaginary line connecting the foremost tips of the Dutch columns, which was considered the borderline between Republican and Dutch occupied territory by the

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<sup>5</sup>The National Struggle and the Armed Forces in Indonesia -by Brig.Gen. Nugroho Notokusanto, Director, Centre for Armed Forces History, Department of Defence & Security, Jakarta, 1980.



Dutch).

As a consequence thereof, the TNI units in the "isolated" pockets behind the Dutch lines had to be withdrawn. Further on, the main points of the Linggajati agreement were once more adopted, among other things about formation of the Republic of the United States of Indonesia, in which the Republic will only be one of its parts.

After the Renville agreement was signed, van Mook continued to form marionette states which was later joined into a marionette-federation.

Meanwhile the remaining Republican territory, which was now very small indeed, was blockaded effectively, so that the economy of the Republic deteriorated very critically.

Several wars still could not break the unity of the Indonesian people, so the United Nations acted and the Dutch were compelled to enter into negotiations with the Republic. The Roem-Royen Agreement was reached, followed by the Round Table Conference resulting the Hague Agreement, based on this agreement, on December 27th 1949, the so-called "Transfer of Sovereignty" was carried out, which we consider as the recognition by the Dutch of Indonesian sovereignty over Indonesia comprising the whole area of the former Netherlands East Indies, except Irian Jaya.

The War of Independence had ended and a new period had arrived. Without any foreign aid in the form of arms or troops, the Indonesian people had won their independence. But they had to pay a terrible price: every corner of the country revealed the graves of hundreds of thousands of their heroes.

After this War of Independence, the Indonesian faced several problems to maintain the freedom. Several changes in the governmental system had occurred. Several crises of the Parliamentary system had been solved. The culmination of the

problem was caused by the Communist rebellion in September 1965. It was a bitter experience in Indonesian history. This rebellion was handled successfully in a short time by the armed forces and all of the political and economical conditions were established.

Problem after problem was solved and now Indonesia could direct the full force of its considerable talents and natural resources against the real enemies - technological dualism, regional disintegration, economic instability, and poverty in order to find its own national identity.

The Indonesian national identity is to be sought in the traditional culture - the songs, the dance, the "wayang" (leather puppet plays), the literature - the goal must be "a just and prosperous society based on the Panca Sila<sup>6</sup>" the five fold of the Indonesian social and political philosophy: Belief in the One God, A just and civilized humanity, Indonesian Unity, Populism guided by wisdom in consultation and representation, and Social Justice for the whole Indonesian people.

## B. SOCIAL FRAMEWORK

### 1. Ethnic Groups

Several social conditions affect the way of life of the Indonesian nations. Due to Indonesian's emergence into an archipelago, where its inhabitants, though of one similar ancestry, were separated by seas and there lost contacts, the individual development of cultures, including their languages and their growing into diversifications took place.

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<sup>6</sup>The National Struggle and the Armed Forces in Indonesia - by Brig.Gen. Nugroho Notosusanto, Director, Centre for Armed Forces History - 2nd revised edition, Department of Defence and Security - 1980.

The population of Indonesian has been reclassified on the basis of linguistic identities caused by diversifications above, into four ethnic groups. These are : the Melanesians (mixture between Sub-Mongoloids with the Wajaks) several subdivisions from this ethnic groups to cover Acehnese of North Sumatra, Bataks in North-East Sumatra, the Sundanese and Javanese on the Java island, etc. The Polynesians and Proto-Austronesians to include the Ambonese on the group of the islands in the Moluccas and the Irianese in Irian Jaya; the Micronesians are found on tiny islets of Indonesia's eastern borders.

## 2. Lingua Franca

The Indonesia's National Language "BAHASA INDONESIA" has been officially introduced since Indonesia's independence. Its lexicon and structure are mainly based on the Malay language enriched by Indonesia's lexicon of the multi-local languages and dialects such as Acehnese local language, Batak, Javanese, Ambonese and several Irianese languages and other such languages.

The local languages are equally valid and no attempt and intension exists to abolish these local languages and dialects. Therefore, the greater part of the Indonesian nationals are bilingual.

In August 1973 the cultural agreement had been signed by Indonesia and Malaysia in which similar spelling of both the Malaysian "Bahasa Persatuan" and the Indonesian "Bahasa Indonesia" have been agreed upon.

## 3. Economic and Social Pattern

The Indonesian people who made up the Indonesian nation are pluralistic and consist of a blend of multi-ethnic as well as racial entities, each with its own cultural heritage and socio-cultural manifestations. These

entities are being held together by political, economic and defence efforts. There is a dream of creating unity without eliminating or disregarding the mini cultures of millions of Indonesians seeking a place of dignity in their nation.

The economic and social pattern of Indonesia's society is variable in that, those living on the Mentawai islands west of Sumatra and in North Irian Jaya with its isolated villages are oriented towards agriculture. The social structure in those villages has not yet developed into a significant stratification. A few of those village communities are oriented towards obtaining employment in the cities. Communities which are very much oriented towards employment opportunities particularly to become civil servants besides farming are found on the island of Nias west of Sumatra, in the Batak region in North Sumatra, etc.

Rural communities having a more developed stratification in their social structure and with farming as their main source of living, and having a variety of other activities and earning patterns, are found in the regions of Aceh, in North Sumatra, among the Minangkabaus in West Sumatra and around Ujungpandang in South Sulawesi.

Communities on the island of Java are oriented towards farming, particularly in the growing of rice on dry as well as wet land. Rice is the main staple of the population. Besides farming, these communities have a variety of other activities and earnings which are complex in nature and with differentiation in social stratification and partly oriented towards employment in big cities as civil servants and other jobs in the private sector. This type of social pattern is also found on the island of Bali.

The type of community at district levels and in district towns is engaged in trade and undeveloped industries. This type of social pattern is common in almost all district towns and big cities spread over the whole of the country.

Indonesian communities with a metropolitan type of orientation have developed their activities and earnings in the field of trade and industry to a significant degree. These communities are found in the big cities, Jakarta, Bandung, Semarang, Yogyakarta, Surabaya, Medan, etc.

Based on this classification of the socio-economical pattern in many of Indonesia's regions a conclusion can be drawn that the common socio-economic pattern of the Indonesian people is agriculture-oriented.

Before Indonesia's independence, the rural society was in a poverty-stricken condition and had never enjoyed the becoming economic development of the colonial regime.

Only after Indonesia achieved independence in 1945 could Indonesia start with economic development. After the Communist Rebellion in 1965 was defeated it was this New Order Government which started with economic development through the Five-Year Development Plans launched in 1969. The principle of the plan was to develop the Indonesian economy to a maximum level in all regions of the country.

Meanwhile, in the period of 1980, Indonesia registered a labour force of 48.4 million persons.

The Table 1 will figure the estimates of the labour force employed<sup>7</sup> in the various development sectors.

#### 4. Adat and Gotong Royong

One of the most important traits of the people of Indonesia is Gotong Royong or Mutual Assistance as it practised in Indonesian social life.

From time immemorial the harvesting of the rice in villages is done in gotong-royong (work hand-in-hand) fashion by all the members of a village community, in which

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<sup>7</sup>Indonesia, Official Handbook - Department of Information, Jakarta 1984.

TABLE 1  
The Estimate Labour Forces

Sectors	# of labours
Agriculture	28,040,462 persons
Services & other fields	7,786,558 persons
Trade	6,611,397 persons
Industries	4,360,657 persons
Civil engineering	1,573,142 persons
Transp & Communications	1,467,771 persons
Mining	369,282 persons
Banking	231,935 persons
Electrical engineering	84,684 persons

they assist each other. It applies also to the planting of rice, the building of houses, the construction and repairs of irrigation canals etc., and likewise to wedding and other festivities.

This second cooperation system among village communities has been handed down for centuries from ancestors to posterity as a cultural inheritance, as an "Adat" or tradition. Various expression of "Adat" have later been codified into the Adat Law or Customary Law of Indonesia which during the colonial period was kept intact by the Dutch colonial rulers. Certain provisions of the Adat Law vary in the different regions of the country according to the local traditions and cultural patterns. It stands to reason therefore, that Indonesia's Coat of Arms is inscribed with the motto "Bhinneka Tunggal Ika", meaning Unity in Diversity.

#### 5. Decision Making Process

There are two types of decision making processes which are interrelated with each other. These are Musyawarah (deliberation) and Mufakat (consensus). This

process of decision making is rooted and influenced by the Indonesian social life. It formulates in every situation in which public opinion is needed. It also means a deliberation to reach a consensus.

As 70 % of the Indonesian nation lives in rural areas, this democratic system of deliberation to reach a consensus in decision making is also applied to deliberations conducted in the political institutions like PCA - the People's Consultative Assembly (MPR), DPR - the House of People's Representative (DPR), the Cabinet as well as in the SAC - the Supreme Advisory Council (DPA).

Voting is conducted only when no consensus could be reached. Throughout Indonesia's history, decision in villages regarding land ownership, exploitation of water resources and forest produce, etc. were decided by village heads through "musyawarah" to reach a consensus or "mufakat".

Each member of a village community is entitled to participate in such deliberations, reasonable solutions in cases of conflicts are sought. The spirit of conciliation, called "Pukun" in Indonesia is another apparent trait of Indonesian culture. We should maintain "Rukun" (tolerance) in all matters of controversies are sought without leaving resentments or grudges to either of the parties involved.

Equal rights for women have always been upheld in rural societies since Indonesians regarded them as full fledged participants in cultural and later in civilized communities.

## 6. Customs and Traditions

The Indonesia's social structure is largely determined by a pattern of widely separated agro communities, each possessing a high degree of autonomy.

A large body of customs and traditions ("Adat") has developed in Indonesia which in the course of history has been codified into written and unwritten customary laws or "Adat Laws".

This body of customary laws regulates ownership rights and disposition of properties, inheritance rights, marriages, family relationships and pedigrees in village communities.

Certain provisions of this legal system, such as inheritance rights vary in the different regions and islands of Indonesia.

With the Hindu's arrival some alterations were made and adjusted to those traits of the law related to religious sanctions. Also, later with the introduction of Islam and universally recognized principles of Western European laws additions were made to the basic principles of Indonesia's "Adat" laws which were modified.

However, the "Adat" law is still important in the common life and even in the modern political, cultural, economic life of the Indonesians today. And "Adat" laws are still applicable in cases of marriages, irrigation and the use of communal land in rural areas where members of village communities, under certain prescribed conditions are subtitled to use communal land to be tilled, particularly by those who have been elected by the village community as village head or "Lurah", and by his village administration subordinates.

### C. SUMMARY

From those psychological and sociological background, we can derive several characteristics of the Indonesian people such as:



1. Several influences to the people's attitudes come from the Hindu, Buddhist and Islamic religions.
2. Deprivation existed in the early life of Indonesia. For example, a tough experience existed during the Western Colonialism for 350 years and Japanese occupation for 3.5 years.
3. Several problems have been faced by the people in order to establish as a strong nation, especially political, social and economic problems.
4. The traditions which will affect the people's perception in receiving the new technology such as computers, include "Adat" law, social decision making processes "Musyawarah" and "Mufakat".
5. Unity in Diversity is a symbol of the Coat of Arms, it means whether the nations are spread into several islands but we have one nation, one national language "Bahasa Indonesia", and one national flag "Red & White".

### III. DIFFERENT PERCEPTION IN RECEIVING THE NEW COMPUTER TECHNOLOGY

Different perceptions are influenced by many factors. Ultimately, the work of small and large organizations is done by the people. Some of this work is done directly, and some is done with the aid of machines. As an example, the attitudes and abilities of people who work with computers are critical factors in their successful introduction.

A successful computer system must also be a successful human enterprise. This requires that human factors be considered in the planning and operation of computing systems.

The introduction of computers affects the content of jobs at each level of an organization. This is the major way in which computers affect people.

The abilities and attitudes of people can enhance or inhibit the performance of a computer system either directly by inhibiting the efficiency of a computer or indirectly by limiting the effectiveness of the computer's role in the organization's work.

#### **A. IMPACT OF COMPUTERS ON EMPLOYEES**

There are many studies that examine the effects of computers on the content of jobs.

As in the case of studies on the impact of computers upon organizations, most of these studies were conducted in the 1960s and 1970s, and therefore most of the findings apply generally to large computers in big organizations.

When the findings clearly do not apply for small systems in the 1980s, alternative patterns of impact are suggested.

