VIRTUAL EMPLOYEE MANAGEMENT THROUGH THE INTERNET

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ABSTRACT

Flexibility and stability of workforces are essential for a firm to keep competitive in the market. Both the internal and the external labors should be flexibly organized and coordinated in order to meet the firm's strategic goals in a stable way. In this paper, we explore the systematic methodologies for flexible and stable management of workforces. We propose a computationally plausible model (named VEM) for managing *virtual employees* (VEs) through the Internet. A VE may be an internal labor or an external labor. After being assigned with a specific task of a project, the VE acts as a regular employee of the firm. The position for the VE disappears when he/she finishes the task. Thus the firm may get qualified workforce without suffering from many problems (e.g. skill training, fringe benefits, and layoffs) in hiring regular employees. Mutual understanding between the firm and the VE may be enhanced for further cooperation. On the other hand, due to the diverse backgrounds of VEs (e.g. working styles, available time, and workplaces), the benefits of employing VEs cannot be obtained until a more effective management strategy is implemented. Three major aspects of effective VE management are identified: proactive project management, VE communication, and task evaluation. They are achieved through the Internet so that all the VEs in different workplaces may be linked together as a team. The interactions among the three aspects provide the necessary supports (e.g. VE recruitment, coordination, early warning, and exception management) to the management level of the firm. Thus the firm may flexibly direct various kinds of workforces to their strategic goals.

Keywords: Virtual Employee Management, Proactive Project Management, VE Communication, Task Evaluation, Internet

INTRODUCTION

Flexibly setting up suitable workforces is a critical success factor for most companies. Therefore, the boundaries among the internal departments of a company are being redefined in many ways (e.g. identity, political, task, and authority boundaries [6]). On the other hand, as more and more companies rely on contingent workers (e.g. part-time workers, self-employed workers, business services, and temporary workers), external labors become another valuable human resource to be fitted into the companies [2]. Therefore, to maintain a stable workforce, a company should be able to flexibly organize both the internal and the external labors.

The flexible organization of internal and external workforces is helpful in many ways. It establishes diverse workforces that may promote flexibility, reduce operating costs, and speed up the responses to technological change [3]. External labors often bring new technology and skills to increase competitive capability. Integration of internal and external labors enhances the diverse workforces and stimulates creativity.

Obviously, the above benefits of diverse workforces cannot be obtained until effective management strategies are implemented. Therefore, due to the concerns of cost, risk and productivity, many alternatives (e.g. outsourcing and employee leasing) have been used to find contractors to reduce the management efforts. These alternatives save the cost of recruitment, training, management, and fringe benefits.

However, many companies have been (explicitly or implicitly) in the revolutions of shifting their basis from natural resources to intellectual assets [5]. For those jobs that need intensive intellectual assets and core experiences of the company, qualified and trustable contractors are often difficult to find. Furthermore, the problems of maintenance and trouble-shooting of the products from the contractors are often heavy burdens for the company.

Therefore, more and more contingent workers that are organized and controlled by the company are introduced to the workforce [2]. From the viewpoint of flexible organization boundaries, core workers and contingent workers of a firm should be integrated together to achieve the goals precisely defined by the firm. From the viewpoint of project management, these workers (no matter internal or external) are grouped together to achieve the goal of the project. Thus the workers from different sources and of different backgrounds are integrated on a project-based basis. In the project, each worker becomes a *virtual employee* (VE). Due to the diverse backgrounds of VEs, the management of the VEs is a challenge to both the human resource management community and the information technology community.

In this paper, we explore the ways of effectively organizing and managing the qualified VEs. In particular, we are concerned with the integration of information technologies so that employee management may be supported by an information system. In the next section, we define a concept of VE. In section 3, we propose a model for effectively managing VEs through the Internet. We identify the major functions and their architectures for both obtaining the benefits of VEs and excluding the potential problems

of VEs. Section 4 evaluates the framework from several practical concerns such as costs, risks, and critical success factors of employing VEs. We finally conclude that, through the introduction of information technology, information systems may be developed to support the effective management of VEs, which are fundamental components for establishing flexible and stable workforces.

VIRTUAL EMPLOYEE

When compared with regular employees, a VE is a worker having the following four features:

(1) He/she may be an internal labor or an external labor.

(2) He/she is precisely assigned with a task of a project.

(3) He/she performs his/her task under the control of the project manager of the company.

(4) He/she leaves the project team after finishing his/her task.

A VE differs from a traditional part-time worker in that he/she works in a project-based and task-oriented manner (rather than in a fixed-time and routine-like manner). A VE differs from a traditional outsourcing contractor in that the VE team for a particular project are set up and controlled by the project managers of the company (rather than by the contractors). As each qualified labor (internal or external) is treated as a task-oriented VE, the company may obtain a more stable supply of suitable workforces, which are organized and controlled using project management techniques.

The benefits of introducing VEs

The benefits of employing VEs may be summarized as follows:

(1) The cost (e.g. skill training, fringe benefits, and layoffs) of hiring regular employees may be reduced.

(2) Human resources often play a central role in building competitive advantages for a company [11]. By considering the internal and the external human resources, the strategic goals of the company is more likely to be achieved by qualified workforces.

(3) Diverse work forces may promote flexibility, reduce operating costs, and speed up the responses to technological change [3]. Integration of internal and external VEs may enhance diverse workforces and stimulate creativity.

(4) Through the process of executing VE projects, mutual understanding between VEs and the company may be enhanced for further cooperation. The cost and the risk of hiring inappropriate regular employees may be reduced.

Typical conditions of introducing VEs

As described above, VEs are teamed up in a project-based manner. The conditions of introducing VEs may be summarized as follows:

(1) The company has the core knowledge for conducting the project,

(2) The knowledge is a valuable intellectual asset for the company, and

(3) Qualified workers (internal or external) may be found for the tasks in the project.

The three conditions guarantee that the benefits of VEs are worthy of being pursued.

Critical success factors of introducing VEs

Quality and schedule controls are the major challenges of introducing VEs. Due to the diverse backgrounds of VEs (e.g. working styles, available time, personality, and workplaces), more effective management on VEs is essential. In particular, the critical success factors may be summarized as follows:

(1) Proactive project management: In addition to task definition, assignment, and schedule control, *early warning* and *exception management* are important for VE management. Early warning provides the manager with enough time to deal with the next-stage human resource and schedule requirements of VEs. Exception management provides the manager with the way of managing the exceptions (e.g. quality and schedule) when they occur.

(2) VE communication: Being teamed up in a project, the team members require effective communications to develop common mental and coordination models [4]. Since VEs have diverse workplaces and available time, in addition to normal ways of communications, asynchronous communications through the Internet are required.

(3) Task evaluation: Selecting right VEs and then assigning them with right tasks are critical as well. As described above, a VE may be an internal worker or an external worker. Thus, the performance VEs should be evaluated and recorded for reference in other projects. Thus quantitative statistics are generated to assure quality. This may help to improve customer satisfactions and reduce failures in competitive business environments.

