

The Significance of the Computerization in Management in Contemporary Society

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1. Introduction

J. A. Schumpeter (February 8, 1883 - January 8, 1950) defined the concept of innovation as the following five elements in his book: “Das Wesen und der Hauptinhalt der theoretischen National-Ökonomie” (The Essence and the Main Contents of Theoretical Economics) published in 1980:

- (1) New goods and services are produced.
- (2) New production method is introduced.
- (3) A new market is exploited.
- (4) New sources to supply materials and semi-finished products are acquired.
- (5) A new industrial organization is established.

According to him, it is the role of an entrepreneur to lead to innovation by trying to tie up these five elements. Then, if these elements are roughly classified into two elements further, it can be understood as an activity to increase the value of the goods to use and to decrease the value which the goods essentially possess.

The new production activity of goods and services given as the first element is not necessarily satisfied simply because it is new. Unless the new goods and services are favorable and attractive for the users to use, these do not deserve to be produced and used. Further, if these goods and services give satisfaction only to a limited circle of people and are not supported by overwhelmingly many other people, these have relatively low value as innovation. Therefore, the first element is classified as an activity to increase the value of the goods to use from these viewpoints.

Next, the elements from the second to the fifth elements may be regarded as the elements of innovation, which induce the decrease of the value. When production method, market, sources to procure materials, and industrial organization are improved, goods and services may be offered at lower cost. Like the increase of the value to use, if the acquisition of new elements means the increase of cost, these elements are unqualified as the elements for innovation.

Today, in accomplishing the innovation as described above, it is indispensable to carry out such activities as “collection of information”, “arrangement and adjustment of information”, “processing of information”, “transmission of information”, and “sharing of information”. Naturally, long before the time when these activities are processed by the modern approach of using computer, information had been effectively utilized by human endeavor such as interpersonal exchange, experiences,

investigation, etc. When we use apparatus and system called computer for effective utilization of information, we usually expect that the following characteristics of computer are exploited and used well:

- (1) Quickness;
- (2) Accuracy; and
- (3) Durability

The computer has the ability to process the complicated and diversified information automatically, and not manually. For instance, suppose that a plurality of computers are connected with each other and are operated as a network of computer. Then, there is no substantial meaning in the connection of these computers unless these characteristics are added to the mode of use such as information transmission to and from remote places and the mode of sharing the information. In this respect, it has been necessary at the same time to develop a program, which can automate a series of processes and to provide the operating procedure to the computer in advance.

Let us take one more example - the case of documentation. The documents used for business purpose can be stored, and this makes it possible to reduce or eliminate the efforts, which are required to re-write the documents when similar documents are needed. If necessary, these documents may be edited in easy manner. Word processing software deserves to be used because it has expectedly high ability for expression. In other words, in case of the document with trivial content such as a simple memo, which is perhaps used only once, there is no need to prepare the document using word processor, which requires much time to use. On the other hand, the information itself is now commercialized and it is even sold or bought. As it is widely known, lists of names full of personal information are now the objects of commercial dealings. When the information is sold or bought as a commercial product, the information with higher value to use and the information obtainable at lower cost are wanted in the activities for management. This means the same characteristics are required as in the case of the elements of innovation described above.

As explained above, the reconsideration and re-evaluation of the significance of computerization in management activities may provide a valuable guide when we study the development of information technique in future. Under such circumstances, we attempted to clearly define the information and to study the essential features of computerization in this article. Further, the effectiveness of network type management activities in the contemporary society will be discussed.

2. Informational Definition

The following considerations can be performed if informational meaning and role are considered by relation by the economic activity. In a usual economic theory, the action principle of the economic units (an individual, a household economy and a company, public body, etc.) which constitute a social economy system first is considered, and it considers operation of the economic whole system from the mutual relation between those economic units below. Similarly, action and the information on an individual economic unit are considered first, and this section considers the relation between an economic system and information henceforth the following paragraph .

2-1 Action and Information on Individual Economic Unit

In an economic theory (microeconomics), it is explained without action of an individual economic unit taking the “information”-side into consideration. First, consumption economic units, such as an individual and a household economy, make it a problem how to outlay the given income for the goods and service of varieties, and are theory-ized as that which acts so that use (the degree of satisfaction) may be maximized. Moreover, about the company which is a production subject, the premise of the whole company being united and acting first, is carried out. That is, the internal structure or the internal decision-making system of a company are not made into a problem, but it considers as if the big business was a sole proprietorship. It is theory-ized as that which uses factors of production, such as technology, and labor, capital, under the given supply condition so that such a company may moreover maximize profits. The same is said of the public economic unit in general. “Information” is not described by such theory, but the problem about information is not generated, or from the beginning, in them, “information” is described as if it was unnecessary. This was the method of a traditional economic theory since neo-classicism.