Generally the findings relate to three distinct levels of workers :

- the line or support workers
- the middle managers, and
- the top executive.

The research suggests that the introduction of computers affects these groups of employees in different ways.

The findings can be summarized in seven general categories, looking first to the line-level employees and working up the chain of authority.

### 1. Routinization of Line Work

The introduction of computers during the 1960s and 1970s, tended to make clerical, support and line work more routine.

Whistler [Ref. 2] reported that early applications of computers, which focused heavily upon the work of clerks, have tended to increase central control and discipline with respect to procedures and time deadlines.

Klahr and Leavitt as cited by Myers [Ref. 2] distinguished between object processing employees and information processing employees, suggesting that the computer tends to control the object processing functions, whereas the employee controls the information processing tasks.

Stewart [Ref. 2] indicates how the line staff resistance may occur as work becomes more monotonous and minutely demanding .

However, each of these tendencies may not be due to the computer itself, but rather to the way in which it is implemented.

An alternative pattern of impact may be occurring during the 1980s.

Computers are becoming more decentralized and less subject to central organizational control. Programs are

written to be more flexible, responsive, and tolerant of errors and variations of approaches to operation.

Father than improving inflexible task routines on terminal operators, new computers may make less work, but make work more dull and repetitive.

The most boring aspects of line jobs are increasingly automated, so that what remains are those tasks that are challenging and variable.

For example, an automated office system may reduce the amount of draft typing and retyping done by secretaries, leaving them more time to become involved in administrative and management tasks.

## 2. Changes in Line Skills

The introduction of computers during the 1960s and 1970s, tended to be followed by a decline in the average skill levels of line staff.

The reason for this observation is not that worker skills declined, but that the level of skills required declined, since the computer determines much of what was to be done.

Whistler [Ref. 2] found that actual skill classification of employees for a given function were lower following computerization than before. However, he recognized that an opposite effect could be supported by other studies i.e., that:

Computers could call upon the line employees to possess higher levels of skills.

Karloff and Lee [Ref. 2] stress the importance of training line employees in the use of the system and imply that their actual level of skill will depend upon the exact nature of the system and the nature of the training provided.

This pattern of impact is probably less likely during 1980s.

While recent computer systems and applications programs are not extremely difficult to use, proficient use often requires some training and some experience.

Use of a program that aids decision making and report development, such as spreadsheet calculations software, may encourage an employee to learn more about his or her job.

### 3. Decreased Interpersonal Communication

The introduction of computers has been associated with a decline in interpersonal communication. In studies of this effect employees with computers spent more time working alone and less time interacting with other workers or with supervisors [Ref. 2].

Whistler [Ref. 2] in a study of 15 companies implementing computer systems, noted that the greatest decline in interpersonal communications was among lower level workers.

A compounding factor in the work place is that the computer often makes it possible to complete a work task without much help from others.

No longer must one go down the hall to fetch records maintained by other employees. The computer fetches them in seconds from a disk.

No longer must one work with a team of several clerks to develop a report that includes some complicated calculations. The computer can make the calculations in seconds.

The special emphasis upon human relations in management is probably even more important in a working environment that is heavily computerized.

#### 4. Increased Middle Management Process Responsibility

Computer use has lead to an increase in the middle management process or work load responsibility, and a decrease in responsibility for employees. As a function is computerized, more work is often possible with a given number of employees. As a result, the level of a work flow that is the responsibility of a middle manager can increase, while the number of employees doing the work can decrease or remain constant.

The manager's role therefore can involve more attention to the work itself and less time and attention directed to the employees.

However, the importance of the supervisor's role as an employee supervisor probably increases even though the numbers of employees supervised decreases.

This is due to the greater work load of each remaining worker and also to the greater need for communication.

#### 5. Changes in Middle Management Skills

Middle management skills may decline, according to several studies, with the introduction of computer systems.

As in the case with lower level employees this is not due to a decline in skills themselves, but rather it is due to a change in the skills required of people in the middle management role.

Deardon as cited by Myers [Ref. 2] observes that middle managers spend less time following computerization on such logistical problems as scheduling and ordering.

Such a skill would be obsolete when the function is performed by a computer.

Whistler [Ref. 2] suggests that higher skill levels may be needed during planning and implementation of a

computer system, but that lower skill levels would be needed once the system is in operation.

This effect may be likely when a larger system is introduced that automates a work process so that much of the complicated work is done by a computer and not by the employees.

However, small computers introduced into smaller organizations may demand broader middle management skills.

A computer is likely to be used in several operations, and much of the implementation (using the off-the-shelf programs and equipment) is likely to be a direct responsibility of a supervisor, rather than the responsibility of a consultant or data processing specialist.

Add to this the human relations challenges of the computerized work environment, and a picture emerges of a middle manager who must have the old skills of task management as well as improved skills in computer management and human relations.

#### 6. Decreased Middle Management Discretion and Authority

Implementation of a computer system may lead to decreased middle management discretion and authority, and increased procedural control at the upper levels of the organization.

Deardon as cited by Myers [Ref. 2] argues that the centralization of logistical functions will decrease the authority of the middle manager. Decreased middle management authority is a likely impact of a large computer system, which permits exacting control over field operations by a control staff.

However, the newer and smaller computers introduced during the 1980s are less frequently deployed in such a hierarchical fashion.

Instead they are deployed locally, under the control of a few local employees. The middle manager equipped with a computer may be capable of studies and operations that previously could be done only with control office resources.

#### 7. Top Management Opportunities and Skills

The demand for greater skill levels in top management may increase as a result of computerization.

Whistler [Ref. 2] suggests that managerial jobs will develop higher and higher proportions of research content.

In addition, he expects a greater level of involvement by the top managers in operational decisions formerly delegated to the middle managers.

The deeper involvement in operations, in addition to other top-management responsibilities, would require greater competence.

The computer may also increase the degree to which top management jobs include creative or unstructured effort.

Klahr and Leavitt, as cited by Myers [Ref. 2] suggests that executive jobs that involve processing, assessing, and acting upon information will be creatively extended and augmented by the computer.

The increased use of computers, both large and small, will continue to demand that top management be informed and actively involved with computers at all levels of an organizations.

The inevitable introductions into the work place of small computers and automated office system will demand that top managers understand radically different concepts and approaches to the computer usage.

Central control of computing, and the extensive network of terminals dependent upon a central mainframe computer, will continue. But small computer systems,



controlled locally and often individually can change many patterns of management.

A candid assessment of all these expected impacts of computers upon employees and users suggests that all levels of employees, from top management to the line employee, can be positively affected as computers are introduced.

However, middle managements and line jobs can also be eliminated or reordered into more routine, monotonous, disciplined, and constrained activities by the computers.

This is not the desirable outcome, and it may inhibit the overall value to management of a computer system.

Most studies have suggested, however, that most of the adverse impact of computer implementation is not unavoidable.

Furthermore, many adverse effects may arise only in the traditional large scale implementation and may not occur at all with smaller, more flexible system.

## B. CONDITIONS OF THE COMPUTER DEVELOPMENT IN INDONESIA

Technology created many of our urban problems and so it is altogether fitting to use technology to help solving our problems. Technology spawned the industrial revolution, but led to city growth and urban problems. Technology brought us 60 years of dramatic progress in transportation, but has doubled the time it takes us to go across town.

Technology gives us modern heating, lighting, and power, but pollutes the air we breathe. And technology lures students to our graduate schools, but leaves millions of functional illiterates on the human discard cheap.

The newest technology, information technology, is aimed to help us manage our problems encountered in a better way. We are applying computers to improve public services

directly. In one important respect, the computer was invented just in time. Our society threatens to deteriorate into a mass society and abandon, unwillingly, some of our most cherished values concerning the role of the individual.

In a mass and complex society, it is the easy way-out for administrative bureaucrats to make sweeping rules and regulations for great masses and classes of people, and to ignore the many individuals who do not fit tidely into a precast bureaucratic mold.

The enlightened use of computers should make it unnecessary for public officials to tolerate bureaucratic lumping of various phenomena and of various groups.

The Procrustean bed of bureaucracy, by which all citizens, and all events are traditionally treated identically without flexibility and without regard to the individual ease, has been made obsolete by the computer, in principle at least. Unfortunately, computers too often are programmed to instill conformity rather than to accept diversity.

#### 1. Different Perceptions of People

Since the introduction of the first computer, the UNIVAC, by the Remington Rand Corporation in the midst of 1940 - 1950, so much progress has been achieved in this particular field. This led to a shift from a more important consideration other than "manual" versus "computer" issues.

The computer is no longer used only for data processing, but even more than that. Supported with the rapid improvement in telecommunication field, the computer is now directed toward office automation which involves the combination of data processing, word processing and communication technologies.

The arrival of this new technology, information technology, as an attempt of automating the office, will generate several impacts and reactions as a result.

Different perceptions in receiving this new technology might be expected. Top level management might react differently than the middle level management as well as the lower management. Even among the same level of management we might depict different perceptions.

All of these perceptions might be influenced by several factors, such as age and educational background. Knowing how far apart these different levels of management might perceive the arrival of this new technology will have an important impact on determining and forecasting what are the next steps to plan and execute in the attempt of supporting this automation.

## 2. Methodology

Surveys and questionnaires are the principal means of obtaining data on the use of computers and on the attitude about them.

When surveys are carefully designed and executed statistical tests can be applied to measure the significance of the results and estimate the confidence which can be attached to them.

To project computer development and speculate on their social effects, it is possible to apply, with appropriate reservations, some of the new technologies which are being used to forecast technological changes.

The fundamental role of statistics in business and government (including opinion surveys, forecasting, quality control) is well recognized. It has become an underlying methodology in all the social sciences as well as a principal tool in the experimental biological and physical sciences.

Computing and statistics interact in many ways, in testing the reliability and effectiveness and in surveying to determine attitudes about the uses and diserability of computers.

Questionnaires about computers are generated at an unending rate by an enormous number of commercial, rational, and international organizations. Questionnaires which elicit the attitudes toward computers needed in the attempt to gauge the social effects of computers and the acceptability of new system were used in this study.

#### IV. PROBLEM ANALYSIS

Before entering into the main discussion and the development of findings of the survey, the authors will try to describe several terms to be considered in the communication - innovation process.

##### A. INNOVATION

The computer has been spread out in the world, especially faster in the developed countries. And one might wonder how would its adoption of the new computer technology in Indonesia be considered as an innovation. For Indonesia, the computer is still a new technology and a sophisticated piece of equipment. The first arrival of computers in Indonesia will be discussed in Chapter V.

For Indonesia's condition, some organizations, private or governmental, have already used this new technology, but most are not familiar with it.

An innovation is an idea, practice, or object perceived as new by an individual<sup>8</sup>

In this case "new" in an innovative idea not only new knowledge, or even, "new to a situation". The idea of innovation should be separated from invention.

Not every innovation should be adopted immediately. Change agents are seeking, in this case, only to persuade the clients to be willing (and perhaps able) to adopt without long lasting commitment.

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<sup>8</sup>See Communication of Innovations - by Rogers E.M., the Free Press, 1971, page 19 -22.

The change agent functions as a communication link between two or more social systems.