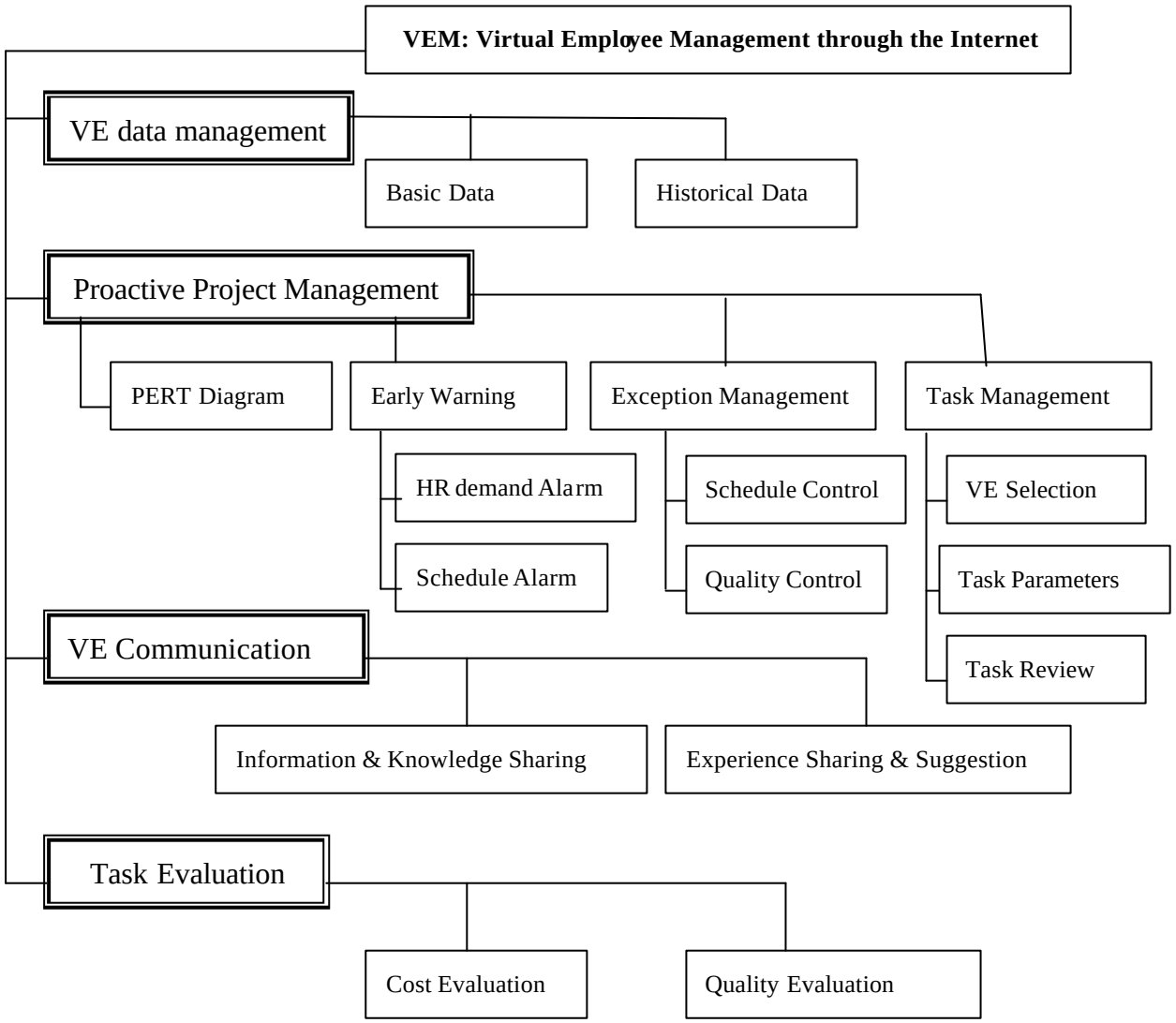

Figure 1. Functional overview of VEM

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We propose a computationally plausible model (named VEM) to support VE management through the Internet. VEM aims at supporting the managers in obtaining the benefits of VEs, while at the same time, reducing the problems induced by VEs.

A functional overview of VEM is illustrated in Figure 1. There are four main functions in VEM: (1) VE data management, (2) project management, (3) VE communication, and (4) task evaluation. The context diagram of them is shown in Figure 2.

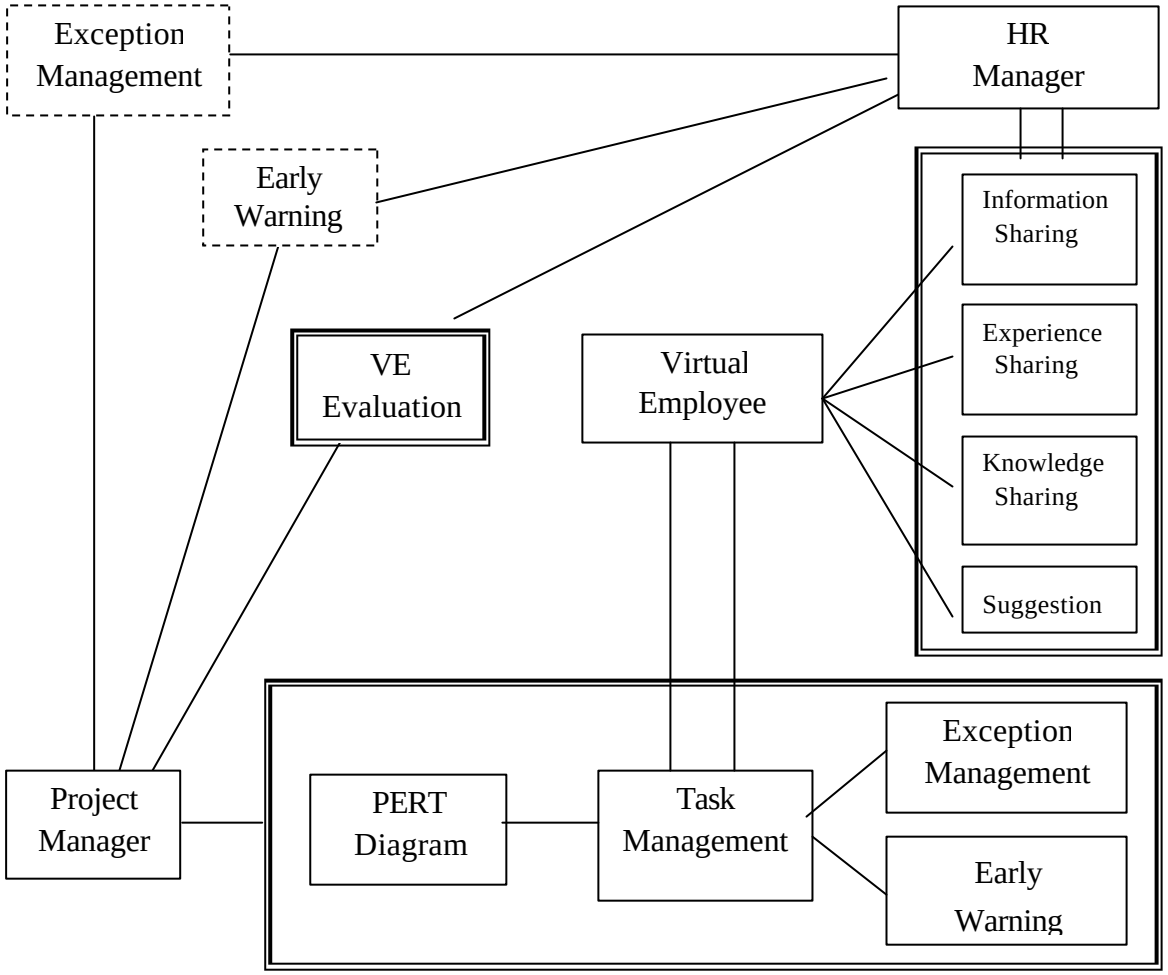

Figure 2. Context diagram of VEM

VE Data Management

The VE data management module processes basic and history data of VEs. Basic data includes VEs' personal information like name, address, sex, birth of date, degree, certificates, available time, ... etc. Historical data includes all the information concerning the performances of the VEs in previous projects. Historical data serves as the basis for rewarding and organizing VEs. It is mainly from the task evaluation module of VEM (ref. Section 3.4). The following aspects of performance data are identified as essential historical data of a VE:

(1) Timeliness of the work completed by the VE,

(2) The quality of the work completed by the VE,

(3) The extend to which the VE shares knowledge with others,

(4) The working altitude of the VE, and

(5) Other problems and contributions of the VE in the project.

VE data may be updated through the Internet so that the most up-to-date information about the VEs may be referenced for VE management.

Proactive Project Management

The proactive project management module proactively supports the manager to control the quality and the schedule of the projects. It includes four functions: (1) task management, (2) PERT diagram generation, (3) early warning, and (4) exception management.

Task Management

The task management module provides a platform for the manager to set up the project and the VE team. It supports task definition, task parameters setting, VE selections, and task review. Through the platform, the manager and the VEs communicate with each other about the current status of each task. Once any events concerning a task (e.g. successfully completed, delayed, ... etc.) is updated, the corresponding sub-modules of project management will be triggered to achieve proactive project management.

PERT Diagram Generation

The module displays the task network and calculates the critical path of the project based on the Program Evaluation and Review Technique (PERT). Due to the exceptions (e.g. quality and schedule exceptions) of the VEs, the critical path of a project may switch from one to another. Therefore, proactively monitoring the change of the critical paths is necessary. The manager in charge will be notified of any change of critical paths. A visual drill-down interface is designed to provide the manager with all information concerning the tasks of the project.

Early Warning

Due to the dynamically changing conditions of VEs, the manager needs a facility of early warning in order to have more time to deal with the critical events that will happen. The facility is *proactive* in the sense that it allows the manager to avoid possible exceptions (rather than dealing with exceptions after they have occurred). The manager is notified before the critical events actually happen.