However, by the actual economic activity, the role with important information is achieved from the first. When buying, the man “who buys a good article as at a low price as possible” and who does not try hard like will be rare.

There is not that price is it higher than other stores whether the goods of a purchase schedule are how much helpful to themselves, and cheap one and the thing which suits the same purpose by other goods -- a possibility that failure and a trouble will

occur becomes the object of examination of many items, even when purchasing whether how much and returned goods is possible for how much and after-sale service, and single goods. The thing which can trust it about each of these items and which it answers, namely, information comes to hand will be an ideal. However, also in time, it is impossible for sufficient information to come to hand also in money in fact. therefore, a consumption subject serves as what "it comes out to some extent and is reached a compromise" about information acquisition. The man who danger is large for not knowing and purchasing goods and service without investigating anything, and completely avoids nothing while it has been ignorant will be most. However, probably, there are few people who outlay unsuitable money for another side and the purchase schedule amount of money of goods and service, or spend time, and receive detailed information. We are always asking for the middle compromise point with the extreme information gathering it went that it was ignorant too far beyond, by the compromise point, give the determination about the purchase of goods and service, and act. Moreover, after actually purchasing goods and service, it may be satisfied with a result, or I fail in shopping, and may think that it will be made not to repeat the same fault at the following opportunity. This is the informational accumulation which passes the purchase of goods and service, i.e., "study."

2-2 Difficulty of Theory-izing from Information Factor

Although the point stated for the foregoing paragraph is "common sense of shopping" which anyone knows so to speak, if it expresses this in the form of an economic theory and it is going to stand it to the role of a certain analysis also about such a simple fact, it will meet with much difficulties. When it is going to picture the fact that admit for an information factor to exist and an individual subject acts rationally in quest of satisfaction of self on the other hand by one side although a certain amount of theory can be made if the view of "information" is eliminated like a usual economic theory, there is much difficulty. Below, it points out to what extent "theory" can be made or from which point difficulty comes out.

In addition, I want to observe the following point in this stage. Generally, an economic unit is engaged in a respectively peculiar economic activity, and, for the reason, consumes "resources", such as income, labor, and general goods, service, etc. For a household economy, "time" of household-economy income and a household-economy member is resources. In a production company, a business fund, capital equipment, labor service, materials which were purchased, etc. are resources.

Although an economic unit uses these resources for the original purposes (consumption, production, etc.), the part is used for it also for information activity. It is because expense starts informational collection, machining and processing, and communication and an advertisement and resources need to be supplied. Activity peculiar to an economic unit is called “object economic activity (substantive activities)”, and it distinguishes from “information activity (informational activities).” Therefore, it will be contained in action and determination of an economic unit how the resources which can be used are distributed to thing and information activity. Subsequently, in a traditional theory, since information activity is disregarded, this point does not come out to the surface.

3. Essence of Computerization

3-1 To the economical efficiency of the economical efficiency of a scale to a network

If a personal computer is connected even if various kinds of computers in a network top come to be connected and it is not a large-sized computer, equivalent or the improvement in a “scalability” from which the function beyond it is obtained is remarkable.

It cuts and the scale which was the important determination factor of an industrial organization, and the economical efficiency of the range are lost. By “open type management”, the concentration injection of the management resources is carried out to the enterprise domain (domain) made the most elated, a slim constitution is maintained, and the motion which pursues a shift in the strategy of demonstrating the greatest synergistic effect by thoroughness practical use of external resources, i.e., the economical efficiency of a network, is seen about the other domain.

In the economy of a scale and the range, a perpendicular type organizes so that it may appear typically for series. At the economical efficiency of a network, it has level type organization structure so that open type management may see.

3-2 Performance of Economic System

In the case of an individual economic unit, increase of uncertain nature and a risk is produced from the shortage of information, and increase of the cost accompanied by economical action and a possibility of producing economical failure become high. Moreover, in the case of “an economic system”, the cooperation between the

shortage of information to system configuration factors becomes difficult, action and the argument which were mutually contradictory arise, and the performance of the whole “economic system” falls to it.

As a familiar example, a new graduate college student’s job hunting will be considered. The student before the terms and conditions given to Japanese economy to the graduation from a university needs the “job-hunting term” of several months from during several weeks. Moreover, a job offers side, such as a company, also needs “job offer term” of the same grade, and, for the reason, has paid the expense of a large sum.