This figure will try to give an understanding on how change agents provide linkage between a change agency and a

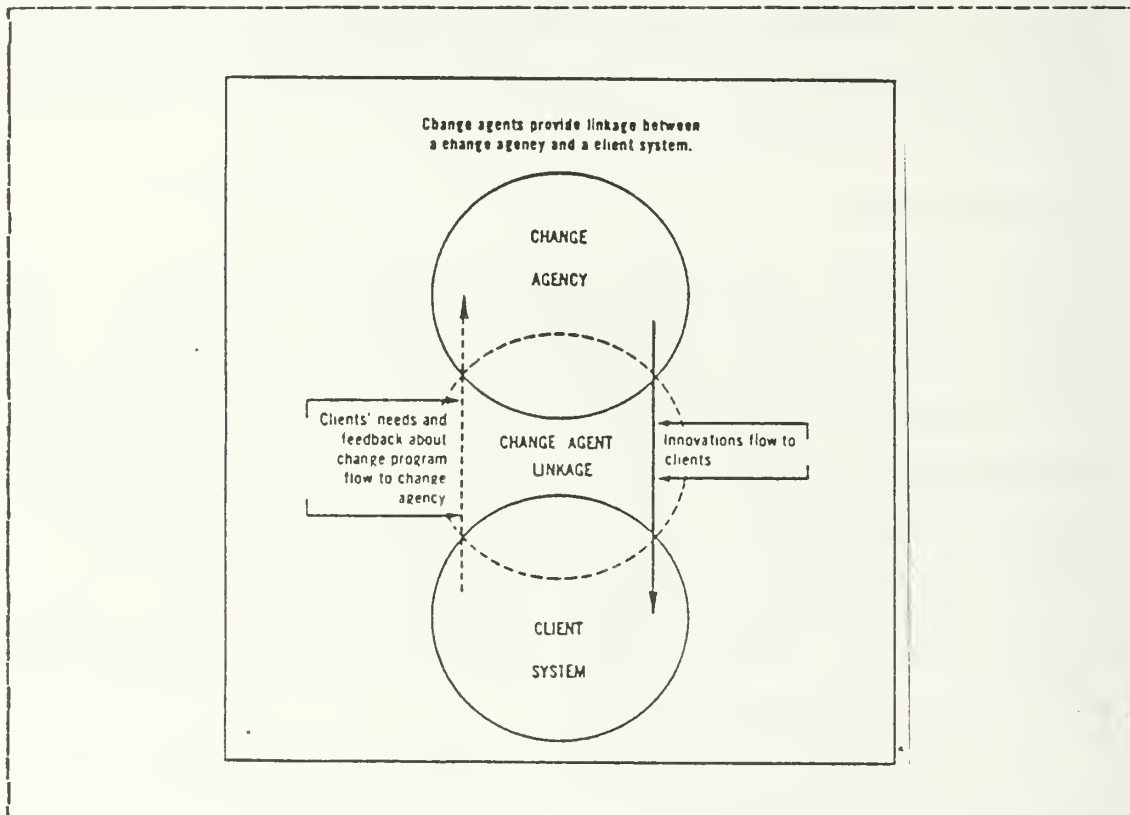


Figure 4.1 Linkage by Change Agent.

client system<sup>9</sup>

The change agent is very important, because he will influence innovation-decisions in a direction deemed desirable by a change agency. So, he will attempt to influence adoption decisions.

<sup>9</sup>Mentioned by Rogers E.M., Communications & Innovations, the Free Press, 1971, page 228 - 229).

The adoption process can be described as the mental process through which an individual/organization passes from first hearing about an innovation to final adoption. Innovativeness is the degree to which an individual is relatively early in adopting a new idea than the other members of the social system.

The suggestion for a general strategy of change can be derived and designed to fit the cultural values and the past experiences. A change agent's clients should perceive a need for an innovation before it can be successfully introduced. Change agents should be more concerned with improving their client's competence in evaluating new ideas and less with simply promoting innovations. Change agents should concentrate their efforts upon opinion leaders in the early stages of diffusion.

The social consequences of innovations should be anticipated and prevented if undesirable [Ref. 5, pp 254 - 282].

Using multiple correlation which is a statistical method, one can design a method of predicting innovativeness. This method factors a series of independent variables which are related to one dependent variable. It can explain a great deal of the variance in the dependent variable.

There is still another method for supporting the prediction of innovativeness, using a configurational approach, i.e. by dividing a sample of respondents into relatively homogeneous subsamples on the basis of each of several independent variables. Each of them is considered as a separate unit for analysis since it has a unique configuration of independent variables.

Rogers, mentioned the adopters classification<sup>10</sup> such as: innovators, early adopters, early majority, late majority and laggards (see Figure 4.2).

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<sup>10</sup>See Communication of Innovations, by Rogers E.M., the Free Press, 1971, page 180-188.

The short description of each classification to include that :

1. Innovator - Venturesome

Eager to try new ideas. This interest leads people out of a local circle of peers and into more cosmopolitan

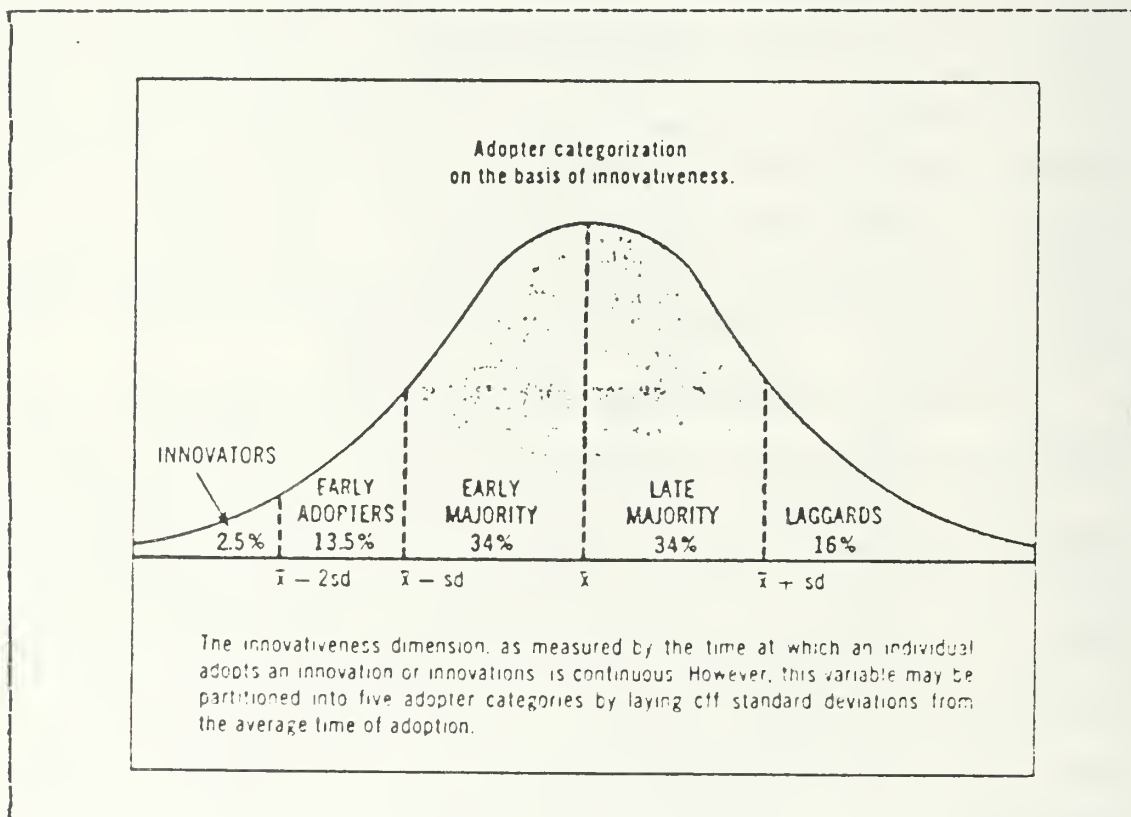


Figure 4.2 Adopters Categories.

social relationships. Communication patterns and friendships among a clique of innovators are common, even though the geographical distance between the innovators may be great.

The salient value of the innovator is venturesomeness. He desires the hazardous, the rash, the daring, and



the risky. The innovator also must be willing to accept an occasional setback when one of the new ideas he adopts proves unsuccessful.

## 2. Early Adopters - Respectable

Early adopters are a more integrated part of the local social system than are innovators. Whereas innovators are cosmopolites, early adapters are localites.

The early adpcter is considered by many as "the man to check with" before using a new idea.

## 3. Early majority - Deliberate

The early majority adopt new ideas just before the average members of a social system. They are positioned between the very early and the relatively late to adopt in the diffusion process.

## 4. Late majority - Skeptical

They adopt new ideas just after the average member of a social system.

## 5. Laggards - Traditional

They possess almost no opinion leadership. They are the mcst localite in their outlook of the adopter categories, many are near isolates. The point of reference for the laggard is the past [Ref. 5, pp 183 - 185].

## B. PROBLEMS DEFINITICN

There are two main problems which can be identified as : material and people. For the first, the material problem deals with the installation of the equipment and the set up of the facilities which will support this equipment as a physical change.

The second problem which is related to the people, requires effort to reduce opposition or resistance to the technological change, facilitating the process of learning the computer terminology, languages and the computer operations.

Here, we are limiting the discussion to the second problem with the goal to enhance a smooth, rapid change in human behavior with respect to the computer technology.

As mentioned by some authors about the adoption processes, the adoption of computer technology would be facilitated by the use of change agents. It might be internal or external to the organization. Thus the problem consists of selecting change agents and their assistants. In this case, it is necessary to find out the factors which will help to predict the best change agents and assistants. It also contains an establishing strategy for educating people about computer technology.

According to the limited resources, to get the maximum efforts and results, it is necessary to set up an order of priority for the best use of time and energy.

This problem analysis, will try to find the change agent as a professional who influences innovation decisions to the computer technology perception in Indonesia and to get the adopters classification in order to get the best strategy in achieving the goal to improve the people's perception.

### C. DATA COLLECTION

The degree of knowledge and familiarity with computers of the respondents were to be tested through a series of 10 questions covering the knowledge about computer influence in this country. The frequency of handling a computer is considered as important element of knowledge and, therefore, included in those 10 questions.

The needs for training for people or the organization in the use of computers, as perceived by respondents was also investigated.

A survey with three groups of questions was conducted by the author to the respondents, to get more supporting ideas and responses (see Appendix A).

300 questionnaires were sent to Indonesia to the several levels of age, education and positional background.

In total, eighty six percent of the target group responded.

To prepare for computer processing the data were coded as described in Appendix B. Data and information collected from questionnaire are analyzed in the next section.

#### D. ANALYSIS OF DATA

The data which has been collected was processed using the Statistical Analysis System (SAS) [Ref. 3] and the Statistical Packages for Social Sciences (SPSS) [Ref. 4].

Raw scores (coded as described in Appendix B) as well as standard or Z scores (converted from raw scores by using SPSS) were used in the process.

##### 1. Demographic Variables

The number of respondents can be broken down into age, education and their positions in the organization (see Table 2).

Figure 4.3 shows that mostly the low level managers were at the age between 20 - 35 years (31.6 %) and that about 68.4 % were at the age greater than 35 years.

In the middle manager level most were greater than 35 years (55.7 %), no people were at the age less than 20 years and age between 20 - 35 years was (14.3 %).

TABLE 2

## Number of Questionnaires Sent out &amp; Responses Received

Levels	# of responses	%
Ages :		
< 20 years	20	7.6
20 - 35 years	166	63.4
> 35 years	76	29
Total	262	100
Education :		
Junior HS	5	1.9
Senior HS	119	45.4
Academy	75	28.6
College/Univ	62	23.7
Cthers	1	.7
Total	262	100
Position :		
Ordinary Official	80	30.5
Section Leader	19	7.3
Chief of Bureau	21	8
Assistant Manager	22	8.4
Manager	8	3.1
Student	112	42.7
Total	262	100

Note :  
 Junior HS = Junior High School  
 Senior HS = Senior High School  
 College/Univ = College/University

The same case can be derived from the top level manager level which is mostly 68.2 % at the age greater than 35 years, no people were less than 20 years and about 31.8 % at the age were between 20 - 35 years.

The student position level was mostly 81.3 % between 20 - 35 years, and 16.9 % less than 20 years and not more than 1.7 % greater than 35 years.

