Develop an Online Based Virtual Office Management Software

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Abstract: Virtual office has become a popular and desired office management system for technology-based low-cost office management system. The process of designing and implement a low cost and effective "Virtual office management system" has been introduced in this research. This virtual management system is a new way of working that enables the virtual worker to work outside the walls of the traditional office. In this system, all the administrative functions of an organization are not necessarily geographically centered in one office. Finally, the system was applied to manufacturing, production and service operations. The results show that from the view point of decision making, product design, production planning, production control to marketing they were able to save their time their money and found the operation management easier.

Key words: Industrial management, virtual office, virtual workers, e-Commerce, ICT tool, virtual organization

INTRODUCTION

The term "Virtual" indicates something not exists in the real world physically but any how it fulfills the requirements of real things. Virtualization not started in the 21st century the concept of virtualization started yearly of 1960's In computing technology (Conroy, 2018). In that time computer scientists invented the virtual machine as an alternate of real Hardware which was the beginning of virtualization that is being used vastly in every sector in the current area. Gradually virtualization introduced into modern management strategy. Most recent virtualized management strategy is the virtual office. The first virtual office was founded by Ralph Gregory of Boulder, CO back in 1994. At the time, leases for executive suites were king of the roost and there was a sore need for a more flexible solution. Gregory founded his company the virtual office, inc. to provide for this major gap in service there by gives rise to what is now a multi-million-dollar global industry (Anonymous, 2018). They included a virtual receptionist to manage huge pressure on their physical staff. In the past few years, virtual offices have been a growing trend in the professional world. Virtual offices or service packages which offer communication, address and temporary office services such as meeting rooms and IT assistance without the need for dedicated office space are proving to be incredibly popular with telecommuters, entre preneurs and small businesses. In 1980 a company named "Servcorp's Virtual Offices" (Anonymous, 2013) was founded. Probably, it was the first commercial virtual management

service provider commercial organization. The next necessity was hiring expert employees from around the world for a reputed organization to solve the problem industries started hiring an expert from a remote location. Developed countries like the USA have the highest number of virtual workers. A study says that 46% of organizations polled, use virtual teams, according to survey results released July 13, 2012 by the Society for Human Resource Management (SHRM) (Eversole, 2012). Weinstein (2005) described the efficiency of the virtual office in his book (The Arrival of Virtual Office-2005) (Weinstein, 2005). He mentioned that "Virtual office solutions allow geographically dispersed employees to work together as if they were in the same physical workspace". So, it is clear that according to requirements high-performance communication and connecting remote employees is a trend which will be the future management strategy. Karvonen et al. (2004) described the changes to manage such, organization which has the virtual workforce and virtual management. Virtual organizational management is the needed change in the management paradigm. Some researcher argued that traditional industrial management system is less effective than the modern virtual working environment (Daniel, 2011; Chaffey and Chadwick, 2012; Johnson, 2000). World most reputed business magazine "Forbes" published an article (Bailey, 2013) which discovered that virtual working environment increases the productivity of employees. Although, virtual management seems very efficient and cost-effective there have some challenges. During designing a virtual system, it is a significant factor that

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the system should have enough monitoring option and bindings for the managerial user that they can play their vital role to run the system without losing enough monitoring. Information management is one big challenge in modern management (Drucker and White, 1999). Due to the requirement of massive data processing there has a tool named Management Information System (MIS). MIS also, requires manual data entry for processing but the virtualized management can make it more automated as all the processing will be in the computerized system. Therefore, in this study a virtual office management system software has been proposed in where people (designers, engineers, manager and another employee) can perform their task from their residence or any place using some modern technology like computers, mobile, etc.

MATERIALS AND METHODS

The virtual office: From the literature review, the definition of VO is not a single point. Odgers and Keeling (1999) define VO in such, way "A new form of organization is evolving that uses information technologies in where virtual workers are people that work at home or away from the workplace by using a computer, smartphone and data communication devices". Therefore, a virtual organization is a platform where people work from outside the wall of a traditional office by using computer networks.

Different model of virtual organization: According to Lewis *et al.* (2000) there is three Virtual Organization (VO) model namely, partial virtual organization and utterly virtual organization. In partial VO Model, only workers interact with the workplace via. personal computer or smartphone by internet connection. Complete VO Model the company is tightly linked to an extensive network of manager, workers, suppliers, distributors, retailers and customers. In this study a complete VO Model has been developed for any business organizations.

In this study, some most used project management software has been analyzed and compared with our proposed management software. The proposed virtual office management system is an integrated module that has everything inside a package. Even there has some software which is available on the internet which is used for project management but they have different features and not applicable to all type of industry. And the other thing is all of that software requires a high cost to use so those are commercial tools and not free for everyone. In countries like Bangladesh it is not possible to use highly paid software for every type of industry where the virtual

industry model open for all. Table 1 showed the comparison information about some most used project management software and proposed virtual office management software.

Elements of the proposed virtual office model: The significant elements of this model are shown in Fig. 1. From this Fig. 1, it can be seen that clients, virtual office and physical production are the major elements of this proposed industry model. In this model, these three elements have been synchronized for smooth operation in any industry. The components of this virtual industry model are briefly described.

For an industry, most of the case clients are buyer groups/companies from the local or foreign market (export). In this proposed model, online customers are a big market. Buyers will be able to access and order directly from their place via. "Virtual Office Software" the Software will count, calculate the production plan from some given inputs from clients and managers.

Virtual office segment: Virtual office segment is the focal point and backbone to establish a virtual industry. By using technology such as, laptop computers, cell phones and internet access a virtual office setup helps business owners and employees to work from any location. The virtual office can provide significant savings and flexibility compared to renting a traditional office space. The virtual office needs only a single room to set up some technical equipment. Managers and owner of the industry can monitor the whole working process from anywhere around the world. A web-based application has been developed which will fulfill the coordination between all elements of the virtual industry model.