The fundamental reason has demand and supply in not being matched efficiently in the huge new labor market of a national scale. Consequently, since employment and adoption are decided one by one from the combination with a “priority” high for a job-hunting side and a job offer side, average “search term” delays. It is in the state where it does not know well how much a near employment place will be found the optimum if job-hunting activity is continued under the conditions given to self when seeing from the student side. Moreover, if a job offer side also selects the student to how many persons, since it does not know well whether near new employment is securable the optimum, the job offer activity over a long period of time will be continued. That is, in order that “its watch” may turn when or aim may not stick in a huge market, it is made unavoidable that remain in a market for a long period of time, and most continues “search activity” finished barrenly. Thus, the shortage of information about the actual condition of the labor market has produced the burden heavy also for “an economic system” also for an individual economic unit.

However, in another side, we have experienced rapid development of an information technology. The computer was put in practical use from the second half of the 1940s just behind the Second World War, progressed steadily during the half-century by present, and has permeated our life and all the fields of work. Especially, progress of computer element LSI after the second half of the 1970s realized improvement and a price drop of a computer function, and its price and functional ratio have dropped to 1/several 1000 within for 20 - 30 years. The one person one set time of a computer and the broader-based extensive supply time of a computer utility are realized, and it is thought at the beginning of the 21st century that a computer function can be used now as “when” “where”, “as required”.

Moreover, the digital technology centering on a computer did not remain in original

information processing, but has spread and permeated at all social portions. Consequently, the conventional industrial base is changed completely, a new company and a new occupation are produced, and the facilities of a life are increasing sharply. Therefore, the hope which presupposes whether it is unsolvable of the difficulty and the non-efficiency produced from the shortage of information with practical use of an information technology is produced.

The view of “computerization” is drawn from above-mentioned observation and above-mentioned prediction. It shows the fact that progress of an information technology has brought progress of a social economic activity in the first place. Much more progress of a social economic activity is realized, and by second aiming at the progress and spread of information technologies in future shows a possibility that the difficulty and the non-efficiency produced from the shortage of information will be solvable.

In Japan the possibility of “computerization” has been recognized prior to other industrially advanced nations, and was already widely discussed late in the 1960s (“the first information theory”). Since it entered after that in the 1970s and the environmental problem and the oil crisis arose, the argument of computerization became burning down temporarily. However, in connection with the complete spread of personal computers, and development of a communication network, it argues about “computerization” again after the 1980s. “Computerization” is received as “current” of a time and came to be simultaneously taken up as an indicator of corporate management or a government measure in my country. In this section, this “computerization” and its policy connotation are considered.

Although “computerization” was advancing in connection with progress of social economy to be sure to it when seeing the past history in the first place, did it actually become the cause of progress of social economy? That is, wasn’t “computerization” realized as a result of the progress of social economy realized from another factor? Supposing “computerization” contributed to progress of social economy, it must be shown clearly in what the “course” the improvement and spread of computer performances “became fruitful” to progress of social economy, for example. This problem is solving the causal relationship between many factors of the social economy development in connection with “computerization”, and is making the “hypothesis” for it. It is set to it with a problem whether the justification can be proved from statistics data etc. as if the hypothesis systematic about the above-mentioned causal relationship was obtained by the second.

When an answer affirmative on the second problem is obtained for a start above-mentioned by the third, next, a problem comes out in respect of a "policy". It is the problem of whether to carry out business. If another word is carried out, when you have no governmental public measure (i.e., when "computerization" advances only by spontaneous action of an individual and a household economy, and a private enterprise), it is examination of the problem of whether an unnecessary fall of "information" speed arises, i.e., the necessity for a "information" public measure. And when a public measure has a certain meaning, as for the desirable public measure for "computerization", in each field, something becomes a problem for the first time.

3-3 Meaning of "Computerization" for Japan

There are 2 kinds of meaning in "computerization" for Japan. It is that it develops the information industry as an "earnings hand" of Japanese economy the first. The Japanese economy after the Second World War has developed as a center manufacturing industries, such as a fiber, shipbuilding, steel, a car, a household-electric-appliances product, and a production machine. Corresponding to each development stage, such industries bore the central role one by one, and have supported Japanese economy. However, the car and household-electric-appliances industry which was the main industry after the 1980s are moving a position to overseas by computerization of latest income rise and quantity wages, and manufacturing technique (emasculatation of a manufacturing industry). Although the hi-technology product of each field has export power, if future new strategy industry does not appear, Japanese economy may follow the way of stagnation and a decline in the long run. While there are few natural resources, the Japanese with a high educational level and the high degree of industry can expect the information industry with the possibility of rich growth as industry which can gain a "comparative advantage."