Overall it is true that the change agents should be chosen from the people at the age between 20 - 35 years and

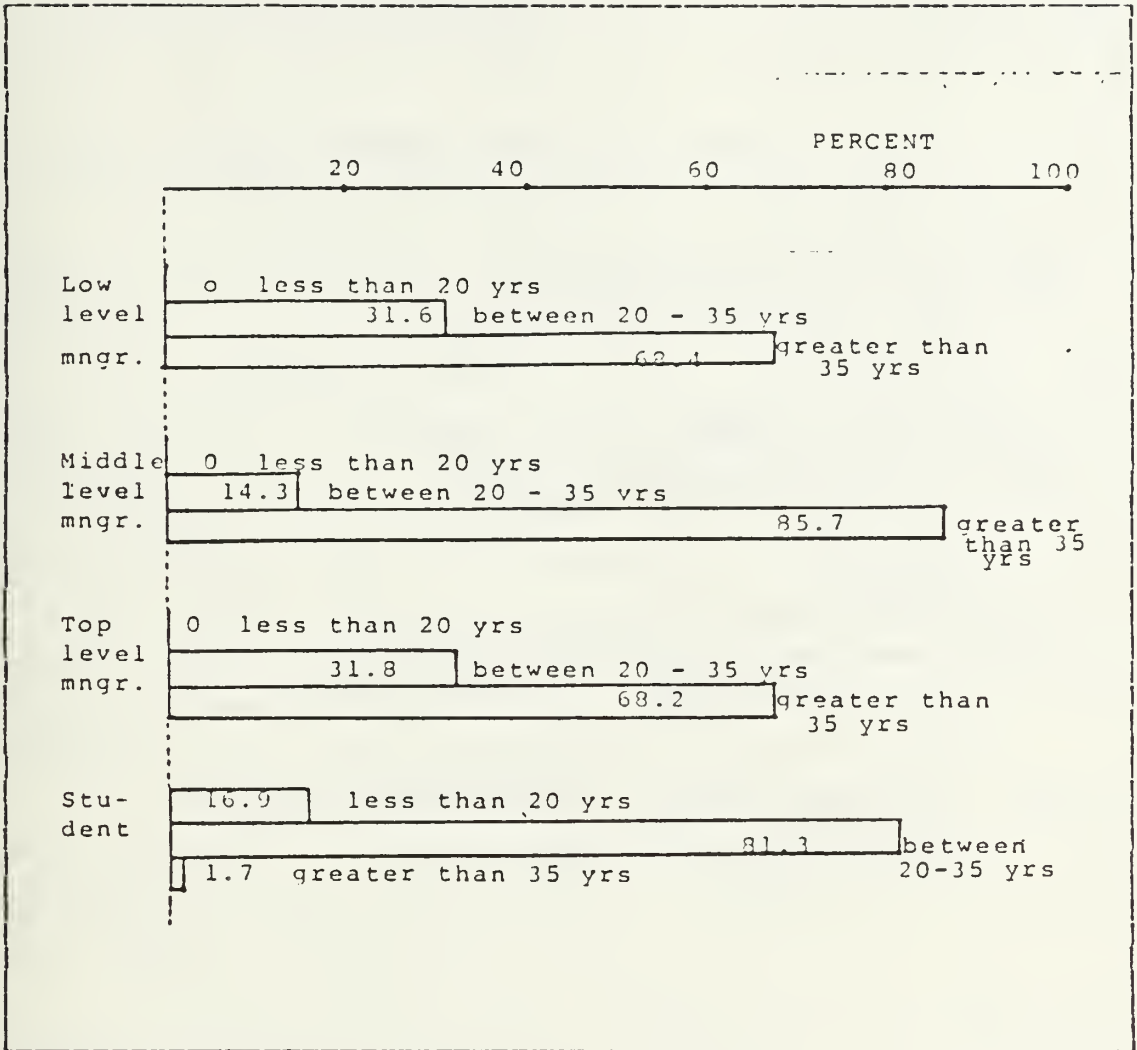


Figure 4.3 Positions vs Ages ( % ).

up, because mostly they are mature and have a credibility in the technological change.

From Figure 4.4 it can be generalized that at the low level manager, most have High School background (51.3 %); Academy (27.5 %) and College/University (21.2 %). For the middle level manager the highest educational background is Academy (42.8 %), the rest of the respondents have 38.1 % High School and 19.1 % College/University background. On

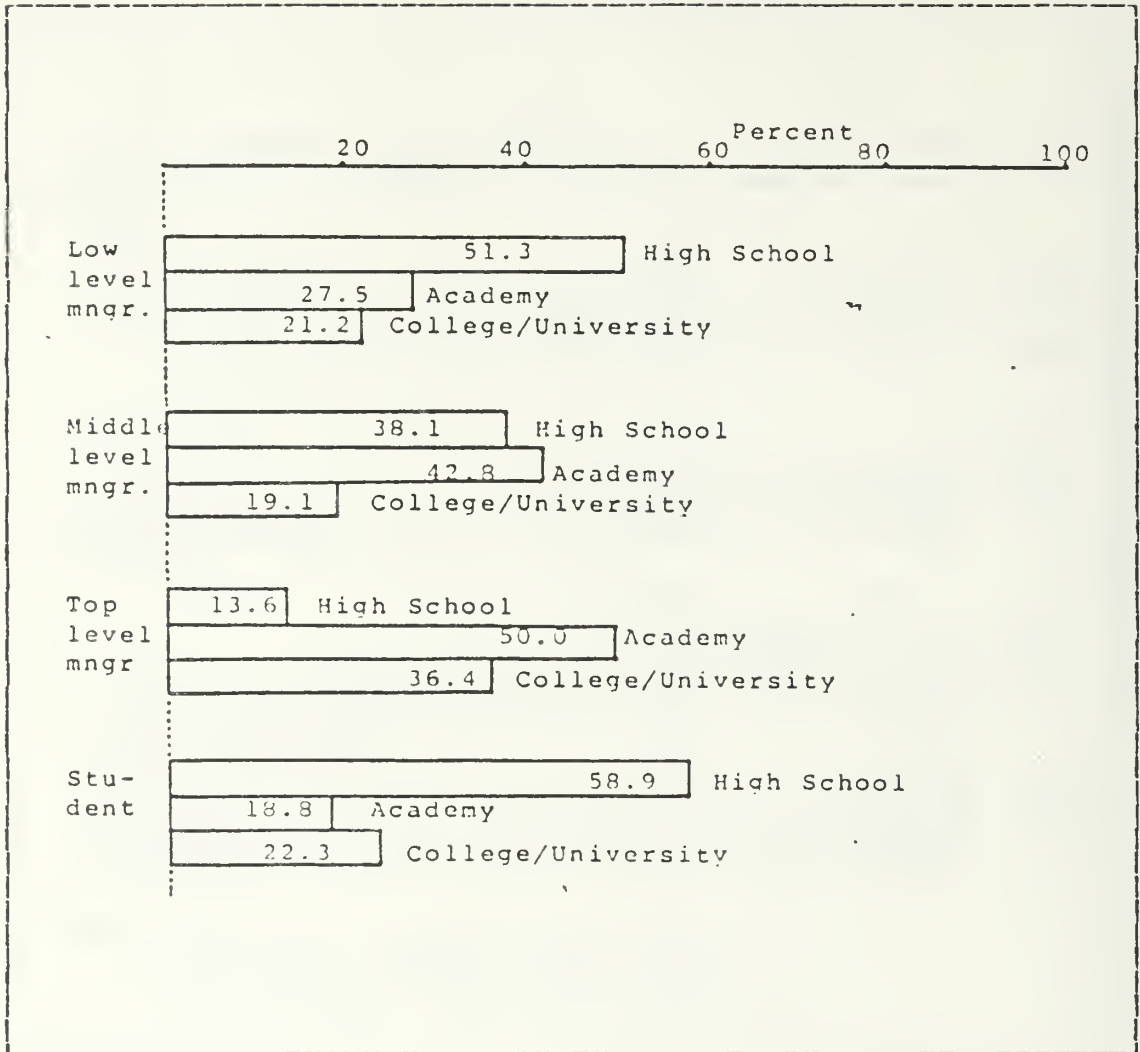


Figure 4.4 Positions vs Educations ( % ).

the other hand at the top level manager about 50.0 % have the Academy background, 36.4 % College/University and 13.6 % High School.

The highest responses at the student level of position come from 58.9 % High School background, 22.3 % College/University and 18.8 % Academy.

Overall derivation from Table 4.3 is that, the most suitable group of change agents can be chosen among the High

School educational background and up, and from the low level manager who already has sufficient background education.

## 2. Attitude (toward Computerization)

A frequency distribution of responses to a five point scale of attitude toward computerization gave the following results (see Table 3).

A frequency distribution of responses to a five point scale of attitude toward computerization gave the indication that on the basis of innovativeness, individuals in a social system are found to be normally or nearly distributed and can be classified as : innovators (first 2.5 % , to the left of  $Z = X - 2 \text{ sd}$ ), early adapters (next 13.5 % , between  $X - 2 \text{ sd}$  and  $X - \text{sd}$ ), early majority (next 34 % , between  $X - \text{sd}$  and  $X$ ), late majority (next 34 % , between  $X$  and  $X + \text{sd}$ ), and laggards (remaining 16 %).

These five categories are ideal types, each of which has a dominant value : innovators, venturesome; early adopters, respect; early majority; late majority, skeptical; and laggards, traditional.

If we compare early adopters to later adopters, earlier adopters tend to have : younger age, higher social status, more favorable financial positions, more specialized operations, a different type of mental ability, more cosmopolite social relationships, more opinion leadership, contact with more impersonal and cosmopolite information sources which are in closer contact with the origin of new ideas, contact with a greater number of different information sources<sup>11</sup>

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<sup>11</sup>Mentioned by Rogers, E.M., in Diffusion of Innovations, the Free Press, 1962, page 148 - 191)

TABLE 3  
Attitude towards Computerization ( % )

	More eager to know	Want to learn more than already acquired	Other
All respondent	48.1	48.5	3.4
Age :			
20 yrs	55.0	40.0	5.0
20 - 35 yrs	41.6	54.8	3.6
35 yrs	60.5	36.8	2.7
Education :			
High School	44.7	51.8	3.5
Academy/College/Univ.	53.2	41.9	4.9
Position :			
Low	47.4	52.6	0
Middle	57.1	42.9	0
Top	34.8	46.5	18.7
Student	46.4	48.2	5.4

Note : Low = low level manager = Ordinary official & section leader  
Mid = middle level manager = Chief of bureau & Assistant manager  
Top = top level manager = Manager  
Stud = Student

If we apply this concept, from Table 3 we see that as innovators can be chosen of people at the age between 20 - 35 years about 48.5 % want to learn more than already acquired about computer.



### 3. Computer Understanding

This will give the attitude of the respondents about computer, that computers can help humans, can replace

**TABLE 4**  
**Computer Understanding ( % )**

	Can help humans	Can replace humans	Can help & replace humans	Other
All respondents	74.81	1.15	23.66	.38
Age :				
20 yrs	60.0	0	35.0	5.0
20 - 35 yrs	69.9	1.8	28.3	0
35 yrs	89.5	0	10.5	0
Education :				
High School	75.4	0	24.6	0
Academy/College/Univ.	72.6	3.2	24.2	0
Position	78.9			
Low		0	21.1	0
Mid	90.5	0	7.5	0
Top	62.5	0	37.5	0
Student		.9	28.5	1.0
	0	100	100	100

Note : Low = low level manager = Ordinary official & section leader  
 Mid = middle level manager = Chief of bureau & Assistant manager.  
 Top = top level manager = Manager

humans, help & replace human or not at all. The results can be seen in Table 4.

The change agent serves as a communication link between a professional system and the client system. The extent of promotional efforts by change agents is directly related to the rate of adoption of an innovation<sup>12</sup>

Change agents have more communication with higher status than with lower status members of a social system.

Related to the Table 4 (Computer understanding) change agents would best be people at the age 20 - 35 years (69.9 % understand that computer will help humans), High School and University and at the middle manager level.

## E. FACTOR ANALYSIS

In order to get the global view of how many factors would account for the total variance of the list of variables and to what extent would the individual variables "load" onto those factors, the subprogram SPSS Factor was used.

In this case, traditionally the respective eigenvalue indicates the variance accounted for by each factor and can be determined by :

$$\text{sum } \{ ( a(j,i) ) ** 2 \} , \text{ where } j = 1 \text{ to } n$$

and  $\{ a(j,i) \} ** 2 = \text{factor loadings.}$

The proportion of total variances accounted for by a factor is :

$$\{ \text{sum } \{ ( a(j,i) ) ** 2 \} \} / n , n = \# \text{ of factors}$$

The breakdown of the factors can be seen from table 5 above.

Those factors were rotated using Varimax rotation and the following loadings of the variables upon the three principal factors :

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<sup>12</sup>See Rogers & Shumaker, Communication of Innovations, the Free Press, 2nd edition, 1971, page 228 - 230).

TABLE 5

## Lists of Factors and its Eigenvalues &amp; Variances

List of factors	Eigenvalues	Percentage of variance
I	1.23189	41.1 *
II	0.70225	23.4 *
III	0.50906	17.0 *
IV	0.34874	11.6
V	0.20481	6.8

\* considered significant

TABLE 6

## Factor Loadings upon Variables

	Factor I	Factor II	Factor III
Knowledge	-0.00872	0.08497	0.00213
Time knowledge	-0.10590	0.58991	0.02144
Familiarization	-0.05290	0.47986	-0.17657
Media	-0.66836	0.01218	-0.16783
Attitude	0.16534	0.18110	-0.12406
Opinion	0.12073	-0.13657	-0.01426
Computer usage	-0.10009	-0.14378	0.07343
Intensification	0.14179	-0.06009	0.52623
Personal burden	0.08398	-0.06027	0.44066
Update	0.61863	-0.16890	0.12746

For analyzing those tables we can determine which variables load the heaviest : Update is loaded heaviest on Factor I ; Time of knowledge and Familiarization are loaded heaviest on Factor II ; Intensification and Personal burden are loaded heaviest on Factor III.

