The analysis of the Virtual management

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(I)Virtual Management on the linkage of science and techonology and market industry

This report attempts to analyse issues regarding the virtual management. Before, I had analyzed the linkage of science technology of multimedia market and industry, and proposed about the establishment of virtual management 1).

The prospects of virtual management are being discussed in various form in America, Europe, and Japan. But most of the argument provided are not “analysis of virtual management” but the merely report virtual business. These reports are in a sense data but not analysis. In other words, the essence and core of virtual management cannot be found in those reports. Because current virtual management cannot be merely understood without mutual connection between the three pillar of sciences: material science, life science, and information science.

<1>Firstly, the science of hardware is based on virtual reality. This cannot be without analysis of the intellectual inputs which is the basic material science. Secondly, Mechanism of self-organization of virtual reality cannot be understood without recognition of life science. Thirdly, though advance Information science is still insufficient in term of technological advancement, it is one of an important key of virtual reality. Recent development of the information science is begining to elucidate the significance of what virtual information can provide to enhance the development of virtual management.

<2> Anyway, Essence of Virtual Corporation can not be understood without settlements of those issue. If the linkage of hardware and software technology is not elucidated, linkages of material and element, parts and device and a product can not understood, much less “Cooperation and division of labor of hardware machine system” and “Cooperation and division of labor of the multimedia software system; extension of hardware machine system” will be not understood. The software system is similar with

comparing system of software and hardware, In software system, the material is language, parts and element is module of a software, device and equipment are subsystem of software, and software product is system production. Therefore, “Cooperation and division of labor of software system” cannot be understood without understanding of the hardware mechanism.

Moreover, the present trend of multimedia development in focus on the linkage bet ween related “hardware technology” and “hardware mechanical coopertion and division of labor”, and linkage between “software related technology” and in short “software integrated cooperatioin and division of labor”. In short, the” hardware related technology will be integrated with “software related technology”, and “hardware mechanical cooperation and division of labor linkage with “software cooperation and division of labor” 2).

<3>However, at an existing stage, this reversal phenomenon occurs. Now, the linkage of software technology in the present age build in to the linkage of software technology and “Cooperation and division of labor of software system” from the likage of hardware technology “Cooperation and division of labor of hardware machine system”. It may be said that this change is secondary industry revolution 3). Primary industry revolution was “machine revolution of hardware”. Accordingly it may be said that 180 degree of paradigm conversion moves. Without understanding this change, the essence of multimedia catch nothing. Analysis of the linkage of market and industry is the same too.

<4>Multimedia connection market achieves high growth currently. Anybody believes that a change of this multimedia market, Former MIS and New Media Boom vary it, is not a temporary phenomenon. A change happens rapidly in music, a movie, broadcast, a newspaper, entertainment, the circulation, finance, education, medical each field. But this multimedia boom depends on multimedia personal computer. This is very important issue. On the other hand, a conspicuous change in a field of production and production does not happen in Europe and America in particular. But in Japan, a change of production and production begins to happen. Otherwise is late in fields such as the circulation or finance. What is a problem? It is considered from management and the side of production management in particular. Science, technology contents of multimedia do not become clear yet. Therefore, it is important to arrange contents of multimedia market.

The information industry based multimedia can be divided two dimentsions. One is pure multimedia industry and another is existed industry that used multimedia technology. Now, what is demanded is that new multimedia industry is classified. The multimedia information industry spreads quantitatively and differentiates rapidly. We

cannot grasp multimedia management without analyzing it. And in order to understand management of multimedia, it is necessary to analyze the macro science and technology linkage and the market and industry linkage. If this two side (technical-push and demand-pull) is not understood collectively, micro management analysis cannot be accomplished justly. In market economy, technical push does not just become demand-pull; finally, demand-pull prescribes technical push. It is important to analyze multimedia management after the characteristics of macro software revolution are understood.

()The fundamental characteristics of virtual management.