Managers: Managers are the critical persons for the industry to manage the man, machine material in an enterprise. Though this model skips, physical workplace manager will play the crucial role in this model. He will organize and synchronize among all part. This model will make it very easy for the manager as he is going to perform any task, monitor the progress using software and other tools.

Engineers (R&D): In this model, the industry or company does not need to hire a full-time engineer to perform research and development. An industry/company can hire part-time expertise for that the salary-related cost will be reduced. As it will reduce cost the entrepreneur can hire several part-time experts.

Table 1: Comparison information about some most used project management Software and proposed virtual office management Software

Factor	Conventional virtual office software	New virtual office model
Price	Most of conventional software has a good price that's why people get discouraged to use highly paid software	Virtual industry model will be a freeware to use, it will be opened for all to use without any payment
Application sector	Not applicable for all type of organizations, most of them are specialized for software industry or specific industry	Global platform for all type of organizations
Functionalities	Limited functionality, need several software to perform as a virtual organization	Virtual industry model has several functionalities in a single software, it is an integrated system
User friendly	More difficult to use for general user	Easy user interface and user friendly to use
Hardware Requirements	Conventional system requires many network devices	The system needs only internet connection and a general computer. It is accessible from any location using internet so, it requires very less hardware
Upgrade and maintenance	Conventional system requires high payment to upgrade. It is also, difficult to maintain due to large network environment	Virtual industry model will be a freeware and open source software so, users will be able to upgrade the system by changing its code according to their requirements. It only requires internet connectivity but not a complex LAN/WAN network. Now a days, managing a LAN is much expensive than have an internet connection

Fig. 1: The virtual office model block diagrams

Employee: An industry needs different employees for a different purpose, for example, accounts, marketing, advertising, etc. All of such, employees will also, work through a network accessing the virtual industry software system and complete their assign task without any delay. In this system there are no opportunities to claim wages without working because of the software system.

Network connectivity: Network connectivity means physical (wired or wireless) and logical (protocol) connection of a computer network or an individual device to a system such as, the internet or a LAN. In web hosting this can be referring to how the company receives its bandwidth and how it is connected to the provider. In this model it first needs to have fast network connectivity to connect all the functional blocks. The system can use the internet, mobile networks and other fast internet services for connecting remote human resources to log in to the software and work. Internet will be used to communicate with employees, clients and rental industry via. virtual office software. If the industry locates near the virtual office network area it can use LAN. Because it needs very high speed fulltime network to observe, communicate and monitor that industry's working progress due to virtual industry's order. The functional blocks that are shown in Fig. 1 they are connected through the various network which is very important in the proposed model.

Development process of "Virtual Office" software: The development process is done by following some steps that shown in development process flowchart in Fig. 2. The first step was selecting appropriate development tools then design the database, design user
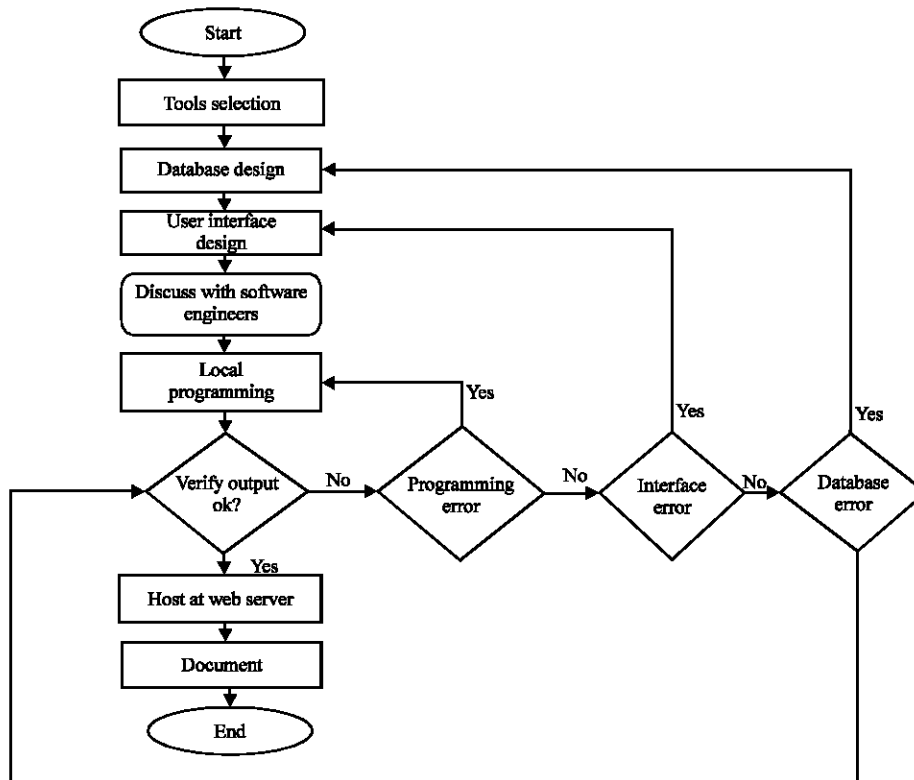
Fig. 2: Working flowchart of virtual office software development process

interface. After the end of the designing process, it required to hire a skilled software engineer thus the system needed sophisticated programming. The next step was developing the programs modules of the software's and tests the output. Bug fixing process was done until the programs performed according to design. End of bug fixing process, the software was hosted on the web server to make it globally accessible.

Used tools: Following tools and technologies has been used to develop the software.