From those factor analyses, it can be predicted which variables will probably be the best important for selecting change of agents as the strong elements in supporting the perception changing efforts within the sample population.

#### F. MULTIPLE REGRESSION ANALYSIS

We next will discuss effect of the variables upon Attitude toward computerization effort and Knowledge of the computer.

Table 7 and Table 8 explains what happens with the attitude and knowledge and its effect to the people's

Independent variables	Beta	DF	F
Computer usage	0.18217	1 , 225	7.992 *
Familiarization	0.18188		7.238 *
Media	-0.18668		7.935 *
Intensification	-0.12377		3.541
Time knowledge	-0.01842		0.075
Opinion	-0.00666		0.010

\* significant at .025 level

perception.

It can be seen that when we are looking for internal change agents and change agent assistants within organizations and we are concerned with the attitude toward computerization, we would pick those high on computer usage, familiarization and on media.

TABLE 8  
Knowledge of the Computer

Independent variable	Beta	DF	F
Opinion	0.04960	1 , 225	0.521
Time knowledge	0.03314		0.216
Media	-0.07636		1.012
Update	-0.07189		0.900
Familiarization	0.02746		0.150
Personal burden	-0.1829		0.069
Intensification	0.01268		0.032

No variables which were significant

We would seem to predict more effective selection by noting those high on Computer usage, Familiarization and Media (negative).

When Knowledge of the computerization is the key focus, there are no significant variables. Two have low significances, such as Media (F = 1.012) and Update (F = 0.900).

TABLE 9  
Indicators for Selecting the Change Agents

Attitude	Knowledge	Common to attitude and knowledge
Computer usage	-	Computer usage
Familiarization	-	Familiarization
Media (-)	Media (-)	Media (-)

(-) those of Beta weights

The entire responses can be summarized as Table 9.

## G. CHANGE AGENTS AND THEIR ASSISTANTS SELECTION

Overall for selecting change agents and their assistants, from the data profile we have change agents should be selected from people of the age between 20 - 35 years, because they have a credibility caused by their maturity of thinking.

From the educational background, they may be selected among the high school background or above. In the levels of position, change agents should be selected from the low level manager or middle managers, but the top managers should also be involved in this efforts.

The change agents should have relatively high knowledge of computers, and preferably a favorable attitude toward it them.

Generally speaking, the change agents can be chosen from those who have high levels of education, great need in computer usage, younger age and familiar with computers.

In selecting change agent assistants, attitude should be used as a main factor. However attitude and knowledge have almost all factors in common for the entire population. Overall, attitude is characterized by the eagerness of knowing computers. In this case, people at the high school and at the low level manager position mostly want to learn more than already acquired. So, the factors to be used in the selection of change agents and their assistants are high school and above, eagerness of knowing/studying computers, younger age (between 20 - 35 years) and also great need of computer usage.

In getting the rapid growth of the public opinion to the computer technology, educational effort should be developed in a proper strategy.

Also the media should be improved because media can be used as means of transmitting messages that involve, because

it can reach a large audience rapidly, create a knowledge and spread information, leading to changes in weakly held status [Ref. 5, pp 242-248].

Education efforts need a source which is limited, so that it will be appropriate to determine the priorities to be selected in the adoption process. Two factors should be considered : attitude and knowledge of the innovation. It can be generated as a grid which cover all of those factors, and the order of priority can be chosen among those elements.

Those who already have high knowledge of innovation and negative opinion to the adoption should be given the least priority effort. It might be having the highest resistance to the change, and also the lowest probability of attitude change, we can avoid this group.

Also for the people who have low knowledge but have negative attitude, require an inordinate amount of programmatic energy for attitude change.

For group 2 (low knowledge and neutral attitude) and group 3 (low knowledge and positive attitude) are considered having the highest likelihood of change [Ref. 5, pp 250-258].

Group 1 (high knowledge and neutral attitude) should be given the first priority and will require supportive attention.

## H. CONCLUSION

From those discussions above, conclusions can be generated as :

1. People have ever heard/known about computer since its first arrival up to the latest generation, mostly at the age between 20 - 35 years, certain levels of educations from the senior high school up to the college/university

Attitude towards Innovation	3 *	4	Positive
	2 *	1 *	Neutral
	5	6	Negative
	Low knowledge of innovation	High knowledge of innovation	

Note :

1 thru 6 indicate priorities

1 the highest

6 the least

Figure 4.5 Grid of Priorities.

levels. Students are giving the highest responses that computers are difficult.

2. People feel that computer usage is still difficult for supporting study and finishing the job. Most responses come from the people at the age between 20 - 35 years, senior high school level and low level managers and student level positions.



4. In relationships to human needs, mostly people feel that computer can help humans, especially at the age between 20 - 35 years, from senior high school up to the college/university background and also low level manager and student position levels.

3. In response to the motivation of the people about computers, it can be seen that people are eager to know at the age between 20 - 35 years, from the senior high school up to the college/university levels of education and low level manager and student level of positions.

5. Computers should be intensified in Indonesia. In this case people at the age between 20 - 35 years, from senior high school up to the college/university levels of educations and low level manager and student level positions agree to these efforts.

6. In general, the computers are well known to the people at a certain : ages - between 20 - 35 years ; educational background - senior high school up to the college/university and positions - low level manager and students.

For the middle and top management level, still more efforts are needed to give the motivation in computer usage.

## V. IMPERATIVE FOR TRAINING INDONESIANS FOR COMPUTER MASTERY

Indonesia as a developing country also has the opportunity to develop the computer technology, but it is not so easy to get the optimal use and benefit of it because of the insufficient knowledge of computer personnel in handling this sophisticated equipment.

In order to discuss the development of computer technology and how training and education should be done to get the qualified computer personnel, we shall describe what we mean by computer personnel.

Computer personnel<sup>13</sup> are those : who are directly concerned with the operation of computer and associated equipment (for example : programmers, systems analysts, computer operators, data entry and retrieval operators) and those involved directly with providing management and administrative support to computer facilities (for example : data processing managers, tape librarians, receptionists and clerical employees).

Each of these computer personnel have their own jobs, such as the :

### 1. Data Processing Manager

The person in charge of conducting and managing the Data Processing unit in the organization. The Data Processing Manager is the highest position in every organization because he must be positioned near the top management.

The qualifications for data processing manager include : executive and managerial skill, specific knowledge of the systems, basic programming, and machine operations in

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<sup>13</sup>Encyclopedia of Computer Science and Engineering - edited by A. Ralston and E.D.Relly, van Nostrand Reinhold Company, 2nd edition.

data processing systems.

## 2. Systems Analysts

The people who investigate, analyze, design and install, and evaluate an information system. They are usually located in or near the computer facility in an organization. It is most common to find them in a project development department which reports to the Director of Information Systems. They also need to be competent as a communicator, a technician, and a business generalist. Their technical skill includes : persuasive skills, the ability to be effective in leading and attending meetings, and supervisory skills; fact gathering, identification of information needs, feasibility analysis, equipment evaluation, and system design.

As a business generalist, the analyst needs to know the several business functional areas, the company, and the industry.

## 3. Programmers

The computer programmer is the link between a problem or process to be computerized and its successful realization on the computer. They will participate in the definition and specification of the problem itself as well as the algorithms to be used in its solution; then design the more detailed structure of the implementation, select the most suitable programming language, write and debug the necessary program, provide clear and complete documentation for both user and other programmers who may need to modify the program.

## 4. Computer Operator

A person trained to operate any or several pieces of equipment comprising the computer system.

## 5. Data entry and retrieval Operator

A person trained to operate a typewriter-like device used to prepare programs and data for input to the computer.

## A. COMPUTERS IN INDONESIA

The computer in Indonesia is also used in every level of organization -- governmental or private.

### 1. Historical Background of the Arrival of Computers in Indonesia

Indonesia's first computer was installed during 1956 in the Central Bank of Indonesia using a Univac System 1004 from the USA. Its second computer was installed 8 years later in the office of the Adjutant General of the Army in Bandung - West Java as a type of IBM 1401. In 1965 two more computers were put into operation in Jakarta, the capital city of Indonesia, one in the state-owned Department Store "Sarinah", and the other in the Central Bureau of Statistics (BPS - CBS).

Computer purchases have continued since that time, but the lack of support devices and trained personnel has seriously hampered full utilization of the installed equipment.

The CBS computer mainly is used for National Census of population, industrial development etc. In fact, this computer is still not used to full capacity. The Central Bureau of Statistics is one of the most efficient government operations in Indonesia. United Nations funds and consultants have provided support to CBS for several years. One foreign consultant still supervises the program, but many Indonesian personnel have been trained in recent years.

In addition to the most advanced users of business equipment such as CBS, Bank of Indonesia, and the National Oil Company, Pertamina, several other government agencies are installing modern business machines including computers.

A survey of the development of computer in Indonesia had been conducted by CBS during the year of 1977 - 1981 :

**TABLE 10**  
CBS Survey of the Development of Computer in Indonesia

Year	units	accelerations (in percent)
70	17	23.5
71	21	19
72	25	36
73	34	38.2
74	47	31.9
75	62	14.5
76	71	5.6
77	75	18.6
78	89	7.8
79	96	17.7
80	113	7.9
81	122	

But, although the development of computer is increasing from year to year, Indonesia is still in the second level of development according to UNESCO's report. UNESCO conducted research in the computer development area, this research report has been submitted to the United Nations in 1971 and refined in 1973. Here, UNESCO classified the development of computer technology in 4 levels : initial, basic, operational and advanced. Each level has

its own characteristics<sup>14</sup> which can be described as :

a. Initial:

There are no operational computers in the country. A few nationals had contact with computing. The only local sources of information are computer salesmen.

b. Basic :

In this level , there is some understanding of computers in government (and private) decision centers. A few computer installations are to be found. There are some nationals involved in computer operations. There is some education and training in computer technology in the country. Computers are used in basic government operations.

c. Operational :

There is extensive understanding of computers in government (and private) decision centers. Among the numerous computer installations there are some very large machines. There are centers for education and training in computer technology and some are of excellent quality. They offer degree programs in computer information science. There is design and production of software and some manufacture of hardware. Computers are affecting many disciplines, particularly science, engineering, and medicine.

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<sup>14</sup>United Nations, "The Application of Computer Technology for Development." Dept. of Economic and Social Affairs, E/4800, 1971.

d. Advanced :

Most government and administrative work is carried out by computers. There are well-established professional activities and national meetings on computers. There is a complete range of quality education and training programs. The number of computers, of all sizes, is increasing rapidly. Time-sharing, teleprocessing, and remote job entry are common. There is design and production of both hardware and software. Many technologies have been changed or are in the course of being changed. New applications of computers are found regularly. There is strong participation in and contribution to international activities.

2. Computer Development in Indonesia Related to the UNESCO Research

Computer technology in Indonesia which had been developed since 1956 still needs more improvement. According to the UNESCO survey which has been mentioned above, Indonesia is still in the initial level of development. This can be seen from these characteristics. In 1982 the number of computers to be installed in the governmental offices and private sector totalled 530 units<sup>15</sup> including mainframe, mini and micro from 39 types of computers. After December 31st, 1977 most computer companies had their own distributors and agents in Indonesia. Computer applications have been developed in 11 sectors, governmental and private. Computer education can be obtained in several universities, for example in the Bandung Institute of Technology - Department of Informatics, non-degree education in Informatics, EDP courses for Systems Analyst and Programmer. The National Institute in Computerization, Bakotan, had been

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<sup>15</sup>The Asian Computer Yearbook, 1982-1983.

established on July 4th, 1969, to give consultations in computer problem solving in the governmental administration system. Cooperation with the developed countries were conducted in the technology transfer activities, for example with the Informatique Pour Les Tiers Mondes (ITM), Intergovernmental Bureau for Informatics (IBI), Center of the International Cooperation for Computerization (CICC), etc.

For changing the situation from basic to the operational level, a challenge has been faced by the government, especially in the computer training and education efforts to get more qualified computer personnel who will be responsible for handling the computer usage.