However, the above is secondary as meaning of "computerization." As long as the fundamental structure of Japanese economy must not change as a lot as the former but must depend on import of food, materials, and crude oil, it will be required to realize a comparative advantage in a certain industry, and to have strategy industry. However, there is no transcendental reason it must be the information industry, and even if they are other industries, it does not interfere.

Probably, it is desirable that surely Japan has it as strategy industry from many

character of the information industry. The “information-industry policy” of Japan after the 1960s made this idea the position. However, this policy is not successful by present and the information industry is not yet strategy industry of Japan except the part.

The second of “computerization” more important meaning comes out from information being the basic factor of a social economic activity. For an individual life and individual work, information is the basic factor for the organization of a profit company, a government organization, etc. for activity of large ranges, such as economy, politics, administration, culture, and education. “Computerization” realizes wide range activity more cheaply than the former and quickly. Moreover, conventionally, “computerization” enables information activity of the kind which was not able to be realized, and, as a result, may improve and progress activity of an individual or an organization more nearly extraordinarily than the former.

3-4 Realization of “computerization”

As mentioned above, although the meaning of “computerization” is clear, it is not easy to analyze and understand this systematically and to actually realize “computerization.”

It will consider in the example of “the search for a job, and the search for people” again here. Using a certain means, for example, the computer network like the “Internet”, the search for a job and the search for people “are computerized”, and it considers pursuing a possibility of saving cost. The conventional cost is the time and time for interviewing many students in a visits much to a company, time for an interview, time, and company side, and determining an adoption person by the student side. The reason which produces useless time and useless time on both sides is in the point which must repeat an interview, in order to find that it is unknown how much each demand is finally filled and it out.

Some methods of the Internet use are also considered. For example, it can ask for the input of information required for a student and a company, and both database by the side of job-hunting and a job offer can be created, company information can access, a student can be made to be able to access a student's information at a company side, and the system which finds out an employment place candidate and an adoption candidate can be considered. Or both database is unified and the method of comparing conditions on a database and aiming at job-hunting and “matching” of a

job offer is also considered. These are the methods of realizing partially information activity called job-hunting and a job offer on a computer. The obtained result can be used also for a macro target also in micro. Each student and company can refer to the result obtained from the database, and can make the candidate list of the visit to a company, and student interviews.

Moreover, the total result of “matching” on a database gives the macro information on the supply-and-demand state of the new labor market. Each student and company can do the strategy of employment and the adoption of self using this. These are useful in order that all may decrease “useless information exchange.” Moreover, “performing” the visit to a company for job-hunting and the student interview for a job offer is also considered on the Internet as direct “computerization.” Although the information exchange which is equal to direct company visit and interview on the Internet is unrealizable from the first, the information exchange near it is realizable.

It has it considered by “electronic-mail exchange” using character information, and the second on the Internet in the first place as the method “the picture and video mail exchange” using a picture, a sound, the 1 direction video, etc., and the third “it is a highly efficient video telephone both-directions instancy.” Rather than the first, profits and cost have the third case higher than the second, take both sides into consideration in the second, and the propriety of use is decided. In the long run, the use of “the highly efficient video telephone of both-directions instancy” is attained cheaply, and, probably, it will substitute the great portion of present interview. A reader is imagined in various possibilities other than these.

Next, “the information enterprise of job-hunting and job offer activity” will be considered. Work required because of the realization is clarifying first the conditions by the side of demand and supply about “job-hunting and job offer service” on the Internet. The demand sides in this case are a student and a company. When each student and each company use the Internet as an alternative means of a direct interview, there is preparation which pays the price, the “demand function” to job-hunting and job offer service on the Internet needs to be presumed. For that purpose, what usefulness is accepted in job-hunting and the job offer on the Internet to which a student and a company substitute partially what present time and expense are paid, and direct visit and interview for a company visit and an interview, and data will be required. Data for that will be created using a direct interview, a questionnaire, or common statistics data.

On the other hand, about a supply side, a computer, software, and a network need to be unified and the expense and investment for actually supplying this service on the Internet need to be known. When the “level” of this service differs by character information, whether a picture and a sound are used, or a highly efficient video telephone is used, the conditions of demand and supply need to be clarified for every level. The existence of the propriety of realization of a “information of job-hunting and job offer” enterprise, and the profit and the necessity for public assistance etc. is what should be judged after clarifying the conditions by the side of these demand and supplies. In order to create these “data for enterprises” so that it may be guessed easily, work of considerable quantity is needed. In order to actually create this data, the creation of data related to “job-hunting and job offer service” on the Internet and creation of basic data for it can be considered directly.

