1.0 Introduction

This chapter defines what Information and Communication Technology (ICT) is and discusses how it affects project management through ICT business management trends. The significance of a Project Management System (PMS) to the organization, Taters Enterprises, Inc. (TEI), is supported by problem identification and assessment done by the researchers.

1.1 Introduction to Information and Communication Technology (ICT)

Information and Communication Technology (ICT) is used to convey, manipulate and store information electronically. ICT is defined as the combination of information technology with other related technologies, especially communication technology. Through technology, it can support activities such as, gathering, storing, processing, and presenting data. Nowadays, communication is considered as an activity, hence the name, Information and Communication Technology (Gokhe, n.d.). According to Moursund (2005), "*ICT has become one of the basic building blocks of modern society*." The growth of ICT is the evolution of technology, and businesses are expected to adapt and integrate new trends in ICT to their business processes to gain more opportunities and competitive advantages.

ICT has been evolving at an extremely fast pace. Not only is it increasing at a fast rate, but it also costs a lot to keep up with the current trends. These trends in business management include digital transformation, cloud computing, and analytics.

Digital transformation is changing business through technology (Hopping, Marzouk & Marshall, 2018). Over time, technology has been an aid that businesses use to get ahead of the industry. Today, technology is, more often than not, the most valuable asset in a business. Automating processes as "going digital" has become an added value bonus. "Going digital" is a product of combining other trends, such as mobile technology and information technology. Through automating business processes, productivity in the workplace has a chance to increase, as well as collaboration with employees as tools and technology allow people to work together through systems and the Internet (Calixterio, 2017).

With the digitized data, this can now be uploaded and saved to the cloud. The cloud, otherwise known as cloud computing, is the use of technology to

process data through the Internet. This allows businesses to be able to access and process data anywhere and anytime as these data are easily accessible in the cloud (ESDS, 2014). This also ensures that everyone involved in the organization has access to all updated files, thus avoiding data discrepancies. The cloud also serves as a data repository for organizations.

A business, may it be big or small, startup or established, all, need data to help the business grow. By analyzing data, organizations can improve upon themselves, internally and externally, improve on business processes and on customer relations, and reduce cost all the while increasing profit. Analyzed data also helps the organization as it aids management to make the right decisions and the best decisions based on facts for the betterment of the organization and its stakeholders.

The application of ICT in business processes, specifically project management, guarantees that the right technology solves the problems of the organization, and is being implemented properly considering the schedule, resources, risk, and quality management. Decades ago, project management has already been existing. According to the Gentile (2012), project management ensures that resources are maximized by organizing and managing them and projects are delivered within schedule, budget, and scope. The practice of managing projects became more common, thus, leading organizations to invest more on project management tools and techniques, such as Gantt charts for scheduling, RACI charts for responsibilities assignment, and Work-Breakdown Structure for distributing the workload within the project team. These tools and techniques have been proven to be necessary in managing teams and projects effectively. Project management is usually seen in the construction industry and hardly is it seen in food and beverage, but as the industry evolves, big player organizations tend to deviate from the norm.

Project Management Systems (PMS) have been increasingly in-demand as the act of managing projects has increased over time. Several of a PMS' functions would be planning, scheduling, generation of Gantt charts, and documentation. Organizations that have invested in the use of PMS' are Uber, who uses Asana, NASA, who uses Basecamp, Cisco, who uses Jira, Toyota, who uses Microsoft Project, Netflix, who uses Smartsheet, and Google, who uses Wrike. These systems and their respective functions and features would be discussed in the next chapter.

1.2 Background of the Project

Taters Enterprises, Inc. (TEI) is the franchisor of two (2) different snack chains with a total of forty-one (41), either an inline store or a kiosk, branches nationwide.

TEI has been managing to keep up with the current ICT trends as they do use online chat applications such as Glip, which only the Marketing Department is using as of the moment, to keep in touch with project team members. They are also considering using Glip company-wide to enhance interdepartmental communication. They have also been using various software such as, Aloha and Web POS for sales, Integra for payroll, and SAP for accounting. With regards to data analytics, they lack actual data as they do not strictly document each project properly and lack a single data repository. As for digital transformation, they are taking steps into this trend as they have been developing systems, such as a Human Resource Information System, Management Information System and a Task Management System to be specific, to be used by the whole organization as well as connecting them to the internet.

Despite all available technologies, they do not capitalize on it as they currently manage projects manually. The TEI project management process starts with meeting up with all concerned departments to assign project activities and tasks. Once the project is kicked off, there is no systemized way of monitoring and controlling of the project tasks as they have no platform to do so. Contributing to this, TEI does not actively document all projects to aid the project managers in monitoring and controlling the project. If there are project documents available, the only technologies that TEI uses in project management are Microsoft Office - Excel for Gantt charts and Word for reports.