### 3. Training Efforts for the Computer Personnel in Indonesia

In the Indonesia's Guidelines of State Policy<sup>16</sup> it has been stipulated that the development efforts in the field of Science and Technology should be directed towards the improvement of Indonesia's national know-how in Science and Technology congruent to the need for progress in Indonesia's National Development efforts. Besides, it is also means to push development activities while its efficient utilization will promote employment opportunities. Mostly, as with other countries the growth of a particular field of study depends partly upon the relative priority attached to that field by those who control the finances. Priorities are determined and reviewed in a more or less rational way according to the assumed needs of the country, the institution and the individual.

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<sup>16</sup>INDONESIA - An Official Handbook, Department of Informations, Jakarta, 1984.



Generally, the computer made its first appearance in Indonesia in the form of an administrative procedure rather than as a research tool. So, in order to improve the computer usage in the field of research and technology, Indonesia developed 15 institutions which handle computer training and education. The goals of these institutions are focused on preparing for and accomplishing a particular job in the computer area, for example computer programmers, system analysts, machine operators etc. Three institutions have been supported by the government. These are Bandung Institute of Technology (ITB), Department of Public Works and Elnusa Company which is a branch of Pertamina (National Oil Company). The highest level of education can be found in the Department of Informatics of ITB. This institute gives the courses which cover computer science, computer organization, PL/1, Cobol, Fortran, Assembler, Data Structure, practical graphs, information systems, installation management and network system design. The titles, degree conferred : one year programmer certificate (Diploma 1), 3 years Systems Analyst Diploma (Diploma 2).

The 12 other institutions are in the private sector, and mostly train the computer personnel in the programmer and machine operator levels.

Although 1984, is the third year where the computer subject/knowledge has been developed by the universities/institutes (Department of Informatics), it is still insufficient to get enough qualified computer personnel. The computer usage is more and more advancing. For finding the way out from this situation in the short term government should establish a Computer Education Center (CEC). This official institution will handle and standardize the computer curriculum, software development, standard codes etc. So, every institutions will adjust their training and education system to the standards available in CEC.

The other approach is using the inside organization training which will be conducted by the computer company, in this case graduates will train the rest of computer personnel in the organization.

In the long term, government needs sponsoring graduates in computing or related discipline (e.g. Mathematics, Electronics) for postgraduate training at established institutions abroad and requiring the graduate to enter into a bond to serve his sponsoring institutions for a certain period upon his return.

## B. FUTURE IMPACT ON COMPUTER PERSONNEL

### 1. Improve Manpower Resource to Support Computerization in Indonesia

The experience of industrialized countries with regard to computerization, automation and employment cannot be applied without modification to Indonesia as a developing country, because of differences in educational opportunities, mobility, job security, and other socio-economic factors. Much of the labor force is engaged in agriculture and basic process industries. A rapid, large scale introduction of computerization/automation almost always leads to a massive displacement of the labor force, the economic, social, and personal costs of unemployment and retraining in developing countries are critical factors in any decision to introduce computers. Here, human/manpower resources are the nation's and organization's most valuable asset.

The present Third Five-Year Development Plan recognized the responsibility of the Indonesian government to maintain the development in the field of unemployment. There are 5 problems to be faced in general : the rapid population

growth on the one hand, while on the other hand there still is the limited economic growth which is not yet capable to absorb the large number of worker's needing employment. The composition of the labor force age (of which 50 % is of 24 and under) with almost no working experience; the uneven distribution of the labor on the islands of Indonesia, particularly in relation to the available sources of the country's national wealth; the available force produced by educational systems and training which is not yet fully adjusted to the development needs and employment opportunities both in number and types of profession; and finally, the insufficient functioning of a real labour market in Indonesia which enables workers to be efficiently channeled into employment are contributing factors.

In the framework of solving labor as a part of manpower resources integrated policies and measures were pursued during the Third Five-Year Development Plan (TFDP). Targets to be achieved were the expansion of employment opportunities, equitable distribution of activities in all sectors, and equitable distribution of development gains. In this connection, 4 types of policies have been formulated in order to create as many employment opportunities as possible, namely, general policies in the socio-economic field covering fiscal, monetary and investment policies; sectoral policies which are aimed at expanding employment opportunities and at the same time to increase production, regional policies which take the form of mobilization of labor from region with excess of labor force, to those in need of them, for instance through inter-regional employment opportunities and special policies which in a relatively short time would provide employment directly or indirectly to the low-income bracket, in particular those in rural areas during the low-employment period.

To create more employment opportunities is one of the prime priorities of the Indonesian government which is applied to all sectors, governmental and private. In this regard, sectoral as well as regional development programs are directed to the creation of more job opportunities with sufficient income.

Through these efforts it is expected that Indonesia will succeed to increase its national production and at the same time reach an equity in the distribution of the development gains through the increased participation of the society in the development efforts. To achieve this goal, the manpower policy is directed towards achieving better distribution of manpower through vocational trainings as well as the improvement of the labor market information

In supporting the improvement of computerization one of the main efforts is establishing more institutions, besides the 15 institutions available now. It can be seen that in 1983 Indonesian government has supported the Gadjah Mada University to begin its activities in developing a new Department of Informatics which will educate, train the people in the programmer and system analyst levels. Also, 4 more private computer institutions have been officially permitted doing their activities.

## 2. The Usage of Computer Personnel in MIS

A management information system is an assemblage of data (facts, opinions, etc.) so processed (summarized, categorized, projected, etc.) that it constitutes intelligence (information) for purposes of managerial decision-making and the attainment of organizational goals.

In a small organization informal information systems can be used. But as an organization grows in size and diversity, it will no longer suffice. The lack of information

and improper communication of it can cause organizational breakdowns.

Large organizations must use formal information systems, which provide a basis for managing records, operations and functions. An information system is a major method of communications between humans in an organization, and serves as a linkage with the external environment. Besides this formal information system each organization has an informal information system based on personal contacts, observations, etc.

Sheer volume and complexity of information patterns in today's organizations have revealed the inadequacies of the traditional approaches to transmitting information, including such impediments as information overload, irrelevancy, lack of timelines, and inaccuracies. It will cause decision-making to be based upon arbitrariness, inadequate analysis, and uninformed judgement.

MIS can be handled primarily by manual means, mechanical methods, by computer or some combination of the three. Recent technology has provided the basis for significant potential for improvements in MIS.

The features of the computer which make a MIS more feasible are : accurate and rapid processing of data, vast storage and prompt retrievability of information and performance of computations and logical operations with very high reliability.

In a short statement, it means that computer has the capability of being used on higher-level problems and can be integral to MIS which are supportive of managerial decision-making. The improvement of MIS using computer will affect the immediate computer personnel requirement.

### C. RECOMMENDATIONS

From the above discussion, for improving the capability of computer in the MIS activity, Indonesia still need more qualified computer personnel, so it is better for the government:

1. To develop more computer institutions which are capable and responsible to train and educate people in the computer technology areas.
2. For improving from basic to the operational level of development, the high level of educations should be extended to include the computer technology subjects, especially in the university level, so it can produce graduates which capable in designing computer to support the computer production efforts.
3. Give the opportunities to the people to study abroad in the established universities in relation to the intergovernmental agreements.
4. The National Computer Association should be formulated officially, and it will give: advice and consultation in the computer problem solving area, especially in the governmental administration system.

## VI. CONCLUSION / RECOMMENDATION

### A. CONCLUSION

The research points to five major items. First, attitudes toward and response to the computer elicited from people -- their distinct, specific, and selective reactions to the questions asked. To most people the computer is becoming the overriding technical symbol of sophisticated equipment yet, there probably is very little awareness of the technical complexity of the device. However there is a considerable amount of perceived awareness of both its existence and its impact.

In addition, one can state after reviewing the data that many of the people express their need to get more training and education in comprehending and handling this sophisticated equipment.

The people also express that the computer is only a piece of equipment to be used for helping human in terms of interpersonal relationships and their day-to-day activities.

There is no latent fear of de-personalization and loss of control over decisions affecting one's behavior that can be detected from those questionnaire.

Finally, we should point out that this research is limited by sample-size, composition, subjects, potential bias of the original questionnaire, as well as other traditional limitations on survey research data.

### B. RECOMMENDATIONS FOR STRATEGY

According to the results of the survey, although 94.66 % of the respondents have already known of the computer for more than 2 (two) years, we found that most of them still

have difficulties in responding to the third group of questions (group of questions in part C of the questionnaire) (see Appendix A and Appendix D).

This indicates the fact that their knowledge level in computer technology is still not advanced. This fact also supports the findings from the second group of questions that most of the respondents still complain, that learning to use the computer is still considered difficult for them (52.69 % of the respondents).

However, a positive attitude has been depicted by the respondents. Most of them agree that the use of computer will help them in accomplishing their daily tasks and jobs and that it's usage should be intensified in their workplace (98.08 % view that computer will help to solve their daily tasks and jobs and 85.66 % agree that computerization should be intensified).

More over, most of those findings were derived from the respondents of the age group between 20 and 35 years, with the educational background at least from High School (HS) and above (Academy/College/University), holding the lower and middle level of management positions.

Based on those findings, we then, would recommend that more efforts should be concentrated and planned to upgrade the knowledge of computer technology among the Indonesian people as a preparation for shifting its present stage, the basic stage, into the next stage, the operational stage.

This work can be started with those, that belong to the age group between 20 and 35 years old which comprise the largest group of respondents who are already familiar with the computer for more than 2 (two) years (60.31 %), eager to know more about computer (26.34 %) and want to learn more about it (34.33 %), although they are also representing the largest group of respondents that are still experiencing difficulties in learning about it (33.59 %). And when we



break it down further according to their educational background, we would recommend that the work can be more concentrated with those who are now studying in High Schools or above (i.e., Academy/College/University students) or if they are already holding a job position, those who belong to the lower and middle level management positions, because these groups represent the largest percentage of eagerness to know and to learn more about computer and already have a positive attitude to the introduction of computers into their working place.

Of course the involvement of the top level management group in this effort is mandatory if we want to see this effort to be successful. But we are stressing more our recommendation herewith, to the middle level management group in this case, because this group within 5 (five) or 10 (ten) more years will become the top level management group, who already had a positive attitude background toward the computerization effort.

To overcome the difficulties and problems which are being experienced by most of the people in learning this subject, more reference books, magazines in the domestic language (the Indonesian language) should be published. In addition to that, more information using television should be applied, on any occasions available. Providing computers into High Schools and Universities, is considered as a good way in promoting the familiarization of computers to the people.

Software domestication effort, which is now still using the English language, should be established to support the development in this technology.

Computer exhibitions should be intensified, not in the capital city Jakarta only, but also should be spread out to the other cities or areas.

So far, we found that, the government itself, has started to develop a positive effort to provide a better environment for computerization in Indonesia.

The launching of the two communications satellites "Palapa", to cover the entire region of the country, from the west to the east and from the south to the north, depicting the intention of the government to draw together the whole country into the one communication network system. Software and procedures in coordinating the telecommunications network for the data communications usage have already been established.

In the private sector area, PT Panasatek, can be mentioned as the first national computer company which has already started with the promising effort in producing our own computer. Staf I/80 and Staf 8 are the two examples of the first 8-bits micro computers being produced, although it is not being marketed yet.

As a closure, we can conclude, that the most important factor in determining the success of every effort in computer usage, is the people, who operate and will use the computer. Their perceptions and attitudes will play as the main factors that will determine and impact the success of the computerization effort, because the computer is only just a tool.

#### C. NEED FOR FURTHER RESEARCH :

1) In Indonesia, as a part of the third world, it is difficult to predict through what type of mechanism we will generate adequate societal demand on Research and Development systems. In this case, participation - one of the central elements of the emerging new approach to development - will play a determining role. Consequently, one of the main areas of problems to explore is social

participation in the generation of computer technologies appropriate for an autonomous development project.

2) Development of comprehensive longitudinal survey programs, following the lead of computer technology indicators, that will provide highly differentiated information about changes in public attitudes and conceptions.

3) From this study, the main focus for discussion is on the consideration that attitude and knowledge are the two most important factors in adoption process of the computer technology. Relationship between both was found to be relatively strong and it was assumed to have a causal effect, in this case, knowledge seems to have a determining attitude. It might be interesting to search for its real nature and adjust these assumptions.

4) Further research of a survey nature as well as laboratory experimentation where more specific issues can be processed in greater depth and detail to increase our understanding of the human impact on computer technology.