MySQL database (php-myadmin): MySQL is a favorite and vastly used structure query language tools. The software is entirely free to use. The proposed software has been developed using MySQL database. As the virtual office needs a robust database which stores all the information regarding the operation of the virtual office. Another free software has been used to perform all operation with MySQL and others program that is "PHP-MyAdmin".

Adobe photoshop for graphical design: For making the virtual software user-friendly, some image and graphics have been used. All of the images and other graphics were prepared with "Adobe Photoshop" which is application software.

HTML, CSS for graphical user interface design: Hyper Text Markup Language or HTML is a design tool to organized data into a webpage. HTML is the most highly used technology in website designing sector. CSS stands for Cascading Style Sheet and this is a designing tool for HTML webpage.

PHP programming language for logical web programming: PHP is an object oriented programming language, primarily used for web-based programming. PHP or hypertext processor is a free programming tool which could be used by many people with free of cost.

Javascript: Javascript or JS is a programming language. The language has been used to develop virtual office software for various sophisticated function.

Apache web server: Virtual office software is a web-based application, so, it requires to be hosted at an online web hosting space. Apache Web Server is a free web server which has been used to test the webapplication offline as well as keep it active at online.

Notepad++ for edit source code: It is free software available at online to download. The software has been used to write and edit the programming codes for the programs of the virtual office.
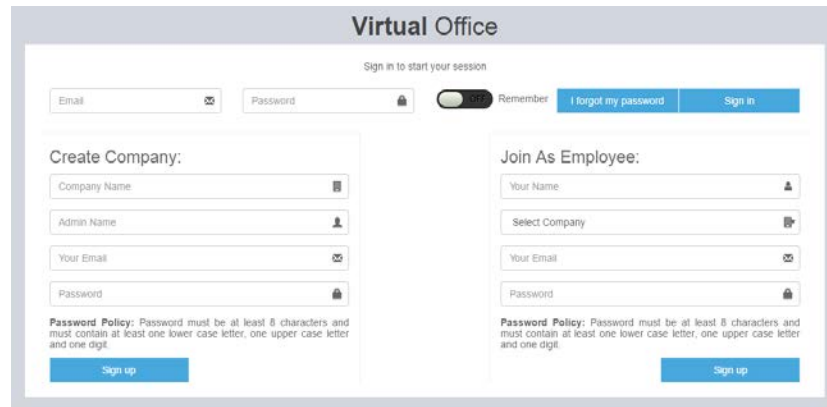
Fig. 3: User login interface

Fig. 4: Virtual office dashboard

RESULTS AND DISCUSSION

Result/output of Virtual Model software

Home page of virtual model software: The system's graphical user interface has been developed using "HTML" and "CSS". The virtual system has a nice and interactive graphical user interface. It is very user-friendly and visually clear to understand the operation. In the home page of the system the user will see a simple interface where it has four different areas. In the left side on top (Fig. 3) it has two data entry field available for user ID and password to get access to the software. If the user lost his password there has a button to retrieve the password. The system has two more data entry options to create a new company account and new user bottom of the page. From there a new company will enter their name, administrator name, email id and password to start using "virtual office" as a new industry. Similarly, a new employee can start using first time the system from the same page by filling the "Join as new employee" section's required data. As usual, it has a password recovery option. If any user forgets his username or password, he can recover that using the email address that he used during the registration process. When the user clicks the "I forgot my password" button the system sends an email with a recovery hyperlink. The user has to log in his email and click on that link and the link will redirect the system onto a page where he will be able to set his new password. In the cyber world, it is a critical issue to ensure system security from the hacker. All traditional security option and current security policy have been used in this system that should be available in such, a virtual workspace. The system will contain vital information regarding many industries and their management the employee their on going project. So, it has to be a secure system that will have a reliable data processing algorithm.

Virtual office dashboard/virtual-office-desk: After login into the virtual office system, the user will be able to work using his interface as like he uses his office desk at workplace shown in Fig. 4.
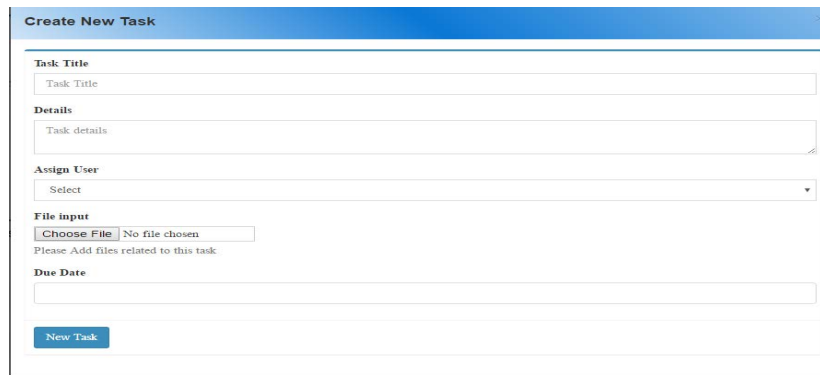
Fig. 5: Task management page

Fig. 6: New task/Job creator

Task management interface: In task management interface there have four different panels shown in Fig. 5. In left-top it has a list of task named "My Task List" this list is the queue of tasks that assigned to the user by other. This list has four headings and they are " title, assigned by day and action". The title means a short description of the task, assigned by column shows the respective co-worker name who assigned the task. Column "Day" shows the remaining days to finish that job. In the column "Action" there has an option list where the user can set the current status that is he is doing the task or he finished the task. According to his option settings the corresponding user who assigned the task will be able to track the task status by observing this status option. Similarly, there has another list on the left-bottom side. The list shows the task that assigned my user to his co-workers. This list also, has four heading column named "title, assigned to, day, status". The title stands for the job's short description as mentioned in the previous list. The column "Assigned To" shows the mane of the co-worker who will respond to finish that task. Status column indicates the status the set by the responsible co-worker who is doing the job if the respective worker starts work with the task it will show "Working" if the co-worker didn't start the task it would show "Pending" as task status. In the top of this list, there has a button named "Create New Task" by clicking on this button user can go the page for creating a new task. The right side of the page also has two blocks, in right-top there has a list which consists of the complete task name and the co-worker name who assigned. Gradually this list will be long, so, it would be difficult to show them in a single page due to the problem there has a page numbering system where only five items will be in a single page the user will see all tasks in slotted into the page by selecting every page. When it is large data, then it will become difficult to find any specific job, to solve the problem the software has strong wildcard searching option that can see any of matching task from the massive data record.