Two kinds of events are identified to be critical for the manager: human resource demand and VE schedules. The system notifies the manager of the human resource demand of tasks before the needs actually occur for the task. Therefore, the project may be conducted even though some tasks are not assigned with VEs. This is important for VE management, since it is often impractical to assign all tasks with VEs at the initiation stage of the project. Even all tasks are assigned with VEs, uncertainties still exist due to the diverse backgrounds of the VEs.

Similarly, before a task is actually completed, the manager and the VE in charge are

notified to check the schedule. Suitable procedures may be conducted if the task might be delayed. The amount of time that early warning precedes the actual happening of the events is a system parameter that may be set by the manager.

Exception Management

When an exception actually happens, the system should be able to promptly detect it and support the manager in designing solutions to the exception. There are two kinds of exceptions identified in VEM: schedule exceptions (i.e. the task is not completed on schedule) and quality exceptions (the task does not adhere to the quality requirements). Measurable specifications for the exceptions are needed so that the system may effectively detect the exceptions [9].

The exception management facility allows the manager to promptly reorganize the schedules and the resources so that the project may go on smoothly. When reorganizing the schedules and resources, the system supports the manager in pinpointing the problems, redefining the schedules, selecting backup VEs, assigning the backup VEs, and estimating the possible loss due to the exceptions.

VE Communication

The VE communication module provides a platform for the manager and the VEs to share information and knowledge through the Internet. Being set up as a team, the VEs needs to develop and share the same mental models [4]. Due to the diverse workplaces and working time of the VEs, synchronous and asynchronous communications through the Internet are required. Therefore, in addition to common media for communications, a web site that integrates the VEs as a society will be helpful.

In the platform, knowledge and information sharing may be documented for reference in VE management. All the team members may get suggestions and experiences from each other. Mutual understandings among the manager and the VEs may be enhanced through the platform as well.

Task Evaluation

The task evaluation module is a facility for the manager to evaluate and control the cost and the quality of the project. By setting up a set of measurable evaluation criteria, the module monitors the progress of the project. As an exception concerning the overall cost and quality of the project occur, the manager is notified to deal with the situation.

The performance of each VE (ref. Section 3.1) is also monitored and recorded for reference as well. Statistical data of each VE's performance may be used to assign right people with right tasks. This is a major concern of most human resource managers. In VE management, the historical performance data VE is of particular importance.

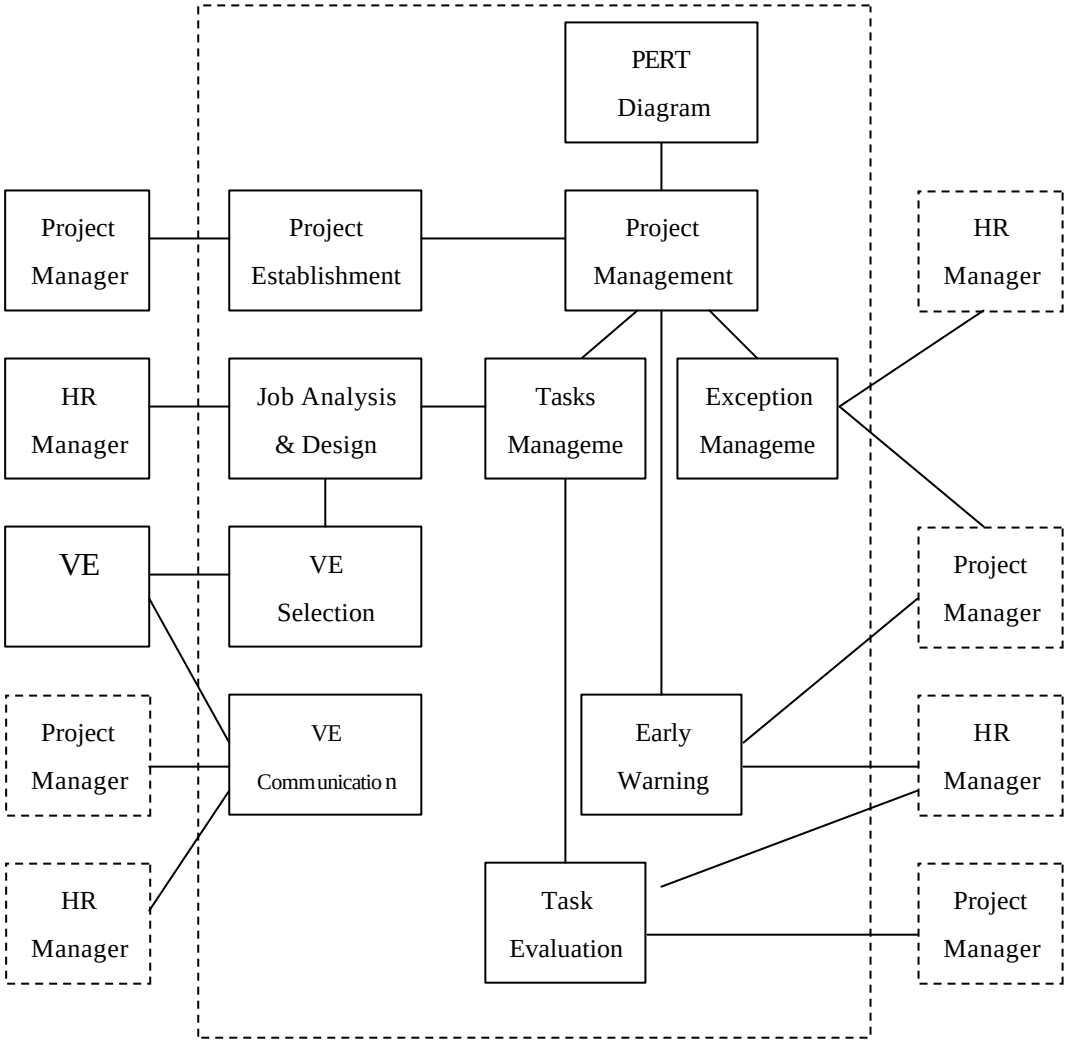

Figure 3. An example flow chart of VEM

An example

A flow chart of VEM is shown in Figure 3. To illustrate the flow, an example is raised as follows. Suppose a senior employee of a company is appointed the manager of a project. The project is to achieve the firm's strategic goal. He works out a task network and defines each task precisely. A team needs to be promptly set up to complete the project. Since this project requires much core knowledge of the firm, he decides to establish a team based on VEs.

After finishing job analysis and design, he scans a VE candidate pool to list qualified VEs either inside or outside the firm. Based on the procedures of VE selection and recruitment, he establishes a two-way communication with each candidate to check their available time and attitudes toward this project. The project manager then collected

feedback information from the candidates and prepares a list of qualified candidates. After interviewing each qualified VE candidate, the VE team for the project is established. The project manager informs the team members and keeps in touch with them through the Internet. The VEs in the team may begin to communicate with each other through the Internet as well.

During the execution of the project, the project manager collects and studies all the information concerning the VEs. He aims at finding and solving any problems that the VEs encounter. Occasionally the manager is notified (by the system) of the human resource demand of some tasks. Before the needs actually occur, the manager arranges suitable VEs for the tasks to avoid the possible exceptions. Sometimes the manager is notified (by the system) of the tasks that should be completed in the near future. He contacts the VEs that are in charge of the tasks. The schedule is checked to avoid possible delays of the project.

The manager encourages all the team members to exchange and share information with each other. Experiences and knowledge concerning the execution of the project are gradually accumulated for later reference. The society and the cooperation among VEs was tightly established through the Internet.

Once an exception or an alarm happens, the project manager is invoked to solve the problem. If a VE does not fulfill the requirements of his/her task, the project manager is notified of whether the critical path of the project is changed. Redeployment of backup VEs and redefinition of original schedules are two common methods to deal with the problem. The project manager selects a method and then initiates whatever managerial actions to implement the method.

The VEs begins to report the completion of their tasks. The project manager evaluates their work from the viewpoints of quality and timeliness. The evaluation results are recorded as historical performance data of each VE. Based on the evaluation, the project manager identifies the ways of rewarding those VEs that have met the requirements of their tasks.

EVALUATION

We have proposed a definition of virtual employees to facilitate the flexible integration of internal and external labors. A computational plausible model VEM is also proposed to effectively manage the virtual employees through the Internet. In this section, we evaluate the framework from the following four perspectives: (1) related work of VEM, (2) benefits of delivering VEM, and (3) critical success factors of VEM. Based on the evaluation, we summarize the future research directions of the work.

Related Work

From the viewpoint of underlying information technology, database technology and Internet computing are relevant to VEM. They serve as the fundamental platforms on which VEM is developed. The maturity and stability of the technology facilitate the implementation of VEM.