5) Based on the discussion, we see that like any model, the above is just a simplification of the real world, but limited on data and theories. We should check its validity and the model should be tested against a control organization. Feedback will help to streamline the model in its applications.

6) It seems that the distribution of the respondents is somewhat unbalanced, we need to distribute in several levels of the societal systems.

7) According to Table 10, we need to make another survey which will try to find what happens to the acceleration of the computer development in Indonesia, and try to improve its solution.

APPENDIX A  
QUESTIONNAIRES

INTRODUCTION

We are two Indonesian officers doing graduate study at the Naval Postgraduate School, Monterey, California. We earnestly request your assistance in this project. The few minutes of your time will help us complete this study.

1. This questionnaire has been structured to get information about the development of Computer usage in Indonesia. We hope that respondents will participate in this area.
2. Respondents do not need put their name or any other identification on this form
3. We appreciate your participation.

Monterey, February 1984

Benny T. Reksoprodjo (Lcdr Ind. Navy)

S. Imam Subagyo (Capt. Ind. AF)

## QUESTIONNAIRE I

A. Please check the answer which is matched to your idea (give cross sign).

1. What is your age ?
  - a. Below/under 20 years.
  - b. Between 20 - 35 years.
  - c. Above 35 years.
  
2. What level of education have you completed ?
  - a. Junior High School.
  - b. Senior High School.
  - c. Academy.
  - d. College/ University.
  - f. Others.
  
3. Are you still :
  - a. Studying ?
  - b. Working as government official ?
  - c. Working outside the government ?
  - d. As military personnel ?
  - e. Running your own business ?
  
4. In what level are you ?
  - a. Ordinary official.
  - b. Section leader.
  - c. Chief of bureau.
  - d. Assistant manager.
  - e. Manager.
  - f. Student.
  
5. Have you ever heard/known about Computers ?
  - a. No.
  - b. Yes.
  
6. If you answer yes; when ?
  - a. More than 2 years ago.

- b. About/within 1 - 2 years ago.
  - c. Recently.
7. Have you ever seen a Computer ?
- a. Yes
  - b. No
8. If your answer yes; Where ?
- a. At school/from books.
  - b. From magazine/newspaper.
  - c. Television show.
  - d. Exhibition.
9. Do you want to know more about Computers ?
- a. Eager to know.
  - b. Want to learn more.
  - c. Not eager to know.
  - d. No need to learn.
10. Do you think that to study using computers will be
- a. Easy.
  - b. Difficult.
11. Do you think that, Computer
- a. Can help human.
  - b. Can replace human.
  - c. Can help and replace human.
  - d. Not at all.
12. Do you think that
- a. Computer usage should be intensified in Indonesia ?
  - b. It is still not the right time to use Computer ?
  - c. We need not to use Computer at all ?
13. According to your point of view/opinion, learning on how to use computer can
- a. Help to solve your tasks and jobs.
  - b. Give you an additional burden.

c. No influence at all.

14. Where do the last time you saw Computer ?

a. At school.

b. In the office.

c. In the exhibition.

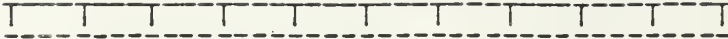
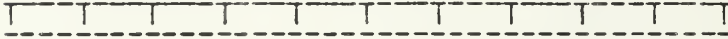
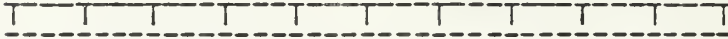

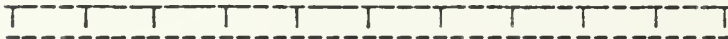
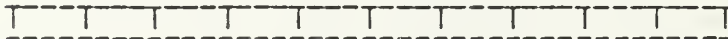
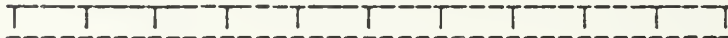
15. What needs to be considered when we introduce the use of Computers in your organization ?

B. Please give the cross sign in the box indicated below numbers from 1 to 10 which is suitable to your ideas.

COMPUTERS ARE :

1 2 3 4 5 6 7 8 9 10

1. Difficult	_ _ _ _ _ _ _ _ _	Easy
2. Expensive	_ _ _ _ _ _ _ _ _	Cheap
3. Hard	_ _ _ _ _ _ _ _ _	Simple
4. Annoying	_ _ _ _ _ _ _ _ _	Helpful
5. Heavy	_ _ _ _ _ _ _ _ _	Light
6. Not necessary	_ _ _ _ _ _ _ _ _	Necessary
7. Not economical	_ _ _ _ _ _ _ _ _	Economical
8. Labor intensive	_ _ _ _ _ _ _ _ _	Capital intensive
9. Incorrect	_ _ _ _ _ _ _ _ _	Correct

10. Inaccurate		Accurate
11. Extensive		Intensive
12. Unreliable		Reliable
13. Dangerous		Safe
14. Ugly		Attractive
15. Slow		Fast
16. Clever		Dumb

C. Answer with the first word that comes to mind.

- 1. BIT \_\_\_\_\_
- 2. BYTE \_\_\_\_\_
- 3. CHIP \_\_\_\_\_
- 4. COLD \_\_\_\_\_
- 5. COMPUTER \_\_\_\_\_
- 6. COPY \_\_\_\_\_
- 7. DATA \_\_\_\_\_
- 8. DISK \_\_\_\_\_
- 9. FRIENDLY \_\_\_\_\_
- 10. GATE \_\_\_\_\_
- 11. STORAGE \_\_\_\_\_
- 12. TAPE \_\_\_\_\_
- 13. TERMINAL \_\_\_\_\_
- 14. TRANSISTOR \_\_\_\_\_
- 15. USER \_\_\_\_\_

D. COMMENTS



(if you feel to do so, please put your comment in this space provided. You can put your opinion on how should computer be used in Indonesia).

## PENDAHULUAN

1. Daftar pertanyaan ini disusun untuk mendapatkan data mengenai perkembangan pemakaian Komputer di Indonesia. Kami mohonkan bantuan para responden untuk memberikan jawaban atas pertanyaan-pertanyaan terlampir.
2. Responden tidak perlu menuliskan nama ataupun identitas lainnya dilembar pertanyaan ini.
3. Akhirulkata atas segala bantuan yang telah diberikan, diucapkan banyak terimakasih.

Monterey, Februari 1984

Benny T. Reksoprodjo (Mayor Laut - TNI AL)

S. Imam Subagyo (Kapten DK - TNI AU)

## DAFTAR PERTANYAAN

- A. Ferilah tanda silang pada jawaban yang sesuai menurut pendapat anda.
1. Berapakah usia anda sekarang ?
    - a. Dibawah 20 tahun.
    - b. Antara 20 - 35 tahun.
    - c. Diatas 35 tahun.
  2. Pendidikan terakhir manakah yang telah anda peroleh ?
    - a. Tingkat SLP.
    - b. Tingkat SLA.
    - c. Tingkat Akademi.
    - d. Tingkat Perguruan Tinggi.
    - f. Selain a, b, c, d.
  3. Status pegawai yang manakah yang anda punyai pada saat ini ?
    - a. Belum bekerdja, masih belajar.
    - b. Pegawai pemerintah.
    - c. Pegawai swasta.
    - d. 'Akri.
    - e. Wiraswasta.
  4. Kedudukan yang manakah yang anda punyai saat ini ?
    - a. Pegawai pelaksana.
    - b. Kepala seksi.
    - c. Kepala biro.
    - d. Kepala bagian/Perwira pembantu (Paban).
    - e. Kepala Departemen/Menejer/pimpinan perusahaan.
    - f. Mahasiswa.
  5. Pernahkah anda mendengar/membaca tentang Komputer ?
    - a. Belum.
    - b. Pernah.
  6. Kapan ?
    - a. Lebih dari 2 tahun yang lalu.

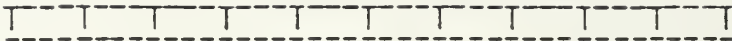

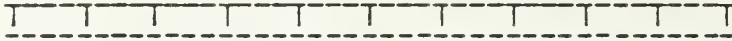
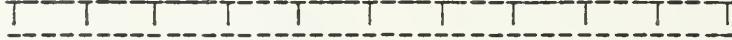
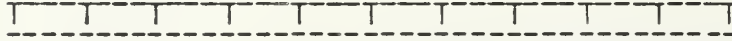

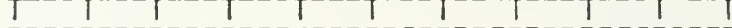
- b. Antara 1 - 2 tahun yang lalu.
  - c. Baru saja.
7. Pernahkah anda melihat dan mengetahui tentang Komputer ?
- a. Pernah.
  - b. Belum.
8. Dari mana ?
- a. Buku pelajaran/bacaan.
  - b. Dari majalah/surat kabar.
  - c. Dari televisi/film.
  - d. Pameran promosi.
9. Bagaimana minat anda tentang peralatan Komputer ini ?
- a. Tertarik.
  - b. Ingin mempelajari.
  - c. Tidak tertarik sama sekali
  - d. Tidak ingin mempelajari.
10. Menurut pendapat anda, belajar menggunakan Komputer :
- a. Mudah.
  - b. Sulit.
11. Menurut pendapat anda, Komputer :
- a. Bisa membantu manusia.
  - b. Bisa menggantikan manusia.
  - c. Bisa membantu dan menggantikan manusia.
  - d. Tidak semuanya.
12. Menurut anda, penggunaan Komputer di Indonesia :
- a. Perlu digalakkan.
  - b. Belum waktunya untuk digalakkan.
  - c. Tidak perlu sama sekali.
13. Penggunaan Komputer akan bisa :
- a. Membantu pelaksanaan tugas pekerjaan anda.
  - b. Menambah beban tugas pekerjaan anda.
  - c. Tidak ada pengaruhnya sama sekali.

14. Dimanakah anda terakhir kalinya melihat/menggunakan Komputer ?
- Disekolah.
  - Dikantor.
  - Di pameran dagang.
15. Kebutuhan apakah yang diperlukan dalam rangka pengembangan Komputer di Indonesia ? (Mohon tanggapan anda)

B. Dalam pertanyaan dibawah ini anda cukup memberi tanda silang pada kotak yang tersedia dibawah angka 1 sampai dengan sepuluh, jawaban sesuai dengan pendapat anda.

KOMPUTER ADALAH :

	1	2	3	4	5	6	7	8	9	10	
1. Sulit											Mudah
2. Mahal											Murah
3. Rumit											Sederhana
4. Mengganggu											Membantu
5. Menambah beban											Mengurangi beban
6. Tidak perlu											Perlu
7. Boros											hemat
8. Padat Karya											Padat Modal
9. Salah											Tepat

10. Sembrono		Teliti
11. Ekstensif		Intensif
12. Meragukan		Pasti
13. Berbahaya		Aman
14. Tidak menarik		Menarik
15. Lambat		Cepat
16. Pandai		Bodoh

C. Jawablah dengan satu kata langsung yang ada pada ide anda begitu membaca kata-kata dibawah ini.

- 1. BIT \_\_\_\_\_
- 2. BYTE \_\_\_\_\_
- 3. CHIP \_\_\_\_\_
- 4. DINGIN \_\_\_\_\_
- 5. KOMPUTER \_\_\_\_\_
- 6. COPY \_\_\_\_\_
- 7. DATA \_\_\_\_\_
- 8. CAKRAM \_\_\_\_\_
- 9. RAMAH \_\_\_\_\_
- 10. GERBANG \_\_\_\_\_
- 11. PENYIMPAN \_\_\_\_\_
- 12. PITA \_\_\_\_\_
- 13. POSKERJA/TERMINAL \_\_\_\_\_

14. TRANSISTOR

-----

15. PENGGUNA

-----

D. SARAN, KESAN DAN PANDANGAN ANDA TENTANG KOMPUTER :

(diisi bilamana anda masih ingin/merasa perlu menambahkan beberapa saran/pendapat/komentar).