Create new task: Figure 6 is showing a form which will get the input to create a new job. It has three text fields. The first one for "Task Title" where the user will enter the specific small details in a sentence that could be understood by the respective person who will do the task.

Fig. 7: Personal organizer settings and viewer

The task title must contain a summarized sentence about the job. The next field is details of the task, in this field user will write down the information on the task that information should be unambiguous to understand the job what to do and the process. The user can write extensive test and other instruction here. These two fields are mandatory to assign a new task/job to others. In the next field, the user will select the user who will do the job and it is a dropdown list. Name of all employee of an organization will appear on this list. From the list user will select the desired employee name who will be responsible for the job, this is also a mandatory data field. The next field is a file selection and uploading option, using this feature user can send the necessary file that will be used to working on the task/job. Most of the time employee needs to work with the soft copy of various documents. For example, a civil engineer can send a layout plan of a building to an electrical engineer to work on it for the electrical wiring diagram. In the software, the user will be able to upload any file and any size. When the respective user who was assigned the job will open the task, he will see the attachment and will be able to download the file for work. Usually, organizations use a typical mailing system, over the third party mailing system the virtual office has a secure facility to handle the data. It is not a mandatory option to attach a file because sometimes some tasks couldn't have any such data. The final field is the deadline. When the user clicks on the area a calendar will appear in front of the user and he will select the date when the task must have to be finished. In task management and tracking process it is essential to have a specific deadline.

Personal organizer: In the 21st century, people are using a smartphone, tablet pc and many electronic devices to maintain their daily to-do list. So, it is clear to us that the organizer is essential to support daily busy life efficiently.

To make the virtual working environment more efficient, the system has an organizer attached to the virtual office software. When the user goes to the organizer option, he will be shown the user interface in Fig. 7. There have two blocks in the user page in the top portion it has the necessary data field to create a new do-to item and save it into the database. To keep a new thing in the database, the user has to enter the new to-do item's title, details of the subject, due date, set its current status, set the notification method and attach a related file. The system used the option "status" to set the item status that it should be done or done. It has another useful function that is if the user wishes he can set email notification method which will send an email to the user if the user forgets the item in the organizer. In the bottom of the page it has a list with the same heading that user entered while saving a new to-do item. The list shows all to-do items in short order according to due time. If there have any change at any to-do item in the organizer the user can edit that item by clicking the "edit" icon at the end of the item name. Normally after saving a new item in the organizer the list get updated simultaneously. There has a button to refresh the list manually by clicking on "Refresh To Do" button in the top-right side of the list. When some to-do item is expired, the user will delete that item by clicking the "Delete" marked icon.

Virtual discussion board: Usually, physical offices have a shared space or lobby at the workspace, in that place sometimes employees pass some relax moments they gossip, sometimes discuss their work. In organizational work progress this type of discussion and sharing of task-related material helps employees to be enthusiastic. As the proposed model will be almost similar to the real world and the system has to serve such purposes. There
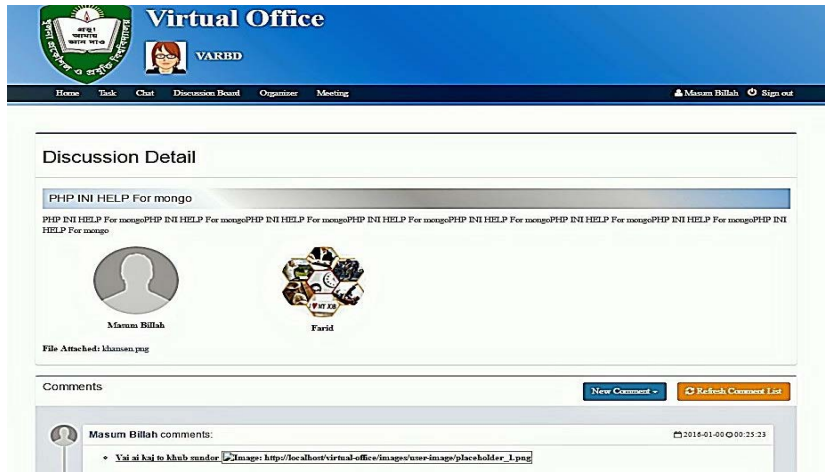
Fig. 8: Virtual discussion page