Another fundamental technology for VEM is the project management technique. Various techniques and information systems for project management have been developed in literature [7]. Critical Path Management (CPM) and Program Evaluation and Review Technique (PERT) are two popular and well-known techniques closely related to VEM. They have been implemented in some commercialized packages as well (e.g. Microsoft Project 98). They may help the manager to direct the firm's valuable resources to critical tasks in order to speed up the whole project. VEM implements CPM and PERT on the Internet in order to build a suitable platform for managing VEs in different workplaces at different work time.

Redeployment of employees and redefinition of schedules have been identified as effective ways of tackling problems in project management [8]. VEM extends the idea and provides several novel supports to the manager when an exception happens. In supporting the redeployment of VEs, VEM provides a facility to select and set up the backup VEs. In supporting the redefinition of schedules, VEM provides a drill-down interface to redefine the schedules. The items related to the schedules (e.g. cost evaluation) are automatically checked once the change of the schedules is confirmed. In addition, VEM further achieves *proactive* project management in the sense that the system notifies the manager of the critical events that will happen in the near future. Thus the manager may have enough time to avoid exceptions (rather than simply dealing with the problems that have happened).

VEs share some features with outsourcing contractors. An outsourcing contractor completes a project for the company. Thus the cost of project management, labor maintenance, and unemployment compensation liabilities may be reduced for the company [1]. Outsourcing is different from hiring a VE outside the company to perform a task. The major difference is that companies must be in charge of VE management. VEs are preferred when the company is conducting an important project that requires core intellectual assets of the company.

Information and knowledge sharing is essential for enhancing the performance of project teams [10]. Project changes may happen at any time in many ways. Regardless of the specific change, there exists ambiguities and doubts associated with the change. Therefore, VEM provides a platform for the managers and VEs to communicate with each other at any time in any places. The information and knowledge shared among the team members may be further documented for improving VE management.

Benefits of Delivering VEM

The benefits of VEM are twofold: (1) cost and risk reduction in human resource management and (2) quality promotion in project management.

Cost and Risk Reduction in Human Resource Management

VEM aims at supporting a firm to flexibly organize and direct its workforces to its strategic goals. The flexibility of integrating various kinds of workforces may contribute

the reduction of cost and risk to human resource management [3, 6]. In this area, the contributions of VEM may be summarized as follows:

(1) VEs are organized in a project-based manner. They are not appointed to any regular positions of the organization. After the project is completed, the VEs are dismissed. The cost and the risk of reorganizing the organization structure may be significantly reduced.

(2) Only core employees are deployed into the functional groups of the firm. There is no surplus of jobholders. Thus the core intellectual assets of the firm may be accumulated. The cost and the risk of layoffs, turnovers and breeding of human capitals are reduced.

(3) By considering both the internal and external labors, the firm may have a larger basis for recruiting qualified workers. The cost and the risk of human resource training may be reduced.

(4) Tracking and recording the performance of VEs in previous projects may reduce the cost and the risk of inappropriate VE assignment.

The reduction of the costs and the risks provides the firm with more resources for rewarding VEs. Rewarding the VEs stimulates the motivations of the VEs, which in turn, further reduces the costs and the risks of human resource management (ref. section 4.3).

Quality Promotion in Project Management

The quality of VE project management is obviously essential. The key point is that the manager should fully understand the philosophy of their own quality management and be totally committed to the goals [6, 12]. The quality will be promoted based on strong leaderships and measurable management standards. VEM supports the manager in committing the quality controls on VE projects. Its contributions to quality promotion are twofold:

(1) Through VEM, a VE team may be established to bring talented and experienced workers together. The quality of the VE project may be promoted by stimulating creativity and interchanging experiences through the Internet.

(2) VEM supports the manager in managing exceptions such as delayed schedule, defects, and VE turnovers. Its proactive project management facility provides the project leader and the human resource manager with enough time to track and tackle abnormalities. Thus the quality of the project may be promoted, while the risks of project failures may be reduced.

Critical Success Factors of Delivering VEM

Although VEM may provide contributions to human resource management and project management on VEs, other management strategies are still necessary so that the benefits of employing VEs may be actually obtained. The management strategies are

necessary due to the diverse backgrounds of VEs. Each VE may have his/her own available time, working style, workplace, and jobs. The different backgrounds lead to uncertainties in qualities and schedules of VE tasks. VEM is a tool for the manager to monitor and control the uncertainties. Additional management strategies should be set up for reducing the uncertainties and their effects. These strategies become the critical success factors of delivering VEM to the firm:

(1) More efforts should be paid for stimulating effective communications among the diverse workforces of different talents. Although VEM incorporates a platform on which the communications may be conducted through the Internet, traditional media of communications (e.g. telephone, face-to-face, documents) and are still necessary. As described above, a virtual society of VEs may be established through the VEM. All forms of communications should be conducted in a society-based manner.

(2) Suitable policies for rewarding VEs with good performances should be established. As discussed above, the VEs selected for a project are of qualified talents and experiences. They will be dismissed after the completion of the project. A suitable rewarding policy may stimulate the motivations of the VEs.

(3) Task analysis and design should be precisely and completely conducted before setting up the VE team. This involves the clarification of the inter-relationships among tasks. The specification, responsibility, and expected costs of each task should be clearly defined.

Future Work

We are currently extending the framework from the following perspectives:

(1) Implementing all the modules of VEM: All the modules are implemented and run on the Internet.

(2) Developing a technique for automatic VE selection: Currently, VEM records the basic and historical data of each VE. A more automatic VE matching and selection technique is required when there are many VEs in the database. The technique may be used in setting up VE team and selecting backup VE (when an exception occurs).

(3) A comprehensive real test of VEM: The system based on VEM will be delivered to a test site. The performance and contributions of VEM may be comprehensively evaluated in the real test.

(4) Analyzing the feasibility and critical success factors of employing VEs: Based on the system implementation and the real test, the feasibility and the usage of VEs may be re-examined. The ways of employing VEs may be improved from the analysis.

CONCLUSION

In this paper, we propose a definition of virtual employees to flexibly integrate internal and external labors of a company. A team of virtual employees is set up in a

project-based manner. Since the VEs are inherently of different backgrounds, their management becomes a major challenge. Therefore, we propose a plausible computer model VEM to facilitate the effective management of virtual employees through the Internet. Proactive project management, effective communication, and task evaluation are identified as critical components to support virtual employee management. VEM serves as a platform on which the manager may conduct project-related management through the Internet. The system creates a communication channel among all the team members. Critical exceptions and events concerning the project are proactively monitored by the system. The manager is notified when the exceptions and the events occur. Thus the manager may have more time to avoid and deal with exceptions. As the flexibility of workforce organization has been recognized as an essential consideration in current competitive environments, virtual employees and their management information systems may be a way to maintain a stable workforce to meet the strategic goals of a firm.

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THE IMPACT OF INFORMATION TECHNOLOGY ON CAREER STRATEGIES AND CAREER DEVELOPMENT ACTIVITIES OF YOUNG KNOWLEDGE WORKERS

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THE IMPACT OF INFORMATION TECHNOLOGY ON CAREER STRATEGIES AND CAREER DEVELOPMENT ACTIVITIES OF YOUNG KNOWLEDGE WORKERS

ABSTRACT

The aim of this paper is to measure the impact of information technologies (IT) on the career strategies and career development activities of young knowledge workers in technology-driven organizations. These activities as reported by Burke, Divinagracia and Mamo (1998) include orientation, career development program, technical training, management development, certification program, advanced management program, coaching from peers, key project assignments, mentoring, sponsoring, networking, and career pathing.

Information was obtained from young knowledge workers at the Los Banos Science Community (LBSC) in the Philippines. The LBSC is host to numerous food, engineering, and biological-related technology-driven organizations.

The young knowledge workers, who served as respondents in this study, are highly educated and are satisfied with the progress that they are achieving in their careers and jobs. Most of them anticipate an upward movement in the managerial hierarchy of their respective organizations because of their performance and merits. The respondents gave a high rating on the usefulness of the career development activities that they participated in. They likewise perceive a higher level of usefulness in the career development activities that they will participate in the future. These include, among others, increased participation in management development and its related programs; and networking.

In the next five years, the career strategies of the young knowledge workers are aimed at obtaining a broad-based work experience in their present work environment; and using a network of contacts inside and outside their respective organizations to obtain useful information. The engagement of these future career strategies are driven by the strategies that the young knowledge workers have pursued within the past year, and the information technologies that are currently employing in their jobs.