APPENDIX B  
CODING OF THE DATA

1. Resp - # of respondents
2. Age - Age of the respondents ( < 20 years = 1; 20 - 35 years = 2 ; > 35 years = 3).
3. Educ - educational background of the respondents (Junior High School = 1 ; Senior High School = 2; Academy = 3; College/University = 4).
4. Position - Position of the respondents in their organization (Ordinary official = 1; Section leader = 2; Chief of bureau = 3; Assistant Manager = 4; Manager = 5; Student = 6).
5. Knowledge - the knowledge of the respondents about computer, have they heard/ known about computer ( no = 1; yes = 2 ).
6. The time to get the knowledge- according to the knowledge, when did they hear/see/know about computer ( > 2 years = 1; 1 - 2 years = 2 ; recently = 3).
7. Familiarization - See computer in physic - (No = 1 ; yes = 2)
8. Media - which media do they get the information/ knowledge about computer (School/books = 1; magazine/ newspaper = 2; television show = 3; exhibition = 4)
9. Attitude - attitude of the respondents to the eagerness in learning computer ( No need to learn=1; not eager to know = 2; want to learn more = 3; eager to know = 4).
10. Opinion- opinion of the respondents that studying using computer will be easy or difficult ( easy = 1; difficult = 2).



11. Computer usage - computer usage in helping human to solve their jobs/tasks ( Not at all = 1; can replace human = 2; can help & replace human = 3; can help human = 4).
12. Intensification effort - computer intensification is necessary or no ( no need to use computer at all = 1; not the right time = 2; should be intensified = 3).
13. Computer as a burden to the people ( No influence at all = 1; give the additional burden = 2; solve tasks & jobs = 3).
14. Recent information of computerization ( at school = 1; office = 2; exhibition = 3).

APPENDIX C

TABLES OF RESPONSES RELATED TO THE AGES, EDUCATION AND  
POSITION

TABLE 1

Responses related to the Ages (in percentages)

Responses related to the Age A (Below/under 20 years)

Answ	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
A	1.15	3.05	5.34	1.53	4.20	2.29	4.58	5.73	7.25	3.05
B	6.49	3.05	1.91	2.67	3.05	5.34	-	1.53	0.38	0.38
C	-	0.38	-	1.91	-	-	2.67	-	-	2.29
D	-	-	-	0.76	-	-	-	-	-	-
Y	-	1.15	0.38	0.76	0.38	-	0.38	0.38	-	1.91
HResp	B	A/B	A	B	A	B	A	A	A	A

Responses related to the Age B (between 20 - 35 years)

Answ	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
A	3.05	31.68	56.49	26.72	26.34	28.24	44.27	54.20	61.83	21.76
B	60.31	22.90	6.87	15.65	34.73	33.59	1.15	9.16	0.76	13.36
C	-	8.02	-	8.78	1.15	-	17.94	-	0.38	23.28
D	-	-	-	9.16	0.76	-	-	-	-	-
Y	-	0.76	-	3.05	0.38	1.53	0	0	0.38	4.96
HResp	F	A	A	A	B	B	A	A	A	C

Responses related to the Age C (above 35 years)

Answ	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
A	1.53	21.37	24.81	10.31	17.56	14.50	25.95	24.81	28.24	1.15
B	27.48	4.20	3.82	9.92	10.69	13.36	0	4.20	0.76	19.85
C	-	2.29	-	3.05	0	-	3.05	-	0	6.11
D	-	-	-	3.82	0.76	-	-	-	-	-
Y	-	1.15	0.38	1.91	0	1.15	0	0	0	1.91
HResp	B	A	A	A	A	A	A	A	A	B

TABLE 2

Responses related to the Educations (in percentages)

Responses related to the Education A (Junior High School)

Answ	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
A	1.53	1.15	1.53	0.38	1.91	1.53	2.67	2.67	3.82	0
B	2.29	1.15	2.29	1.91	1.53	2.29	0.38	0.76	0	2.76
C	-	0.38	-	0.76	0	-	0.38	-	0	0.76
D	-	-	-	0	0	-	-	-	0	-
Y	-	1.15	0	0.76	0.38	0	0.38	0.38	0	2.29
HResp	B	A/B/Y	B	B	A	B	A	A	A	B

Responses related to the Education B (Senior High school)

Answ	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
A	1.91	19.08	38.17	19.08	19.47	14.89	32.82	37.40	41.98	14.89
B	41.60	17.56	4.96	11.83	22.52	27.10	0	6.11	1.53	11.45
C	-	6.49	-	6.11	0.76	-	10.69	-	0	34.12
D	-	-	-	5.34	0.76	-	-	-	-	-
Y	-	0.38	0.38	1.15	0	1.53	0	0	0	3.65
HResp	F	A	A	A	B	B	A	A	A	A

Responses related to the Education C (Academy)

Answ	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
A	1.15	19.08	25.95	11.07	14.12	14.89	21.76	25.95	27.86	7.25
B	27.48	6.49	2.29	8.40	14.22	12.98	0	2.67	0.38	11.83
C	-	1.91	-	1.91	0	-	6.87	-	0	8.02
D	-	-	-	4.96	0	-	-	-	0	-
Y	-	1.15	0.38	2.29	0.38	0.76	0	0	0.38	1.53
HResp	B	A	A	A	A/B	A	A	A	A	B

Responses related to the Education D (College/University)

Answ	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
A	1.15	16.79	20.61	8.02	12.60	13.36	17.18	18.32	23.28	3.82
B	22.52	4.58	3.05	6.11	9.92	9.92	0.76	5.34	0	9.16
C	0	1.91	-	4.58	0.38	-	5.73	-	0.38	8.78
D	0	-	-	3.44	0.76	-	-	-	-	-
Y	-	0.38	-	1.53	0	0.38	0	0	0	1.91
HResp	B	A	A	A	A	A	A	A	A	B

Responses related to the Education F (others)

Answ	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
A	0	0	0.38	0	0	0.38	0.38	0.38	0.38	0
B	0.38	0.38	0	0	0.38	0	0	0.38	0	0.38
C	-	0	0	0.38	0	0	0	0	0	0
D	-	0	0	0	0	-	-	-	-	-
Y	0	0	0	0	0	0	0	0	0	0
HResp	E	B	A	C	B	A	A	A	A	B

TABLE 3

Responses related to the Positions (in percentages)

Responses related to the Position A (Ordinary Official)

Answ	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
A	1.91	15.27	24.43	11.07	14.12	14.12	23.28	25.95	29.39	6.11
B	28.63	9.92	6.11	8.78	15.65	16.03	0.38	4.58	1.15	14.12
C	-	4.20	-	5.34	0	0	6.87	-	-	6.87
D	-	-	-	3.44	0.38	-	-	-	-	-
Y	-	1.15	0	1.91	0.38	0.38	0	0	0	3.44
HResp	B	A	A	A	B	B	A	A	A	B

Responses related to the Position B (Section Leader)

Answ	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
A	0	5.34	6.87	2.29	3.44	2.29	5.73	6.49	6.87	0.76
B	7.25	1.91	0.38	2.67	3.82	4.96	0	0.76	0.38	3.44
C	-	0	0	1.15	0	0	1.53	-	0	3.05
D	-	-	-	1.15	0	0	-	-	-	-
Y	-	0	0	0	0	0	0	0	0	0
HResp	B	A	A	A	A	B	A	A	A	B

Responses related to the Position C (Chief of Bureau)

Answ	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
A	0.76	6.11	7.25	3.82	4.58	3.44	7.25	7.25	8.02	0.76
B	7.25	0.76	0.38	3.05	3.44	3.82	0	0.76	0	6.11
C	-	0.76	-	0	0	-	0.76	-	0	1.15
D	-	-	-	1.15	0	-	-	-	-	-
Y	-	0.38	0.38	0	0	0.76	0	0	0	0
HResp	B	A	A	A	A	A	A	A	A	B

Responses related to the Position D (Assistant Manager)

Answ	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
A	0	6.11	7.63	4.58	4.58	4.96	6.87	8.02	8.40	0.76
B	8.40	1.53	0.76	2.29	3.44	3.44	0.38	0.38	0	4.96
C	-	0.76	0	0	0	-	1.15	-	0	1.91
D	-	-	0	0.76	0.38	-	-	-	-	-
Y	-	0	0	0.76	0	0	0	0	0	0.76
HResp	E	A	A	A	A	A	A	A	A	B

Responses related to the Position E (Manager)

Answ	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
A	0.	2.67	3.05	1.15	1.53	1.91	1.91	2.67	3.05	0
B	3.05	0.38	0	1.53	1.53	0.76	0	0.38	0	2.29
C	-	0	-	0	0	-	1.15	-	0	0.76
D	-	0	-	0.38	0	-	-	-	-	-
Y	0	0	0	0	0	0.38	0	0	0	0
HResp	B	A	A	B	A/B	A	A	A	A	B

Responses related to the Position F (Student)

Answ	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
A	3.05	20.61	37.40	15.65	19.85	18.32	29.77	34.35	41.60	17.56
B	39.69	15.65	4.96	9.92	20.61	23.28	0.38	8.02	0.38	2.67
C	-	4.96	-	7.25	1.15	-	12.21	-	0.38	17.94
D	-	-	-	6.87	0.76	-	-	-	-	-
Y	0	1.53	0.38	3.05	0.38	1.15	0.38	0.38	0.38	4.58
Hresp	B	A	A	A	B	B	A	A	A	C

Note :

Answ = Answer.

Hresp = the highest response.

- Q5 = Knowledge : A = no ; B = yes
- Q6 = Time of knowledge : A = more than 2 years ago ; B = about/within 1-2 years ; C = recently.
- Q7 = Familiarization : A = no ; B = yes.
- Q8 = Media : A = at school/books ; B = from magazine/newspaper ; C = television; D = exhibition.
- Q9 = Attitude : A = eager to know ; B = want to learn more ; C = not eager to know ; D = no need to learn.
- Q10 = Opinion : A = no ; B = yes
- Q11 = Computer usability : A = can help human ; B = can replace human ; C = can help & replace human.
- Q12 = Intensification: A = should be intensified ; B = not the right time ; C = do not need to use at all.
- Q13 = Personal burden : A = help to solve the tasks & jobs; B = give the additional burden ; C = no influence at all.
- Q14 = Update: A = at school ; B = in the office ; C = in the office.

APPENDIX D

RESPONSES TO THE QUESTION GROUP # 3

Ranking to the responses for questions # 3

Question	3	2	1
1. BIT	less	unit	Binary digit
2. BYTE	ability	unit	8 characters
3. CHIP	film/cut	material	silikon
4. Cold	weather	ice	static
5. Computer	machine	calcul.equip.	DP equipment
6. Copy	machine	not original	duplicate
7. Data	material	comp.input	information
8. Disk	UFO	sport equip.	thin & round
9. Friendly	accurate	character	easy & flexible
10. Gate	door	chances	electronic circuit
11. Storage	tools	archive	document
12. Tape	sound	cassettes	store
13. Terminal	place	data sender	computer equipment
14. Transistor	sound system	radio	electronic equipment
15. User	human	operator	consumer



APPENDIX E  
 FACTOR LOADINGS & ROTATED FACTORS

Variable	Communality	Factor	Eigenvalue	Pct of var	Cum Pct
Q5	0.04534	1	1.23189	41.1	41.1
Q6	0.36909	2	0.70225	23.4	64.5
Q7	0.27165	3	0.50906	17.0	81.5
Q8	0.52272	4	0.34874	11.6	93.2
Q9	0.46971	5	0.20481	6.8	100.0
Q10	0.18405				
Q11	0.15177				
Q12	0.33058				
Q13	0.22292				
Q14	0.42897				

Varimax Rotated Factor Matrix

Factor loadings

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
Q5	-0.00872	0.08497	0.00213	0.04021	0.19086
Q6	-0.10590	0.58991	0.02144	-0.09235	-0.02973
Q7	-0.05290	0.47986	-0.17657	0.06962	0.05064
Q8	-0.66836	0.01218	-0.16783	-0.03399	-0.21574
Q9	0.16534	0.18110	-0.12406	0.61986	0.09977
Q10	0.12073	-0.13657	-0.01426	-0.00355	0.38808
Q11	-0.10009	-0.14378	0.07343	0.33994	0.01112
Q12	0.14179	-0.06009	0.52623	-0.13297	0.11075
Q13	0.08398	-0.06027	0.44066	0.09728	-0.09263
Q14	0.61863	-0.16890	0.12746	-0.02043	-0.03289

Transformation Matrix

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
FACTOR 1	0.76900	-0.42357	0.44739	0.00704	0.17036
FACTOR 2	0.40952	0.55266	-0.28264	0.62320	0.24206
FACTOR 3	0.19833	0.69983	0.33086	-0.60119	0.00076
FACTOR 4	-0.32278	0.15550	0.76713	0.49643	-0.19143
FACTOR 5	-0.31211	-0.03460	0.14832	-0.06043	0.93581

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