has a module that will help the user to share their contents like a photo, files, personal opinion at a common area where everybody has access. In the discussion page, it will show the current discussion related post by all users. The user will be able to make comments on those posts. When any of users create a comment, the corresponding author will get notification of the comment. Similarly post researcher will reply to those comments. Using this process employee will be able to solve their discussion related task in an alternative way in the virtual world. Now a days there have a lot of social media like "Facebook," "Twitter," "Instagram" where people from far away share their feeling their memorable moments. Likely that, using the virtual office software, people of an organization will share their organization and work-related materials among them. In the "Organizer" page, it has an area where all the task will be viewed which is shown in Fig. 8. There has a photo icon which will contain then a photograph of the user who posted the discussion topic. Bellow the photograph there has a title text area for viewing the title of the discussion topic, next to the details of the discussion. In the details, the user can write he can use an image and can attach any file. Everybody will be able to see and download the file. Sometimes the user can ask for help from his co-worker about some specific work using such a sample file. After the discussion details area, a comments section has been added to make comments on the discussion topic. After reviewing on the discussion, the user can comment over there. All such, comments will be shown according to date and time as a list is attached with each discussion topics. By clicking on the new comment button, the user will open a new comment typing window. That editing panel has a lot of editing facility like formatting comment, insert a photo or other media or attaching a file. The system has an interesting

option for privacy purpose and the user will be able to specify his co-worker who will be able to see the discussion and make a comment there. There has another button named"refresh comments" which will research to refresh the comments list at a discussion and make the data retrieving process updated.

Create new discussion: The page "Create new discussion" will be bused to create a new discussion topic as well as it has been mentioned previously. To start sharing or discussing a new topic the user has to click on "Create New," discussion button and the page will appear. There has four data field on the page. The first one is a text type data field which is mandatory. The user has to enter the specific discussion title. The title must be subject-oriented that other can get an idea about the discussion detail. Next user will write down the details of the discussion. A strong text editor has been integrated with this module which will provide very flexible text processing technical facility. The text processor has the option to add a photo, edit that photo into the discussion area. It has been used on this module to make the discussion posts editable, so that, it will be visually great and nicely elaborated to understand. The next data field is a combo list where all usernames will be appearing. The user will select his co-workers from the list to specify that who will be able to see his discussion topic and share their opinion by making comments. This option will add privacy for users to make their shared ideas, discussion secure from a specific person. Inside organizations, it is common that due to personal cause employee do such behaviors to share staff with a choosy person. In this module, the user can add any file that will be shown to others and downloadable. Sometimes it could be used to have a sample file to understand the discussion topic. For
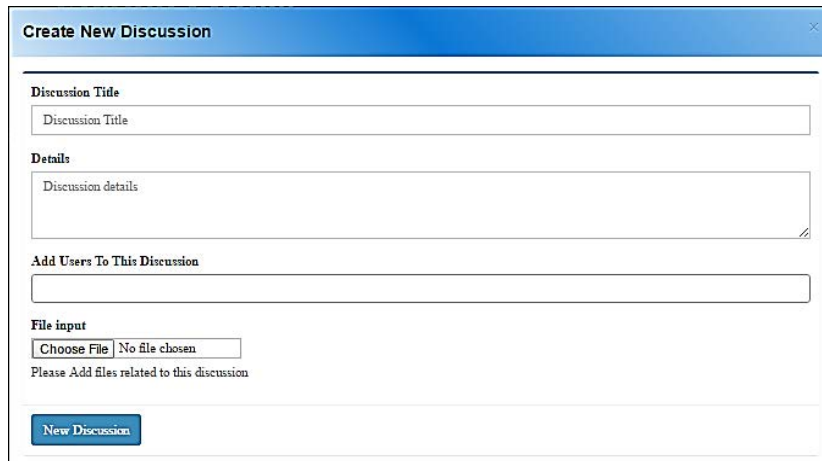
Fig. 9: New discussion creator page

Fig. 10: Internal communication (message pass) chat interface

example, an employee doesn't understand an engineering drawing at an "AutoCAD" file. So, he can create a new discussion topic by writing about his problem from his co-worker list he can select the geek of "AutoCAD" and add those drawing file with his discussion. When user will enter all necessary data and click to "New Discussion" button the user enlisted in that discussion will get a notification. Then the corresponding co-worker will start responding on the forum and they can download the attached file, work on it tell in comments what he did and also can resend the data that he accomplished. Using these option employees of an industry will be able to continue their gossip in the virtual world despite there not meeting physically. The entire data field in this module is mandatory and it means the user has to enter data in all fields else the programming logic will notify the user about missing data and make sure to fill up the fields. In Fig. 9 it is showing the new discussion creation module and its options.

Internal messaging module: Online chat or message sending is a popular and vastly used communication

nowadays. Most of the time people use typical online messaging and chat services which are not designed for specific professional purposes. Usually, people use various third-party website, massager software and mobile application for chat purpose. That could be used but functionally a chat module integrated with virtual office software to make sure that all type of communication facility accumulated in a single software package. By using a separate software window, the user will be able to use all of those facilities that available differently. The existing third-party free chatting tool has some limitation like all of them don't allow sending file or image. Some has limited file size barrier to avoid such restriction, the system has been developed with a built-in chat module. This chat module will research as a real-time short-term communication medium. Figure 10 is showing the chat module of the virtual office software. The user list with in an industry will be displayed on the left are of the dashboard. The user in this list must be logged-in that they will be shown as online. Just click on the co-worker name that he wants to chat. In the right area at the user interface page, it will open the conversation panel. The

Fig. 11: Employee profile editor

user will write his message into a text box and press "Enter" from keyboard or "Send" button on the screen to forward the message. When other users receive it, he will write his message the same way and send that. Message from both ends will be displayed in the screen simultaneously. All of this chat data will be saved into the database until user not deleting them. To delete a specific message from database and screen there has a red marked "trash" icon. Just click on the icon and delete the unwarned message. To send a file to other end users, the user will click the icon in arrow-shaped and file selection window will open. The user will select the file and click send. Any data and any size could end from the chat module. This chat module will work as one to one communication. The system also has another group chatting facility named as meeting module.