The information technologies, career development activities, and career strategies of the young knowledge workers are intertwined with their work environment and movement in their organizations. In preparation for their upward movement, the respondents' career strategies were aimed at acquiring broad-based work experience and the pursuit of management development-related career development activities. With lesser dependence on immediate subordinates in their work stations, the future career strategies of the young knowledge workers will also be directed at using a network of contacts within and outside the organization, and the application of internal and external networking in their career development activities. The envisioned increased usage of information technologies that are related to networking are essential and necessary to enable the young knowledge workers to cope up with their growing work-related and home-related tasks.

BACKGROUND AND RELEVANCE OF THE STUDY

The rapid change in information technology during the past decade is a major force in reshaping the practice of human resource management in the SMEs and other organizations of the future. Information technology and advances in telecommunications have given birth to the future workplace- the virtual enterprise. Using technology, Schellenburg (1994) and Geber (1995) had mentioned that virtual project teams of individuals having the best brains could be formed regardless of geographic location. Greiner and Metes (1995) further stated that virtual work tasks are designed around "electronic information access rather than sequential flow." This means that virtual operations will be characterized by parallel work that is performed by dispersed human resources. People in the virtual workplace will see their work develop and evolve, and contribute to it as appropriate. Moreover, Handy (1997) had characterized the enterprises of the future as "boxes of contracts." Drucker (1997) further described them as networks of lean organizations with shared goals but no long-term relationships.

As the organizations of the future become flatter with hierarchical structures replaced by ad-hoc teams, traditional career paths will disappear. Thus, the challenge is to provide career development programs that will generate meaningful work experiences for the employee (Hendrick, 1989); in a problem-solving environment (Miller, 1997), and a comprehensive orientation program that can speed up organizational culture learning where "teamwork and partnership are the dominant modalities" (Smith & Kelly, 1997).

The aim of this paper is to measure the impact of information technologies (IT) on the career strategies and career development activities of young knowledge workers in technology-driven organizations. These activities as reported by Burke, Divinagracia and Mamo (1998) include orientation, career development program, technical training, management development, certification program, advanced management program, coaching from peers, key project assignments, mentoring, sponsoring, networking, and career pathing.

RESEARCH METHOD

Information was obtained from young knowledge workers at the Los Banos Science Community (LBSC) in the Philippines. The LBSC is host to numerous food, engineering, and biological-related technology-driven organizations.

Pre-tested questionnaires adopted from the research work of Burke, Divinagracia, and Mamo (1998) were used. Quota sampling was used to determine the technology-driven organizations selected for the study. Thereafter, a set of selection criteria was applied to generate the list of respondents interviewed from the sampled organizations.

The measures for career and job success were adopted from measurement scales developed by Quinn and Shepard (1974), Burke (1991), Greenhaus et.al. (1990), and Lodahl and Kejner (1965). The measures for participation in career development

activities were adopted from those formulated by Greenhaus et. al. (1990) and Burke and McKeen (1994). The rest of the measures were adopted from Burke, Divinagracia, and Mamo (1998).

RESULTS AND DISCUSSION

Demographic Characteristics of the Respondents

The demographic characteristics of the respondents are shown in Table 1. Out of the targeted 120 respondents, there were 42 young knowledge workers (or a response rate of about 33%) who participated in this study. More than half of them was below 37 years old. The respondents were predominately female, married, and had completed college.

More than half of them were earning less than P15,000.00 per month (US$400), have children but without household help. These respondents do not have a professional designation, and worked more than 40 hours on a 5-day week without the benefit of having an immediate subordinate.

The respondents were mostly occupying middle management level positions. About half of them expect to move up the organizational ladder.

Levels of Career and Job Satisfaction

Table 2 shows that the respondents have expressed a favorable level of satisfaction with the success that they had achieved in their career; and the progress that they had made in meeting overall career goals as well as goals for advancement.

The respondents somewhat expect to advance as far as their abilities permit. They perceive that promotion in their respective organizations is based on merit and achievement.

They are also, to a certain extent, personally involved in their work. Although the respondents had occasionally thought of leaving their jobs, they are still willing to stay with their present employers even if they will be given the opportunity to go to any job that they wanted.

Career Strategies

The respondents tend to engage the following career strategies (Table 3) more frequently in their respective organizations within the past year:

1. worked harder when they knew that their superiors would see the results;
2. obtained a broad-based work experience in the organization; and
3. used a network of contacts within and outside the organization to obtain useful information

Although their career strategies are not expected to change significantly in the future, the respondents will increasingly engage the second strategy over the first one.

Career Development Activities

Tables 4a and 4b show that the respondents mostly participated in the following career development activities: technical training; key project assignments; mentoring; career development programs, orientation; and coaching from peers. The respondents found these career development activities useful in helping them achieve their career goals.

The following career development activities were also rated useful: management development; career pathing; external networking; and internal networking. The respondents, relative to the former activities, did not as popularly participate in these activities.

In the future, more respondents are expected to participate in the following career development activities, management development; certification program; advance management program; career pathing; external networking; internal networking; and sponsoring.

Use of Information Technologies

Within the past year, the respondents in their work frequently used information technologies such as the Internet, the personal computer, and the telephone. The electronic pager was least utilized (Table 5a).

In the next five years (Table 5b), the respondents expressed higher levels of utilization of each of the different information technologies are available in their respective organizations. Other than the Internet and the telephone, the respondents perceive a significant increase in the usage of personal computers that are linked through a network (e.g. Intranet) from among themselves; and their partner organizations and clients.

Relationship of Information Technology Utilization, Career Strategies, and Career Development Activities

Stepwise regression was applied to determine the possible relationship among current and future information technology utilization, career strategies, and career development activities.

Results showed (Table 6) that there is a highly significant positive relationship between current career strategies (as a dependent variable); and the usefulness of the career development activities that the respondents participated in (as a predictor variable). This means that the usefulness of such activities to the young knowledge workers would tend to positively influence their frequency of engaging a particular set of career strategies.

Moreover, a highly significant relationship was also observed with the career strategies that will be pursued in the future (as a dependent variable), and the career strategies currently pursued as well as the information technologies presently utilized by

the respondents in their work environment (as predictor variables). This relationship implies the likely impact of information technologies on future career strategies.

Lessons Learned

The young knowledge workers, who served as respondents in this study, are highly educated and are satisfied with the progress that they are achieving in their careers and jobs. Most of them anticipate an upward movement in the managerial hierarchy of their respective organizations because of their performance and merits.

In the performance of their tasks, most of the young knowledge workers either have a very limited number of immediate subordinates or none at all. They worked more than 40 hours in a 5-day workweek while attending to the needs of their families and growing children sans nannies and household help.

The respondents gave a high rating on the usefulness of the career development activities that they participated in. They likewise perceive a higher level of usefulness in the career development activities that they will participate in the future. These include, among others, increased participation in management development and its related programs; and networking.

In the next five years, the career strategies of the young knowledge workers are aimed at obtaining a broad-based work experience in their present work environment; and using a network of contacts inside and outside their respective organizations to obtain useful information. The engagement of these future career strategies are driven by the strategies that the young knowledge workers have pursued within the past year, and the information technologies that are currently employing in their jobs.

The information technologies, career development activities, and career strategies of the young knowledge workers are intertwined with their work environment and movement in their organizations. These are illustrated by the following:

1. In preparation for their upward movement, their career strategies are aimed at acquiring broad-based work experience and the pursuit of management development-related career development activities.

2. With lesser dependence on immediate subordinates in their work stations, the future career strategies of the young knowledge workers will also be directed at using a network of contacts within and outside the organization, and the application of internal and external networking in their career development activities.

3. The envisioned increased usage of information technologies that are related to networking are essential and necessary to enable the young knowledge workers to cope up with their growing work-related and home-related tasks.