Historically, that virtual management depends on established management is clear. The thing is shown in chart 1. It seems to be clear with chart 1. Virtual management was not produced suddenly; it is based on the cooperation and division of labor of hard machine system. The portent of engineering appears in Taylorism. Then it became a portent of mass production is clear in stage 1. In the second stage, industrial engineering appears, it regressed standardization of production manufacturing process. This becomes the foundation, which single product mass production of Ford system appears. Moreover, at Toyota system, the systems engineering is introduced, in the result of the standardization of production system was achieved. Flexibility of Toyota production system is supported by multi ability labor and team system. It is important that complete horizontal specialization of production, exceeded horizontal division of labor of Ford system, have been realized. And “many products small quantity production” was achieved. In the fourth stage, as a result that the system engineering of Toyota production system was integrated with the industrial engineering of Ford system and it was developed, software engineering was established. Software engineering depends on advance of a computer, especially software of personal computer. Then, by an appearance of artificial intelligence, it is achieved that Project management is the management key compared with task management of Taylorism, simultaneous management of Ford, and flexible labor organization management of Toyota. And it became CIM(computer integrated manufacturing). As a result, the variable products and variable volume production system has been achieved corresponding to the market trend. These stages becom the basis of the next stage-multimedia management. Therefore, the management of multimedia is on the current extension line of the management 4).

However, this does not mean that it is on the line of the length of only straight (linear) line. That is, the foundation of the management of the multi-media has the side which comes to a rupture, non-continuous (nonlinear) dimensions, in the CIM

management and respect which is. It can be said that the IMS production system instituted in Japan is an important base of the multi-media management. That is, the content of stage 5 shows it. This means the synthesis from the current stage 1 to stage 4 to standardize the intellectual network production according to the artificial intelligence at the same time. And, the intellectual network project management is being promoted because of not an intelligence worker mere change there but the intellectual, multi-skilled worker change. As a result, it come to achieve the intellectual variable products and variable volume production. This fifth stage is the one that the content of IMS was shown however, there is actually a qualitative difference in the step of this IMS and the multi-media with IMS like the difference of 100 steps though it seems like the difference of one step.

That is, the management by the multimedia based on the “Virtual engineering”. And reorganization which centers on “Virtual Engineering” is done at the same time as integrating 12345. It is done to standardize production by the key of not only an intellectual network but also “Virtual Network” basic. And it tries thirdly to achieve “Virtual Multi-Skilled worker change” by which it is not a mere “intellectual multi-skilled worker change” but various people’s intellectual abilities are integrated as if the intellectual, multi-worker change of the same character. This “Virtual Multi-Worker change” is building important foundation where “Virtual Network Management” in the sixth step is accomplished. This tries to rationalize virtual super-solid from the rationalization of a solid of the fifth step. Even this is a typical stage of the virtual management by multi-media and this is different like IMS from the intellectual variable products and variable volume production system. That is, it is virtual variable products and variable volume production by the virtual network. The work is divided between work of the point in the first step in the one based on the virtual division of labor division of labor = and it divides the work into the rationalization of this virtual solid between production processes in the second step vertical division of labor. It is the one to combine the project control with the rationalization and current vertical, horizontal division of labor = business part system of the solid of the horizontal division of labor between team based on versatile horizontal division of labor = worker in the third stage and the fourth stage. The rationalization of a super-solid means a three-dimensional division of labor in the fifth stage and it ties to the project control a variety of project support control and investigation analysis. That is, when the development project of a new product succeeds originally making the project control which supports it, a three-dimensional division of labor to which it is materialized by the division system is taken. However, it has a qualitatively different side though “virtual division of labor” in the sixth stage looked like this. That is, it is the one that just made leverage controlling

sufficient integration of virtual network concretely. That is, it was not the one though it had tied tentatively the enterprise domestic side division of labor by which not only the division of labor of the country (between the enterprises) but also the multinational corporation was made leverage up to date by the intellectual network project management. Virtual like the same one of the enterprise (Appear actually though it might be foreign countries though this might be domestic country) and these of the factory of the same, of the process of the same, of the difference of <different machine> difference however according to “virtual division of labor” like the enterprise <like the same machine it> showing. The management of control an operation of the current, different machine and a different process and different factories and different enterprises is made the same operation, and that is, the one that tries to control a different factory and the enterprise by the same control is this virtual operation and it is integrated management. Mamageing like the enterprise of the factory, of like various machines, various processes, near processes of various factories, and becomes possible though in foreign country operating from home country if this way is brought in. This is characteristic of “virtual network division of labor” 5) .