Employee profile editor: A user has to create an account in the virtual management software to get access to online. During the opening, account employee doesn't require to insert his photo. He can use his short name to open the account fast. After finishing the process when the user thinks about his profile data up-gradation, he will need such technical functionality. There has a link with the user dashboard named "Update My Profile". When the user updates his profile data, he will click that link and will see the user interface shown in Fig. 11. In the interface, the first data field is the photograph of the user. Just select the photo of him that user wants to use as his profile photo then click "Upload" button. The photo will be saved into an online database. This photo will appear to all users and organization's administrator. It will be a quick identification way of a user. The user also can

change or edit his name, email address, contact, address and password from this interface. The given information will be loaded with the interface. The user will change by typing on the editable text field. After changing the text, the user must have to click the update button to keep the change, else the new data not will be saved. There have also, three data fields which are disabled in the interface. It means that user doesn't have the permission to change the data. Industry's management level will manipulate those fields. Administrator of this virtual office software will select those fields. The type of account and role of the user in the industry is in this data field. There has another data field named "Rank" this field also will be updated automatically according to user performance. When user will be able to finish his task with in deadline a good ranking number will be assigned in this field. After each task finishing or failure, the rank field will be updated. Manager of the company and co-worker will get knowledge about user's performance by observing this rank value. As it is mentioned, that the system will perform some task by itself what will reduce extra effort in management.

Industry/company profile editor: The company profile has the fundamental data of an organization. Administrator of an industry will be able to change the information. To edit this data the company's administrator will use his administrator username and password to log in as a company admin and click the button "Edit Company Profile". In company profile, there is a name of organization/industry, address, contact number, email address and business details. All of these fields are text fields and the user can write the required data. In the top of the interface there has an image selection module. Using this option, the company admin can use his company logo. The company logo is the identity of an industry/organization. After changing the text, the user must have to click the "Update" buttoned to keep the change, else the new data not will be saved. Editor page is shown in Fig. 12.

Virtual meeting management module: A study says that arranging a meeting at an organization requires time, a shared space for gathering, utility and operational cost. So, if it is possible to eliminate the traditional meeting procedure, it can save time and make the operation management cost useful. A meeting module has been developed which is integrated with the virtual industry model. The model named "Meeting Zone". Inside the virtual office software, the user will find an interface shown in Fig. 13. If any employee wants to call a meeting, he will click on the button "Call a Meeting". The module

Fig. 12: Company profile editor

Fig. 13: Virtual meeting notification page

also, shows the upcoming meeting list. In the list, the user will see the topic of the meeting who called the meeting. Agendas of the meeting, schedule and finally a counter to showing the upcoming meeting's remaining time. In the last column, it has a link with a symbol marked as a "circle" the user will click on this circle to join the meeting. But only can enter when the meeting time matches with the current system time. Below of upcoming meeting list user can find the previous meeting's data. Last five

meeting's data will be shown here what was the topic of the previous meeting, the name of the responsible person that called the meeting, agenda and regulation.

"Call new meeting" module: This module will be used to create a new meeting data and throw that to all. The employee who has enough supremacy to call a meeting he can handle the option. To arrange a meeting, it is essential to find an available date. When the user selects a time into

Fig. 14: New meeting caller page

the input box, the program will check that any other meeting called at that date or not, if it finds the date free then it searches for the available time because two meeting could be arranged at the same period in different time. After finishing, the date and time selection process user has to enter a meeting title, the title should clarify the meeting details in a sentence. For example, an organization demands to develop a new product of creating a new market so, that, the manager will discuss with others in this case, he can write "Meeting about new product design for local market" which says that the meeting is about developing and launching a new product. The next input field is a text box where the agenda or specific discussion topics will be given. Multiple sentences could be written here. The user can list the agenda according to priority. For example, the agendas could be like, analysis and discussion on the local market, market demands analysis, new product designs and cost, Marketing process". If user input like this his co-worker and respective employees will be able to prepare the necessary materials for the meeting. These fields are minatory and the system will always ask to input the meeting title and agenda there was no chance to create meeting documents with a flaw. Finally, assign a user for the meeting. It means to notify the co-worker who has to attend the meeting. In an organization different meeting conducts with a different group of employee. The user is assigning option customizable that the caller of a meeting can add only the people who are specified for the meeting and only they will receive the notification and counting

notice about the meeting. When all the required data fields will be fill-up then user has to click on the button "New Meeting" at the bottom of the interface window shown in Fig. 14 the meeting will be saved, respective employee will receive a notification email and system will display a down counter timer which indicates the remaining time of meeting.

Live meeting module: The system has a vast option as it can arrange a meeting at online using the virtual office software. The module will research as a standard online chat room in the virtual world. As it is mentioned before that responsible member of management could call a meeting. Everybody will be informed of the meeting schedule and the system will start counting time when the current time will match with the predefined time for the meeting, employees of the company will get access to join the meeting. The user can share his opinion by text message to other in the meeting room but in the further development process of this software, users can add a voice transmission option. Everybody, can send a message simultaneously and everyone will be able to see other's discussion on the meeting agenda. The entire discussion text message that wrote by different employees will be recorded and finally, responsible management authority will make the decision on the meeting and show that to all, if everybody seems to agree with the decision then it will be signed as a regulation. The system will generate an automatic resolution. The resolution will be stored in online memory
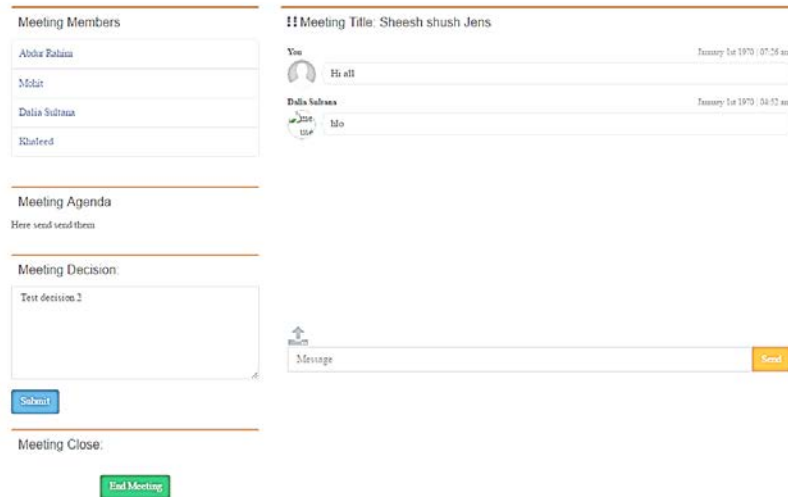
Fig. 15: Live virtual meeting page