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Table 1.
Demographic Characteristics

	N	%
Age		
20-23	1	2.38
24-27	8	14.28
28-31	8	14.29
32-36	9	21.43
37-40	20	47.62
Gender		
Female	24	57.14
Male	18	42.86
Marital Status		
Single, never married	12	28.57
Married	30	71.43
Education		
College undergraduate	2	4.76
Completed college	18	42.86
Some master's	4	9.52
Completed master's	9	21.43
Some doctorate	7	16.67
Completed doctorate	2	4.75
Monthly Gross Income (PhP)		
Below 10,000	5	11.90
10,000-14,999	22	52.38
15,000-19,999	11	26.19
20,000-24,999	2	4.75
35,000 and over	2	4.75
Children		
No	16	38.10
Yes	26	61.90
Household Help		
No	27	64.29
Yes	15	35.71

Table 1 (continuation).
Demographic Characteristics

	N	%
Professional Designation		
No	32	76.19
Yes	10	23.81
Hours Worked per Week		
36 to 40	11	26.19
41 to 45	14	33.33
46 to 50	7	16.67
51 to 55	3	7.14
56 to 60	3	7.14
More than 60	4	9.52
Immediate Subordinates		
More than 10	1	2.38
7 to 9	0	0
4 to 6	4	9.52
1 to 3	15	35.71
None	22	52.38
Current Level in the Organization		
Senior Management level	1	2.38
Middle Management level	20	47.62
Lower Management level	14	33.33
Lowest Management level	7	16.67
Perceived Level in the Organization in the Next Five Years		
Senior Management level	12	28.57
Middle Management level	21	50.00
Lower Management level	7	18.67
Lowest Management level	2	4.76

Table 2
Indicators of Career and Job Satisfaction

	Average Rating
Career Satisfaction	3.76
Career Prospects	3.52
Job Involvement	3.72
Job Satisfaction	3.23
Intention to Quit	2.21

The average response represents the respondents' agreement/ disagreement with statements that measure the level of career and job satisfaction. A value of 5 would mean, among others, that the respondent strongly agrees with the statement that he/she is satisfied with his/her career/ job success. An extreme value of 1 would mean that he/she strongly disagrees with the statement on being able to attain career/ job success. The reverse would apply for the last measure, "Intention to Quit."

Table 3a
Career Strategies Engaged Within the Past Year

	Average Rating
Career Strategy 1 **Worked harder when you knew your superiors would see the results.**	3.14
Career Strategy 2 **Used a network of contacts within the organization to obtain useful information.**	2.89
Career Strategy 3 **Obtained a broad-based work experience within the organization.**	2.91
Career Strategy 4 **Used a network of contacts outside the organization to obtain useful information.**	2.73
Career Strategy 5 **Made your boss aware of the assignments you want.**	2.18
Career Strategy 6 **Sought career guidance from experienced persons within the organization.**	2.38
Career Strategy 7 **Sought career guidance from experienced persons outside the organization.**	2.17

A value of 4 would mean “Always” (100% of the time); a value of 3 would be associated with “Frequent” (71% to 99% of the time); the value of 2 with “Occasional”(45% to 70% of the time); and the value of 1 to “Never” (less than 45% of the time)

Table 3b
Career Strategies That Will Be Engaged in the Next 5 Years

	Average Rating
Career Strategy 1 **Worked harder when you knew your superiors would see the results.**	3.20
Career Strategy 2 **Used a network of contacts within the organization to obtain useful information.**	3.10
Career Strategy 3 **Obtained a broad-based work experience within the organization.**	3.34
Career Strategy 4 **Used a network of contacts outside the organization to obtain useful information.**	3.11
Career Strategy 5 **Made your boss aware of the assignments you want.**	2.79
Career Strategy 6 **Sought career guidance from experienced persons within the organization.**	2.78
Career Strategy 7 **Sought career guidance from experienced persons outside the organization.**	2.42

A value of 4 would mean "Always" (100% of the time); a value of 3 would be associated with "Frequent" (71% to 99% of the time); the value of 2 with "Occasional"(45% to 70% of the time); and the value of 1 to "Never" (less than 45% of the time)

Table 4a.
Indictors of Participation In Career Development Activities and Level of Usefulness

Career Development Activity	Number Participating		Usefulness	
	No.	%	Ave.	SD
ORIENTATION: Program to brief new employees on rules and regulations; policies; procedures; and benefits.	27	64.29	4.73	0.45
CAREER DEVELOPMENT PROGRAM: Classes and/or seminars to help develop a greater awareness of interests; values and career goals; develop career decision-making skills and learn about different career opportunities.	28	61.90	4.68	0.47
TECHNICAL TRAINING: Programs designed to teach specific job-related information and skills (e.g. programming, budgeting, operations research, etc.)	32	76.19	4.90	0.40
MANAGEMENT DEVELOPMENT: Programs designed to teach broad management skills such as supervision and coaching; management decision-making; strategic policy making.	12	28.57	4.63	0.52
CERTIFICATION PROGRAM: Formal certification program in which the employee participates with the company's financial support.	11	26.19	2.21	0.67
ADVANCE MANAGEMENT PROGRAM: Summer or year-long program in management training and development typically conducted at a graduate or professional school.	8	19.06	3.35	0.52

A value of 5 under the column of "Usefulness" would mean that the career development activity was "Extremely Useful"; a value of 4 would mean that the activity was only "Somewhat Useful"; 3 was "Neither Useful or Useless"; 2 was "Somewhat Useless"; and 1 was "Extremely Useless".

Table 4a (Continuation).
Indictors of Participation In Career Development Activities and Level of Usefulness

Career Development Activity	Number Participating		Usefulness	
	No.	%	Ave.	SD
COACHING FROM PEERS: Formal or informal process of day-to-day coaching and counseling by one or more of your peers on how to improve your job performance and how to get along in the organization.	26	61.90	4.23	0.88
KEY PROJECT ASSIGNMENTS: Formal or informal process in which you were selected to carry out or assist in carrying out a specific project, typically involving work on a project team, task force or ad hoc committee.	31	73.81	4.64	0.49
MENTOR: A relationship with a more experienced colleague in order to provide you with increased opportunities for advancement, corporate visibility, guidance and advice, and 'running interference.'	29	89.05	4.74	0.48
SPONSOR: A relationship with an individual of higher status or greater influence in the organization that provides you with 'favored status', special treatment or increased power and influence.	11	26.19	2.01	0.77
INTERNAL NETWORKING: An informal set of contacts and channels of communication inside the organization used to obtain information or advice relevant to your job performance and career goals.	22	52.38	4.51	0.50
EXTERNAL NETWORKING: An informal set of contacts and channels of communication outside the organization used to obtain information or advice relevant to your job performance and career goals.	22	52.38	4.60	0.51
CAREER PATHING: A process of providing or transferring you to a different job in the organization to provide you with needed skills, experience and exposure.	16	38.10	4.60	0.51

A value of 5 under the column of "Usefulness" would mean that the career development activity was "Extremely Useful"; a value of 4 would mean that the activity was only "Somewhat Useful"; 3 was "Neither Useful or Useless"; 2 was "Somewhat Useless"; and 1 was "Extremely Useless".

Table 4b.
Indictors of Future Participation In Career Development Activities and Perceived Level of Usefulness

Career Development Activity	Number Participating		Usefulness	
	No.	%	Ave.	SD
ORIENTATION: Program to brief new employees on rules and regulations; policies; procedures; and benefits.	31	73.81	4.78	0.46
CAREER DEVELOPMENT PROGRAM: Classes and/or seminars to help develop a greater awareness of interests; values and career goals; develop career decision-making skills and learn about different career opportunities.	32	76.19	4.72	1.93
TECHNICAL TRAINING: Programs designed to teach specific job-related information and skills (e.g. programming, budgeting, operations research, etc.)	34	80.95	4.84	1.99
MANAGEMENT DEVELOPMENT: Programs designed to teach broad management skills such as supervision and coaching; management decision-making; strategic policy making.	32	76.19	4.76	1.70
CERTIFICATION PROGRAM: Formal certification program in which the employee participates with the company's financial support.	27	64.29	4.74	1.87
ADVANCE MANAGEMENT PROGRAM: Summer or year-long program in management training and development typically conducted at a graduate or professional school.	26	61.90	4.77	1.71

A value of 5 under the column of "Usefulness" would mean that the career development activity was "Extremely Useful"; a value of 4 would mean that the activity was only "Somewhat Useful"; 3 was "Neither Useful or Useless"; 2 was "Somewhat Useless"; and 1 was "Extremely Useless".