As a result, it can be said, the virtual management by these multi-media is “Integrated management by virtual network at all life cycles”. On the one hand, this divides and obscures the function with the current manufacturing, the design, the supply, and the finance marketing, etc. 6). The distinction exists clearly on the other hand though such a side exists certainly. However, all life cycles of management by “virtual network” become vague to improve an organic uniting more the distinction and are made to unite. It is a result of making each area a compound.

() Virtual research and development by multimedia

Multi-media is clarified that one, field of the information science as pointed out previously, the multi-media has the possession of information engineering and a relation close by 7). As a result, research and development management by the multi media is different from the current hard research and development. The analysis related to the mutual relation straight line (linea) like the basic research, application and development research is not necessarily important. These were the traditional research and development especially Europe methods. However, the method of the research and development of Japan starts from the development research of a new commodity oppositely 8). As a result, the application research is done and the research and development opposite to the common way of research in Europe and America. So that a basic research is done, so the advancement ends. So to speak, the research and development of Japan has been done to the bottom up research and development in

constant to the top down research and development in Europe and America.

However, the research and development by the multi-media appear important difference from method of customary research and development management. As for the one, micro linkage in the integration of the macro science and the technology and micro science and technology. Also the macro markets, the macro industries, micro markets, and micro enterprises is becoming important as well. If does not catch the relation of the market linkage according to both integration of the macro science and technology linkage a macro market linkage, industrial linkage and micro products products concretely, it is impossible to macro and micro research and development like multi media . It is extremely important to be able to make the integration of this macro and micro by “Virtual research and development”.

() Virtual design management by multi-media

The meaning of design currently has changed from the design management of the person by the designer to the design by Computer Aided Design. As for the design, a partial area and the system design by which it is piled up are always centered there. However, the design management by the multi media is largely different from the current one. The ability to supply various goods quickly and widely is needed in a complex product market of the 21st century. The product is not only discriminated by shape and the function, but also is discriminated by service accompanied. The service contain possibility that the customer can affect the design of the product 9).

To supply of the Virtual product corresponding to the structure and the function of the market, the order design control should develop the system and software which is first of all necessary “Integrated network control” concerning market and customer's needs and can give the customer the right design decision which the enterprise was doing in addition, too like this. Here, It's needed to control the Virtual integrated design by a global network. Because, the design is “Virtual integrated design in the network 10) only in a wide meaning such as not only the design of the machine and the design of the software which relates to it but also the process, factories, and the enterprise. After all, the design management in the global network relates is needed.

Thus, the integrated design management with which the design until with the intranet by the network only in the production intranet, too has become the object of the analysis.

() Virtual production management by multimedia

The base of production management started from the task management of Taylor, and the kanban method and the quality control which until Just in Time of Toyota as

already clarified. Moreover the production management of CIM by which the project management and the business division system were integrated and the production management of the following IMS were one that the intellectual production network, project management and the business division system were combined.

Both of these started from the standardization of individual work, the standardization of the production process, the standardization of the project production, and the standardization intellectual production network was made foundation. So these production management was established. However, production management by Virtual information is just “Virtual network project management” based on “standardization of the Virtual network production”. There is substantially a definite difference though there seems to be no difference very much like the fifth <this> stage and the 6th stage superficial points already. If it is said concretely, the development of CIM in Japan substantially adopts the method by control which looks like United States CALS 11).

CIM of the present stage of Japan seem to use a control form near United States CALS though United States CIM is a concept near Factory Automation. Fully integrated and it is not only in production but also research and development, design and sales that is a concept which applied to today’s CALS. However, the resemblance on this content is the one which does not mean real CALS but was instituted as “Japanese CALS management”.

When true CALS is not “Control of manufactuaring and sale integration” in lever as for “Virtual information”, it is not CALS in the meaning of the truth 12).

However in Jpan, “Kanban system” was an information control system use by a human network as been appered in the Toyota system. And, the supply of parts from the subcontractor was related to “Just in time” management concept. When there is a necessary of parts, the necessary amount and time requined will be reported and provided as required. That is to say, “Kanban Metthod” which is due to these human networking is related to the suppliying of parts for the market.