Fig. 16: Company administration page

for documentation and printing purpose. In a typical management system, all of this process requires a long time and standard documentation, instead the online virtual industry model can perform the task using the limited resource and smarter way. The live meeting module is shown in Fig. 15.

Create meeting resolution: A resolution is vital to ensure all regarding bodies concern, proper judgment and making an effective decision and it clears what people are voting for making any decision. Typical resolutions have several parts the timetable and venue information, attendee's information, a brief description of the meeting, taken decisions, the signature of attendees. From the online meeting data, all of the required data would be collected and it will be formatted like a real handmade resolution to print.

Company administration area: To control user/employee's activities, the administrative staff of industry will use this module (Fig. 16). When he logs-in into account, he will see the list of a total employee using the virtual office tools to stay connected virtually. In the record, the name of the employee his status that online or offline his account status will be shown. If the administrator wants to see the complete profile of an employee, click on his name and his details data will be shown to the administrator. The online status will show online when the user is using the virtual office system else it will show "offline". The next column "account status" means the status of an employee that he is approved by the company to use the system. In front of every username list there has a switchable toggle button which has two states. If the user has approval, the button will show as "On" else "Off". To disable any employee's

Table 2: Time study observation sheet of the operation "Contact with manager to purchase a software license for outsourcing team" performed using virtual model

Variables	Time
A, study ends	10.35 (am)
B, study starts	10.03 (am)
C, study time	32 (min)
D, check times	1.68 (min)
E, total study time	33.68 (min)
F, elapsed time	34 (min)
G, difference F-E	0.32 (min)
H, timing error: G/F%	0.9 (%)

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Table 3: Time study observation sheet

Element number	Element description	Rating	Observed time (cm)	Basic time (cm)
1	Login into virtual model software and open task creator page	90	41	036.9
2	Write down the details of task and submit to manager	80	53	042.4
3	Manager gets notification and understands the task	80	58	046.4
4	Purchase the license and type key into task	90	250	225.0
5	Set the task status completed and submit to corresponding member	75	60	045.0

account, the administrator will set the button as "Off" or approve any new account or disabled account, set the button as "On". If an organization feels that he needs to stop the activity of an employee they can use this option. As the system is online software which is open to the world. Any user or hacker can create a fake account using any company name but he not will be able to do anything until the company administrator as making sure that he is a valid employee of corresponding origination. There has a search field in the top of the list. When the employee list is large, management has spent more time to find the specific employee on the list. So, using this search text field, the administrator will type specific employee name list and the system will find the usernames which data matched with the entered search string. If the admin wants to get the employee name in specific file format to use different purpose, he can download the list of "CSV," "Excel" or "PDF" format. There have a printing option to print the employee data as hard copy (Table 2 and 3).

Super admin dashboard/software admin panel: The super administrator role is created during installation and the default user, virtual industry administrator. During the installation of the system, the super admin will have al access and editorial power to manage the system and policy, reporting and configuration settings. The account does not appear in the list of administrators for the super administrator role. It cannot be deleted and its

permissions cannot be modified. Policy permissions allow super administrators to create and edit delegated administration roles and copy filters and policies to these roles. Additionally, super administrators with system permissions can view the audit log and are granted access to virtual office configuration and other options. In the virtual industry model software, the super admin is a built-in user. During the installation of Software, it will be the only user to manage the system and approve other organization to register on the system. Super admin usually can see some necessary information about the organization only and he will be unable to access additional information and the database of an organization. It is an issue of safety and privacy of an industry. Security is the big challenge to the online software-based system. To ensure highly secured information processing and online communication in the administration part of the web software has been developed with insufficient data retrieval permission. Super admin will get a new organization registration request and verify the data given by the applicant. He can make a call or find information about the company validity. If the company has real existence, the super admin will select the "Active " option beside the company name list, simultaneously the organization's account will be active to start their operation in the virtual world. In the meantime, an email notification will be sent automatically to the applicant that his account is ready to use. If the super admin finds that someone trying to register a fake company/organization/industry he will select the inactive option and the account will never be activated. It might be containing millions of company and employee information their activities related records but super admin only can see the company name, contact address, logo, details of their business, email address. How many of the employees are using the virtual office software what type of communication they are doing? It will never be displayed to the super admin. Sometimes people think that the administrator can read all the data which could make the information security vulnerable to an organization. As the system has been developed using data encryption technique, so, if the super admin or the software engineers who will maintain the system access the database, he will see some garbage value those are only visible to the organization. There has someunctionality in the super admin dashboard that when hundred or thousand or organization will use the virtual office software then admin can search any company using "Search" string. For documentation of hard copy data, it has options that convert all available company

Table 4: Time study analysis sheet of the operation "Contact with manager to purchase a software license for outsourcing team" performed using virtual model