Table 4b (Continuation).
Indictors of Future Participation In Career Development Activities and Perceived Level of Usefulness

Career Development Activity	Number Participating		Usefulness	
	No.	%	Ave.	SD
COACHING FROM PEERS: Formal or informal process of day-to-day coaching and counseling by one or more of your peers on how to improve your job performance and how to get along in the organization.	28	66.67	4.54	1.41
KEY PROJECT ASSIGNMENTS: Formal or informal process in which you were selected to carry out or assist in carrying out a specific project, typically involving work on a project team, task force or ad hoc committee.	33	78.57	4.80	1.76
MENTOR: A relationship with a more experienced colleague in order to provide you with increased opportunities for advancement, corporate visibility, guidance and advice, and 'running interference.'	31	73.81	4.80	1.76
SPONSOR: A relationship with an individual of higher status or greater influence in the organization that provides you with 'favored status', special treatment or increased power and influence.	21	50.00	3.92	2.51
INTERNAL NETWORKING: An informal set of contacts and channels of communication inside the organization used to obtain information or advice relevant to your job performance and career goals.	35	83.33	4.63	1.20
EXTERNAL NETWORKING: An informal set of contacts and channels of communication outside the organization used to obtain information or advice relevant to your job performance and career goals.	33	78.57	4.62	2.07
CAREER PATHING: A process of providing or transferring you to a different job in the organization to provide you with needed skills, experience and exposure.	28	66.67	4.52	2.01

A value of 5 under the column of "Usefulness" would mean that the career development activity was "Extremely Useful"; a value of 4 would mean that the activity was only "Somewhat Useful"; 3 was "Neither Useful or Useless"; 2 was "Somewhat Useless"; and 1 was "Extremely Useless".

Table 5a
Use of Information Technologies in Work/ Profession
Within the Past Year

	Average Rating
Telephone with NDD/IDD features	2.88
Mobile phone or cellular phone	2.20
Personal computer with no local area network	2.96
Personal computer with a local area network	2.54
Internet and/or electronic mail	3.04
Fax Machine	2.41
Pager	1.12

A value of 4 would mean "Always" (100% of the time); a value of 3 would be associated with "Frequent" (71% to 99% of the time); the value of 2 with "Occasional"(45% to 70% of the time); and the value of 1 to "Never" (less than 45% of the time)

Table 5b.
Expected Future Use of Information Technologies
In Work/ Profession

	Average Rating
Telephone with NDD/IDD features	3.32
Mobile phone or cellular phone	2.74
Personal computer with no local area network	2.94
Personal computer with a local area network	3.47
Internet and/or electronic mail	3.55
Fax Machine	3.03
Pager	2.04

A value of 4 would mean “Always” (100% of the time); a value of 3 would be associated with “Frequent” (71% to 99% of the time); the value of 2 with “Occasional”(45% to 70% of the time); and the value of 1 to “Never” (less than 45% of the time)

Table 6
Stepwise Regression

Dependent Variables	R^2	$Prob_F$	$Prob_T$
Career Strategies Pursued	0.40	0.0003	
Usefulness of the Career Development Activities			0.003
Career Strategies to be Pursued	0.37	0.0032	
Career Strategies Pursued			0.029
Information Technologies Utilized			0.040

TECHNOLOGY INNOVATIONS IN THE 21ST CENTURY: IMPLICATIONS FOR HUMAN RESOURCE MANAGEMENT IN SMEs

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TECHNOLOGY INNOVATIONS IN THE 21ST CENTURY: IMPLICATIONS FOR HUMAN RESOURCE MANAGEMENT IN SMEs

ABSTRACT

The SMEs in the APEC region have been experiencing radical changes in the past decade such as the economic ambience in the mid-90s as well as the economic turmoil in the late 90s. Besides economic changes, the advent of new technology has also created profound impact on SMEs in terms of products, services, delivery methods, and other business transactions. A recent survey has revealed that the owners of SMEs has regarded human resource management as the second most important function in their enterprises. Although there may not be a separate human resource department established in most SMEs, there still exist the strong demand for effective human resource management practices to effect organizational success of SMEs.

There is a need for the human resource function in organization of all sizes, with the small and medium size enterprise in particular, to keep up with the growing demands for services as the businesses they support expand to meet the competitive global market place. Application of information technology in human resource practice is one means of enhancing the organizational competitiveness within the global arena.

Under the impact of the technological advance, the traditional HR functional model of the SMEs may not be sufficient in the global setting in the 21st century. In this study, the author would examine to what extend that the SME has made use of information technology in their HR practices and how they perceive the importance of such application in the future. Both quantitative and qualitative approaches have been used in this study. The contribution of this study provides valuable insights to executives of SMEs and researchers who are interested in developing effective human resource management for SMEs in the future.

INTRODUCTION

A survey conducted by Hess (1987) showed that small business owners ranked human resource management as the second most important management activity next to general management and organizational work. Moreover, most studies conducted on human resource practices have been targeted at large size enterprises, few attempts have been made to examine how human resource practices contribute to the effective functioning of SMEs. Even rare is the study on impact of information technology on human resource practices of SMEs. This survey is an exploratory study in examining the impact of information technology on the human resource practices adopted by SMEs in the Asian region.

The 21st century is the age of information technology. Information technology will permeate almost every business practice and drive enormous strategic and practical progress. Information technology has brought about tremendous changes in the management process. Although lesser use has been reported in the human resource area when comparing with other management function like accounting and finance, more human resource managers have begun to make full use of information technology in their work.

In 1989, the survey by National Computer Board (NCB) of Singapore has investigated the usage of information technology in Singapore. Results indicated that among all organizations with computers, 49% were using them for human resource applications while 85% used computers for accounting and finance functions. Although the usage for human resource applications was lower than for financial functions, there has been an increase since 1987 when only 30% of the organizations used them for human resource applications. As indicated in the report, the use of computers for human resource applications is more extensive in the larger organizations. The usage was 39% among those with 10-24 employees, compared with 69% among those with more than 100 employees (Torrington & Tan, 1994).

Application of Information Technology in Human Resource Practices

Application of information technology has lagged behind its applications in other management functions such as accounting, manufacturing, and financial planning. It was payroll that gave birth to the first application of information technology in human resource practices in the form of human resource information system (HRIS).

HRIS is defined as a computer-based method for collecting, storing, maintaining, retrieving, and validating HR data. More than just a system for preparing standard reports, an HRIS is typically designed and structured to permit the retrieval of user-defined ad hoc reports, comparative analyses, and employee data items (Carrell et al, 1995). A well-developed human resource information system (HRIS) can provide many benefits to the company. By integrating the available information from various sources, the system can generate output data which are useful for decision-making and planning activities related to human resource activities.

In addition to employee and applicant information, the HRIS data base contains organizational and job-related data. The creation of the data base may be the most important step in implementing the system.

In 1992 Towers Perrin conducted a study which is used as a global benchmark on a number of HR items, identified the top three major current and future benefits of HRIS. First one is the faster information processing and greater information accuracy; second is the improved planning and program development; and third is the enhanced employee communication.

In fact, HRIS has provided the hub of data base which enhance a wide range of human resource administration ranging from manpower planning, job analysis, recruitment and selection, job evaluation, compensation, training, performance appraisal to succession and career planning.

Besides the usage of HRIS, information technology has also different variety of services to be offered by the human resource practitioners. With the advent of electronic commerce, web recruiting has proved to be cost effective and becoming popular in the Asian region. Information technology has also influenced the selection criteria. Future work will require a high level of computer literacy. It will demand not only people who know how to use the Internet, a word processing program and a spreadsheet, but also individuals who understand the radically different conceptual framework in which tasks, projects and alliances will be handled. Company training materials or programmes could be disseminated via web with boundless coverage.

METHODOLOGY

In this survey, questionnaires have been sent to small and medium size enterprise. Small and medium size enterprise refers to company registered in Hong Kong with employee size of two to five hundred. Questions have been asked on their use of information technology in human resource practices; degree of effectiveness in such IT application; and perceived importance of IT application in the future. In addition to the quantitative approach, qualitative approach in the form of interview was used. Human resource managers or person in-charge of human resource function of twenty SMEs were interviewed to express their views on IT application on human resource practices in their organization.

RESULTS AND DISCUSSION

The total number of returned questionnaire is 236. Out of these 236 respondents, only 201 (85%) enterprises having Asian ownership have been included in this study. The ownership distribution is that 54% is Hong Kong; 20% is Chinese; 16% is Chinese Taipei; 4% is Japanese; 3% is Singaporean; 1% for both Malaysian, Indonesian and Thai respectively.

Among these small and medium size enterprises, trading is their major business which amounts to 62%. Technology business is ranked as second (13%) and followed by marketing and advertising ranks (11%). Communication business amounts to 6%

while manufacturing amounts to 5% to be followed by financial services (2%) and construction (1%).

When asked about the application of IT in human resource practices, 35% reported as frequent; 41% reported as sometimes; 14% as occasional and 10% as seldom. 32% of them regarded such application very effective; 49% as effective while 19% reported as quite effective. When asked about the perceived importance of IT application in human resource practices, 42% reported as very important and 53% reported as important.