But CALS management which is due to “Just in time information” is to make sure each connected point of research and development, design, production, sales, distribution runs well together. This management is in the frame work of IMS and not Virtual information management.

Then, if the qualitative change appears somewhere, is there any difference with the multimedia production management being invested? It is only a differrence of the production management by not Just in time information but “Virtual Just in time information”. For instance, though this is not the best there is the one view that the intranet was made leverage from the point of a business secret. As for the production management by Virtual Just in time information which makes the intranet, the

concurrent control at the Just in time is just possible in shape, that is like not only all factories domestic in Japan but also related factories in the vicnity in foreign countries by the multi media 13).

Controls between the enterprises by intranet, that it is the differrent enterprise between industry not only the production management but also between differrent enterprises in another industry with the internet by the multimedia has come to be able to apply. Because standardization of exchange of the information between enterprises by EDI (between different enterprises in one industry with another industry) procedure is previously necessary after this for controlling production of person`s multimedia.

This assumption condition has already presented EDI in Japan as follows. “It exchanges the message of dealings standard by the telecommunication line by using radical between computers of different organizations”. Note 10 (In 1975)

EDI is not CALS though it is a one of condition for the development of CALS. Because, gradual information is shared and CALS is invented also between the enterprises not to mention sharing “Just in time information” in one enterprise. If a promised thing of communications information between computers is not made assumption, sharing information is impossible for that. Especially, the production management by “Virtual Just in time information” in one enterprise which uses the Virtual has an epoch-making role. A just CALS management by the Just in time rapid development by sharing the information between the enterprises will result in rapid development.

(VI) Virtual labor management by multimedia

It is regarded that knowledge engineering by intellectual network, in short, intellectual network project management has important roll to develop multimedia. However, we can not understand virtual labor management by multimedia with only in this point of view. Because, as mentioned above, there are still many multi-ability workers and single-ability workers thought that the number of them has fallen. 0n the other hand, intelligence workers and intellectual multi-ability workers has increasingly come into important position in business. As a result, it is clear that direct labor expenses is going to decline and on the other hand, indirect labor expenses are going to increase relatively. Evidently, nowadays, engineers are becoming to intelligence workers and multi-ability workers (mechatronic engineers). However, in case of virtual labor management, situation is changing that the soft engineer and knowledge engineer are managed under “Virtual engineer 14)□. Nothing is better evidence of strong leadership of virtual engineer with a great deal of creative power in venture business than the fact that he is the central figure. They are the typical type like Microsoft of Bill

Gates and Netscape and Sun micro systems. In brief, managing “Virtual network project” lets them break with convention and develop from just a venture business to worldwide big businesses. Just soft engineers and knowledge engenieers have a limit. They are climing down to intelligence workers and intellectual multi-ability workers. In this way, labor management by multi-media in today have reached this step after recognizing traditional labor management by each step and carrying out rationalization of virtual supersolidness.

This new virtual net work management is propelling decentral labor management with virtual task teams which have the function of forming self organization = self management; on the other hand, labor management today is promoting while strengthening informal communication with electronic mail and interchange of feeling sense and culture with human network. The virtual labor management based on “Virtual division of labor” turns on result of changing from traditional vertical labor management to horizontal labor management.

(VII)Virtual marketing by multimedia

Virtual marketing by multimedia is development of result described above .

In this multimedia-age, market structure, market function (=markets action) and market result are direct extensions of traditional marketing; interaction between business and market interface. However, in addition to this fact, corresponding to network preject management by multimedia, market situation is going through some dramatic change by a marriage of macro and micro market .

Therefore, supply and demand are going to keep in closely relation, and consumer (be it consumers formed group or individual, consumer for luxury or necessity) and business will be link bidirectionally.

As a result, “Virtual marketing” are going to be set in center. And it will absorb and integrate methods from traditinal marketing .

An example this development is “Virtual network marketing” which includes mutimedia personal computer, internet (or intranet) and database .