Time study analysis sheet

| El. | Element description | Basic Times (b.min) | | | RA% | Std. mins (sm) |
		Basic t.	Frequency	b.t x freq		
1	Login into virtual model software and open task creator page	036.9	1/1	0.369	10	0.406
2	Write down the details of task and submit to manager	042.4	1/1	0.424	10	0.466
3	Manager gets notification and understands the task	046.4	1/1	0.464	10	0.510
4	Purchase the license and type key into task	225.0	1/1	2.250	10	2.475
5	Set the task status completed and submit to corresponding member	045.0	1/1	0.450	10	0.495
					total sm =	4.352

Table 5: Time study observation sheet of the operation "Contact with manager to purchase a software license for outsourcing team" performed in traditional system

Variables	Time
A, study ends	10.35 (am)
B, study starts	10.03 (am)
C, study time	32 (min)
D, check time	1.68 (min)
E, total study time	33.68 (min)
F, elapsed time	34 (min)
G, difference F-E	0.32 (min)
H, timing error: G/F%	0.9 (%)

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information on .pdf, .xls or CSV file. After conversation super admin can download the data and use the print command, he can print the daa and keep a printed copy of any emergency or critical data fault. As another super admin user, the virtual office software's super admin doesn't have enough power of user and information control for freedom and security of the virtual industry model. The proposed system has been developed to avoid the existing similar expensive technology and their bindings. So, this model software not will be a money making software it will be a free platform to transform and extended industry into the virtual world (Table 4 and 5).

Case study

Performing time study for some task done by virtual office software: For repetitive and some common job time study was performed to determine the time to complete some task. The virtual model was applied to an outsourcing company which has two workstations. The manager of the company who works on the first floor of a building and 18 workers work under him inside a room in the ground floor. Most of the time the manager call one of their member to assign any job to them or order them. When he needs to get any report from the team, he calls them and a team member physically comes with a pen drive or flash drive to provide any report. This was the traditional system to communicate between and task assigning and reporting system of the company named "Mask Inc." which is an IT-enabled firm. In this

circumstance, the team manager was asked to create an account in the developed virtual model software which named as "virtual office".

Moreover, they did that after user registration when the manager thought that he needs to order someone to perform any task or assign some task, he just used the task module and selected his target employee and assigned a task, as most of the documents and processing in this company based on soft data, so, he was able to attached file with his task.

Similarly, he was getting all types of report with in a few seconds from his team. In the meantime, the system will create proper documentation, calculation of complete task. If all of this process is done traditionally, then the team members and the manager must meet physically. They had to prepare all documentation again with the help of computer word processing or database Software where the virtual model software did this simultaneously. In this model software it only can work with a soft version of data which seems a difficulty but in the current era, most of the data processed in soft version. In this case, time study is a method of measuring work for recording the times of performing a specific task or its elements carried out under specified conditions. An operator does the same operation (task) throughout the day. Time study defines how much time is enough for an operator to finish a specific job.

Time study tools: To do time study you need to arrange following tools:

- A stop watch
- Time study format
- One pen or pencil
- Time study board

Time study for traditional system: When the same operation was performed in traditional system the operation was classified in the following small steps.

Table 6: Time study observation sheet

Element number	Element description	Rating	Observed time (cm)	Basic time (cm)
1	The team member had to go first floor to tell the manager	90	220	198
2	Team member discussed with manager and told him about they need	80	300	240
3	Manager understood the needs clearly and asked the member to come when he will call	80	45	36
4	Purchased the license and call the corresponding member to take the key	90	250	225
5	The team member went to manager room again form ground floor, collected the key and came to workplace at ground floor	75	240	180

Table 7: Time study analysis sheet of the operation "Contact with manager to purchase a software lincense for outsourcing team" performed in traditional system

		Time study analysis sheet				
		Basic times (b.min)			Std.mins	
El	Element Description	Basic t.	Krequency	b.t. x freq	RA %	(sm)
1	The team member had to go first floor to tell the manager	198	1/1	1.98	10	2.178
2	He discussed with manager and told him about they need	240	1/1	2.40	10	2.640
3	Manager understood the needs clearly and asked the member to come when he will call	36	1/1	0.36	10	0.396
4	Purchased the license and call the corresponding member to take the key	225	1/1	2.25	10	2.475
5	The team member went to manager room again form ground floor, collected the key and came to workplace at ground floor	180	1/1	1.80	10	1.980
					Total sm =	9.669

- The team member had to go first floor to tell the manager
- He discussed with manager and told him about they need
- Manager understood the needs clearly and asked the member to come when he will call
- Purchased the license and call the corresponding member to take the key
- The team member went to manager room again form ground floor, collected the key and came to workplace at ground floor

Result summary: From the both data sheet it was found that the virtual industry model can save almost 5 min time for a common task which could be repeat several times in a day. Less time to finish an operational cycle will increase the productivity and decrease the operational cost. Which effects on production cost per unit. Similarly, it is possible to finish many other jobs in lower lead time by apply the virtual model software (Table 6 and 7).

CONCLUSION

This virtual management system is a new way of working that enables the virtual worker to works outside the walls of the traditional office. A system has been developed that will be the structure of all working process of an industry through internet and others ICT tools in where the total system is operated using online software that can communicate, synchronize among all segment of the production process. Thus, entrepreneurs can fulfill their dream by establishing an industry at a little cost and less paper works as well as they can make their product more versatile compared to the other traditional industry. To evaluate the performance and test the function ability the all-new developed software has been applied to a private limited company. From time study analysis it was observed that the virtual industry model can save almost 5 min time for a common task which could be repeat several times in a day. From decision making, product design, production planning, production control to marketing, the industry used the virtual office model on several stages and they were able to save their time their money and found the operation management easier.

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