It is considered when passing judgment of enterprise continuation, seeing the condition of service supply expense. When the capital (venture) for the expense for collecting enough data starting an enterprise experimentally excessively is not supported, either, this enterprise carries out income-and-outgo balance in the long run at a loan, and the realization can be expected even when bringing profit socially.

4. Conclusion

In order to clearly define the significance of “computerization”, i.e. in order to elucidate the contribution of “computerization” to the growth of information industry and to the advancement of socio- economical activities from objective data, basic statistical data to describe “computerization” are required. Various types of “information activity” data such as information systems and devices, software, production of system, supply and use of systems are included in the “statistics of computerization”. These types of data are useful for setting up and carrying out the adequate policies based on the actual conditions of “computerization” by public organizations, and also for project planning and execution by enterprises or by individuals.

In our country, it has been a national aim and aspiration to “catch up” the advanced foreign countries for many years after World War II, and the Government took the initiative to carry out diversified industrial policies. In the field of information industry, the Ministry of International Trade and Industry (MITI) adopted a typical “policy to protect weak and immature industry” for the production of main frame computer since 1950's.

However, MITI took no special policy for the production of personal computer (PC), which rapidly advanced and grew since the middle of 1980's. Probably, MITI may have felt no need to take political guidance under the assumption that Japan may be able to occupy a relatively superior position because PC has such characteristics as "light, thin, short and small" products (the product features regarded as the specialty for the Japanese industry) compared with the main frame computer. This is probably because PC is a "general-purpose equipment" and is different from automobile or household electric appliances and that industrial structure and company organizations in Japan had the features not suitable for the production of PC.

The industrial policy and trade policy are necessary not only for information industry only, but also are needed in the process of growth in any type of industry. It is not limited to the promotion and the encouragement of invention and discovery or protection of art and culture. The scope of application of "intellectual proprietary rights" is rapidly expanding in parallel to the development of information technology. For example, in case of the "information" transmitted over a network such as Internet, a part of its content or format is often changed, and this leads to complicated problems for the protection of copyright and other rights.

Another problem of the policy relating to intellectual proprietary rights is the problem of modes of "standard" in information equipment and services. The issues to be solved imminently are the setting of scope and method for the protection of patent right and copyright relating to the "standard" of products, services, etc. What is to be solved next is the association and the method to deal with the "standard" to be set from public viewpoint and "de facto standard", which appears as the result of competition in the market.

In the public policies needed for the features of "information industry", the most controversial issues are: (1) The setting of the extent and the method of "privacy protection" for individuals and enterprises; (4) The determination of the extent and the method to "open to the public" of the information held by Government organizations and private industries. (5) The fixing of the boundary between legality and illegality for the contents of information transmitted via broadcasting or other information means such as Internet, and economic activities relating such information from the viewpoint of child protection, prohibition of discrimination, etc. and the setting of the procedure to sanction the illegal acts.

In addition, in economic activities or information activities which are considered to be in charge of private circles, there are some cases, for which Government policy must be provided from specific reasons in each of different fields and which may require restriction or intervention as the case may be.

Typical examples are as follows: (a) For the construction of infrastructure such as communication network, the time up to the reaching of financial balance (the period up to the sufficient recovery of investment) is extremely long, and the construction of infrastructure cannot be promoted by private enterprises because of the difficulty to procure the funds. (b) A large amount of funds are needed for fundamental research. The risk of failure is high, and there is the difficulty to recover the cost because the results are to be received and exploited in wider fields of society. (c) Goods and services must be supplied widely and universally including those who are economically weak. For this reason, it is necessary to accumulate and pool the cost in greater sphere (accomplishment of universal services). (d) Public assets must be used for industrial activities, and management and supply of public assets and collection of the charges must be carried out from public viewpoint.

With the introduction of digital technique, innovation is now under way in both infrastructure and services, and the business entities and industrial organizations are now undergoing dynamic changes. The analysis of economic background of these factors as well as the prediction for the time come are the important problems to be discussed in future.

REFERENCES

- 1) Matsushima, K.:
“Commodity-Producing Management in the Era of Internet-Intranet”;
Chuo Keizai Sha, 1997.
- 2) Aoi, H.:
“Electronic Mail”;
Nihon Keizai Shimbun, Inc., 1994.
- 3) Okamoto, H.:
“Introduction and Utilization of Internet/Intranet”;
Jitsumu Kyoiku Publishing Co., Ltd., 1996.
- 4) Okuda, K., Ishiguro, N.:
“Threatening of CALS - U.S. Information Network”,
Nikkan Kogyo Shimbun, Ltd., 1995.
- 5) Oniki, H.:
“Informatization in Japan and Its Impact on Economic Growth”,
Ablex Publishing Corp., 1994