On this system, it is possible to search database consisted of information of market, industry, business and individual at a easier, faster and openly with mutimedia personal computer. It allows us to get infomation by domain at just in time . Moreover, we can collect not only information at home and overseas as if it were just a information about neighbor (=virtually).

As a second example, it is possible to carry out an analysis of linkage effect between departments and consolitayed track reack record internationally, not to mention paformance in a department by annual, by semiannual, by month, by week, and by day.

Moreover, it page read to make a comparison between different business in same industry and different business in different industries by standardizataion of information on communication though EDI and information sharing through internet.

The third example is a possibility that forming of virtual moll in addition to advertisement of traditional marketing. Let's us to sell merchandise and settlement in digital (but there are various problems on safety). As an additional plus, establishment of home page enables us to advertise our goods quickly and conveniently. An interesting benefit differ from traditional mass advertisement arises from home page advertisemeent.

And instead of document, telephone and facsimile, E-mail give huge convenience to consumer and quantitative expansion and high speed to business.

So to speak, in marketing, business have been regarded to hold decisive power. But consumer have the potential for becoming a decider with business owning to virtual interactive by multimedia.

VIII)CALS Management

To realize true CALS, integration management must be accomplished. However, TOYOTA System is good example in Japan, they have been supporting “KANBAN System” by information management with human network. Supply of parts from subcontractor have been connecting with “Just in time management” to make possible to reach “time which needs, necessary quantity, necessary parts”. In order words, KANBAN System which has function to supply of parts by human network and Just In Time which corresponds to situation on market are introduced into Japanese type CALS as “Just In Time infotmation”.

However, management of CALS by Just in Time information only relate each dimension: R&D, design, production, sale, and physical distribution.

This doesn’t reach information management by Virtual Just In Time yet, but only management by IMS.

Well, what is qualitative difference between management by IMS and production management by multimedia?

It is not merely Just In Time information, but “Virtual Just In Time information” to realize production management by multimedia.

For example, thereis a way to use internet, but it isn't the optimal from the view point of business secret .

Production management of Virtual Just in Time information which used intranet can manage not only factories in Japan but also factories in foreign countries concurrently with a sense of just adjacent factories .

Next, it will be possible to realze not only production management through intranet in certain business inside but virtual management among business in same industry and virtual management among different business in different industries.

These production management by multimedia needs standardizataion of communication procedure among business (inside of same industry and different industries) by EDI.

This precondition is shown on Japanese EDI: it is exchanging message among each computer using standard agreement on communication circuit between different organizations since 1975 (note 10).

EDI is condition for development of CALS but is not the CALS itself.

Because, CALS produces information sharing among business in addition to sharing of “Just In Time information” in business inside .

Not presupposing promise thing on communication information among computers for its purpose, information sharing would be impossible .

Especially, production mangement by “Virtual Just In Time information” in business inside, which use intranet, has epoch-making role.

With this, CALS management by Just In Time and information sharing among business will be able to achieve to leaping spread.

(IX) Organization theory by multimedia

Organization of business administration changing from vertical organization to horizontal organization, moreover matrix organization, and switching over from project organization to network project organization. In order to correspond to micro management, development of science and technique as well as market and industry have quickened these organizational change. In industrial structure, the mainly technology as change from IE (industrial Engineering) to SE (System Engineering) in hard system. The other hand, Soft E.(Software Engineering) has taken on an important mission. As the Soft E. has been integrated into hard system so organization has changed.

However, as a result of development of Al software and integration of AI.E.(Artificial Engineering), multimedia personal computer has become to play a large part.

But, soon after, network software as meta-software has stabled on axis. Subsuming OS and AS, network has taken the leading part with multimedia personal computer as just information terminal.

“Secondary industry revolution” that various hard systems are incorporated into soft system has appeared.

As a result, emphasis is switching over from various management organizations

which were formed with management history to soft management organization.

Especially, integrated traditional hard and soft organization into network organization supported by meta-software, “virtual network organization” has come in sight.

And then, instead of soft ware engineer and artificial intelligence engineer, virtual engineer becomes leader.

However, virtual engineer isn't relief but absorber for single-ability worker, multi-ability worker, intelligence worker, intellectual multi-ability worker.