As far as recruitment and selection is concerned, 16% reported frequent use of IT in their recruitment and selection process; 71% reported as sometimes user; 5% as occasional and 2% reported as seldom. Only 6% reported they have not use any IT in their recruitment and selection process. 3% reported the IT application in recruitment and selection is very effective while the majority of 32% reported effective. 19% reported quite effective in the application. When asked about the perceived importance of IT application in recruitment and selection, 41% reported as very important; 27% as important while 32% reported as quite important.

57% of the respondents reported the frequent application of IT in the training and development activities. 24% and 9% reported sometimes and occasional use respectively. Among all respondents, 53% reported the application of IT in their training and development function to be very effective; while 29% reported as effective and 8% reported quite effective. 69% considered IT application in training and development as very important; while 12% and 19% regard it as important and quite important respectively.

96% reported frequent use of IT in compensation administration and 4% reported as sometimes users. 74% of the user rated the application as very effective; while 20% rated as effective and 6% as quite effective. 65% of the respondents perceived IT application in compensation administration as very important; while 19% of them rated important while 16% reported quite important.

2% reported as frequent users of IT application in performance appraisal; while 24% reported as sometimes users; 29% reported as occasional users. 28% reported that they seldom have IT application in performance appraisal function while 17% reported 'not at all' IT application in performance appraisal. Among those SMEs who have use IT applications in performance appraisal, only 1% gave 'very effective' rating, while 28% rated the IT application as 'effective' and 54% rated it as 'quite effective'. The perceived importance of IT application in performance appraisal is 39% rated very important while 40% rated as important. The rest of 21% rated as quite important.

Among the four major human resource practices, compensation administration is the one using the IT application most frequently, to be followed by training and development; performance appraisal. Recruitment and selection is having the least frequent IT application.

As far as effectiveness in use is concerned, compensation administration is having the highest percentage of 'very effective', to be followed by training and development and performance appraisal. Recruitment and selection is having the lowest degree of effectiveness.

Training and development is having the highest degree of 'perceived importance' among the four human resource practices, to be followed by compensation administration and performance appraisal. Recruitment and selection is having the lowest degree of perceived importance among the four human resource practices.

Implications

From the results of this survey, 100% of SMEs have somehow make use of IT application in their HR practices. It implies that IT application has been widely used in the HR practices among SMEs, although the frequent use is found in the compensation administration work. Not only that IT application has been found as most frequent in compensation administration (96%) but also it has been rated as most effective by the users (74%). One reason for such high usage and high effectiveness is due to the early development of related software for the compensation administration package. Also, the job nature of compensation administration justified the frequent application of information technology to reduce the job tediousness. The implication is that the more frequent the usage, the more people get familiarized with its usage and the high effectiveness can be within reach.

On the other hand, there is not much related IT application for the recruitment and selection activities available to be used by the human resource practitioners. This may be due to the unavailability of appropriate technology to be used in the recruitment and selection process. Moreover, it is anticipated that recent use of web or online recruiting may create tremendous change in the traditional recruitment and selection process. The availability of user-friendly web-based preparation techniques enhances the human resource practitioners to make better use of information technology.

IT application in training and development is perceived as the most important among the four human resource practices. This may imply that information technology will not merely satisfy with data provision for training related activity but would diffuse its application in other forms of application like web-based training which has recently gained its popularity. It also may imply the importance of aligning training and development needs, which has grown into a more important human resource function, with latest information technology development in order to achieve the organizational competitiveness in the dynamic arena that all organizations whether large or small are facing.

Interview results indicated that there are reasons for the application of IT in human resource practices. The most obvious reason is the efficiency involved. IT helps to reduce tedious job that was previously done by hands. The efficiency in turn benefits in the time saved and a better job design as a result of IT application. IT can also help to maintain the quality standard of human resource services and activities involved.

Assessment and auditing of HR activities is made flexible and feasible. IT can provide accurate and current data to enable the linkage of HR data and business needs.

On the other hand, there are many barriers that hinder the application of IT in the human resource application. The first barrier is the costs involved. This is especially true to really small company with less than ten employees. Second barrier is the lack of IT orientation of the person in charge. This lack of IT orientation and knowledge limits the feasibility of selecting appropriate IT application.

RECOMMENDATIONS

There has been the misconception that only large multinational organizations justify the application of information technology in human resource practices. With the availability of latest and economical technological resources, it is also justify for small and medium size enterprises to make better use of IT in the human resource management. Although the initial set up cost may imply financial burden, it can be cost effective in the long run with adoption of appropriate selection criteria. It also enhances empowerment and better job design of the human resource practitioners concerned. The orientation of user and selection of resources can be crucial factors for the application.

CONCLUSION

21st century is the time for information exchange and such exchange should not be restricted to just a few management functions like operations, finance or marketing. It should extend its coverage to other important management function like human resource function. Such coverage has definitely benefited the large size organizations, and is now extending its influence to the small and medium size enterprises. The application of information technology has started to impact the human resource practices in tremendous ways and will continue to do so in the coming millennium .

Appendix

Table 1: Nature of business

Nature of business	%
Trading	62
Manufacturing	5
Financial services	2
Construction	1
Communications	6
Technology	13
Marketing and advertising	11

Table 2: No. of employees

No. of employees	%
1-20	9
21-50	10
51-100	21
100-150	5
151-200	14
201-300	12
301-400	17
401-500	12

Table 3: Ownership

Ownership	%
Hong Kong	54
China	20
Chinese Taipei	16
Japan	4
Singapore	3
Malaysia	1
Indonesia	1
Thailand	1

Table 4: HR department/person in charge of HR matters

HR department/person in charge of HR matters	%
Yes	98
No	2

Table 5: Use of IT application in human resource management practices

Use of IT application in human resource management practices	%
Frequent	35
Sometimes	41
Occasional	14
Seldom	10
not at all	0

Table 6: Degree of effectiveness in IT application in human resource practices

Degree of effectiveness in IT application in human resource practices	%
very effective	32
effective	49
quite effective	19
ineffective	0
very ineffective	0

Table 7: Perceived importance of IT application in human resource practices

Perceived importance of IT application in human resource practices	%
very important	42
important	53
quite important	5
not important	0
very unimportant	0

Table 8: Use of IT application in recruitment and selection

Use of IT application in recruitment and selection	%
Frequent	16
Sometimes	71
Occasional	5
Seldom	2
not at all	6

Table 9: Degree of effectiveness in IT application in recruitment and selection

Degree of effectiveness in IT application in recruitment and selection	%
very effective	3
effective	32
quite effective	19
ineffective	0
very ineffective	0

Table 10: Perceived importance of IT application in recruitment and selection

Perceived importance of IT application in recruitment and selection	%
Very important	41
important	27
quite important	32
not important	0
very unimportant	0

Table 11: Use of IT application in training and development

Use of IT application in training and development	%
Frequent	57
Sometimes	24
Occasional	9
Seldom	0
not at all	0

Table 12: Degree of effectiveness in IT application in training and development

Degree of effectiveness in IT application in training and development	%
very effective	53
effective	29
quite effective	8
ineffective	0
very ineffective	0

Table 13: Perceived importance of IT application in training and development

Perceived importance of IT application in training and development	%
very important	69
important	12
quite important	19
not important	0
very unimportant	0

Table 14: Use of IT application in compensation administration

Use of IT application in compensation administration	%
Frequent	96
Sometimes	4
Occasional	0
Seldom	0
not at all	0

Table 15: Degree of effectiveness in IT application in compensation administration

Degree of effectiveness in IT application in compensation administration	%
Very effective	74
Effective	20
Quite effective	6
Ineffective	0
Very ineffective	0

Table 16: Perceived importance of IT application in compensation administration

Perceived importance of IT application in compensation administration	%
very important	65
important	19
quite important	16
not important	0
very unimportant	0

Table 17: Use of IT application in performance appraisal

Use of IT application in performance appraisal	%
Frequent	2
Sometimes	24
Occasional	29
Seldom	28
not at all	17

Table 18: Degree of effectiveness in IT application in performance appraisal

Degree of effectiveness in IT application in performance appraisal	%
Very effective	1
Effective	28
Quite effective	54
Ineffective	0
Very ineffective	0

Table 19: Perceived importance of IT application in performance appraisal

Perceived importance of IT application in performance appraisal	%
very important	39
important	40
quite important	21
not important	0
very unimportant	0

Table 20: IT application on different HR practices

IT Application in different HR practices	Frequent use of IT application	Very effective application of IT	Perceived importance of IT application
Recruitment and selection	16	3	41
Training and development	57	53	69
Compensation administration	96	74	65
Performance appraisal	30	24	39
Overall HR practices	35	32	42

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