The perfect example are entrepreneurs of venture business who started from creative engineers; S.Toyota, S. Honda, Bill Gates.

In this way, integrated soft project organization, network project organization as well as hard vertical organization, horizontal organization, matrix organization, “Virtual network organization” can manage every different organizations.

Here, virtual engineer is capable to operate simultaneously even different machines, processes, factories, firms without the need to distinguish from domestic facilities or overseas N as if they stood close to each other.

On this step, characteristic of industry of country are integrated, meta-organized, and generalized 15).

Rather, it is important that meta-soft (virtual network project software) provides a way to operate different machines, processes, factories, firms as if they were same organization. In addition, the operation exceeds space-time.

Establishment of “network project organization” laid to meta-soft allows to rearrange each organization flexibly.

For example, a firm doesn't have to arrange all functions (general affairs, personnel, sale, production, finance and so on). It should incorporate necessary “department” from outside as occasion demands.

Of course, it becomes possible to rearrange each domestic and overseas process of factory. Therefore, it forms “Virtual intra-compan international division of labor” (ex. produce of Boeing 777).

In the same way, organization of research and development have the potential for becoming virtual laboratory (ex. Virtual laboratory at Ministry of Posts and Telecommunications in Japan).

As the above argument, we can call meta-organization laid to meta-soft “Virtual network organization”.

(XI) Conclusion of virtual network management

As satiated above, “Virtual network project management” is both direct extension of traditional management and peculiar one.

At first, managent have only dealt with “micro management” (of course, adaptation, intervention, recognization with enviroment and so on have been pointed out). There were few concretely studies to have taken micro management functionaly in dynamic development with macro sciece and technology or market and industry.

Well, studies about virtual management have not been treated with only limited success in the past; they have focused just cases.

Second, nothing is cleared without providing an explanation for not only hard dimention but also soft dimention and movement of importance from hard dimention to soft dimention on life cycle of micro management.

The concurrent management on production (=simultaneous management) have been realized in “Virtual network division of labor”.

It is one demonstration that meta-management with meta-soft as core spreads another steps of R&D continually and non-continually on business life cycle. This is a reason making recognize importance of bottom up Japanese management.

Third, for example argument about EC (Electric Commerce), multimedia management is developing rapidly on finance, circulation, distribution in America. But we have few example about oriduction.

To discuss about safety and social problem is of course necessary. However, in addition to these problems, we have to carry out a thorough invention of significance of management of “virtual society”.

Footnotes

1 Tasuku Noguchi, “Science &Technology and Multimedia Management”, IFSAM, 1996, Paris, Invited speech(proceedings)

Tasuku Noguchi, “Macro High-Tech Table and Micro High-Tech Management”, Ifsam, 1992, Tokyo, Keynote speech, September7-9, 1992

This software revolution was being carried out with software integrated system based on the network software

This inter change has already been clearly analysed in my previous thesis(refer footnote 1) regarding the change of the market and industry.

IMS is different from that of MM which is virtual engineering technology based on multimedia tools

Virtual network division of labour is a completely new concept but this is a concept developed in extention of Adam Smith’s division of labour

Toyota system integrated Concurrent Engineering and Product and Design in

through intra net so that the internal corporation's international division of labour is made possible through cyberspace.

(9) Toshiyuki Sakai, "Information Science",Chuo ShinSho,1988

(10) Tasuku Noguchi, "Politique de la Science et Technologie et Gestion de la Rescherche Development.au Japon,1988, report in the joint conference of the Japan Society of Business Administration and the Association of Management and Accounting of France

(11) The concept of "Virtual Corporation" reported in 1989 USA

(12) Edited by Tasuku Noguchi, "The developmend and expansion of CIM management", Chapter 1, Dobunkan, 1994

12 Norihiko Ishiguro, "Electronic commerce", Nikankogyoushinbunsha, 1996, p.206

13 Akio Akagi, "Sociological studies of the internet", Iwanamishoten, 1996, pp.44-45

14 Edited by Tasuku Noguchi, "Business Management of software", Zeimukeirikyoukai, 1988, pp.200-201

15 Tasuku Noguchi, "Software Management", Moriyamashoten, 1989, p.102

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