TEI's vision for the current year is to develop a unified online portal that would provide access to all the current information systems being used by the organization, and those that are being developed, including the Project Management System (PMS). This portal will then produce a consolidated dashboard that will obtain data from the different systems, hence the term the organization coined as *One Data*.

1.3 Statement of the Problem and Opportunities

TEI's main business operation revolves around a series of projects with the coordination of their seven (7) departments. With that being said, it is inevitable

to experience delays in project execution due to various reasons. In addition, an analysis in the Asturian Case by Sonia Cousillas (2010) has concluded that the most difficult target to reach is closing the project on time. Based on a series of interviews with different departments of TEI, the main reasons for project delays are the lack, or almost absence, of a systematic monitoring method for the project, poor dissemination of project updates and concerns, and inadequate project documentation. These three factors correlate with one another wherein they are all significant in the project management process and they are factors that are likely to result in quality issues that may affect the success of the project (Schwalbe, 2011). Specifically, lack of supervision, miscommunication among team members and customers, and inadequate documentation are factors on project failure that were concluded after conducting a study on real project failure factors by Richard Amponsah (2012).

Consequently, the three mentioned causes for project delays affect each other wherein project managers, departmental supervisors, and top management cannot accurately monitor projects due to the absence of project updates which contribute to the lack of proper documentation all throughout the project duration. It was estimated that only 5% of their projects have produced and are following a Gantt Chart, while almost 100% of the project tasks are not being regularly updated by the team. Project updates only arise when the issue or concern is brought up and is retrieved by asking the team member/s responsible for the certain issue, either via Email or verbal questioning. This in turn leads to project delays as there is no schedule to follow except for the overall project's target deadline, there will be numerous miscommunications among departments and activities will not be properly and timely accomplished. Due to the fact that projects are not properly documented, the workload of the employees are not taken into account which results in a difficulty with handling multiple projects by blindly being assigned to a new project without any formal consideration. The employees will have to assess the projects and project tasks which should be prioritized over the others. At the minimum, every project should have a planned schedule and a series of progress reports, whether formal or informal, in order to set the direction and focus of the team members to accomplish all project activities at a given period of time (Schwalbe, 2011). Unfortunately, TEI does not strictly implement this practice.

A project management system will provide TEI an opportunity to entertain more projects simultaneously as monitoring and controlling of projects will be more systematic and documented. With these documents, TEI will be able to replicate successful projects and rectify identified problems.

1.4 Conceptual Framework

Kernel, the proposed project management system to be developed, will be divided into four (4) modules - Project Initiation and Planning, Project Monitoring, Project Control, and Project Closing. It is divided in such a way that it follows the life cycle of project management. In addition, the modules are also designed to solve the problems identified by the researchers. Value-added functions are indicated with yellow stars. An array of features consists of notifications, data visualization, project logs, and user permissions. The system will be used by all employees under all departments of TEI. Lastly, the system will be developed with the use of certain tools and technologies such as, PHP, mySQL, CSS, Bootstrap, Workbench, Atom, and Github *(Refer to Appendix A for Conceptual Framework).*

1.4.1 Modules, Functions, and Features

Kernel would be flexible enough to handle any TEI project in any department. They would be able to make a project, input its details, tasks, and the people assigned to them, as well as their respective target dates. While the project is ongoing, the project team members would be able to see the actual status of the project and at which task the project is currently on and which department is handling said task. Project team members would also be updated through the system as well as through Email of project status changes. Once a project is finished, project owners can save the project to a template to be used for future projects and these templates can be edited as well. Kernel will also be able to track project team performance as well as departmental and individual performance with regards to the project/s. Through TEI-given Key Performance Indices (KPIs), the system would be able to tell the accuracy, completeness and timeliness of a project team, department or individual. These KPIs can be used to assess whether a project member/s or project team was successful in meeting their targeted indices and if the project execution was up to TEI standards.

Project Initiation and Planning

This module covers all preparations before the project is actually implemented, specifically the project description, process identification,

and role assignment to project team. On this module, all processes in the system can be modified.

Project Profile

Project profile takes care of the creation of the project and its details including the project title, project objective, project duration, project launching and project end, project tasks and who are the people assigned to these tasks. This allows the project owner to provide an overview of the project to the project team.

Project Templates

Project templates enable the users, specifically the project owners, to recreate past projects without having to encode a new set of activities, tasks, and checklists from scratch. At this stage, the users are allowed to conduct modifications on the processes and its time frame. Archived projects may also be transformed into a template.

Project templates are often seen in off-the-shelf PMS', however, Kernel's templates would be editable depending on certain changes that project managers see fit to better the process to meet their KPIs of accuracy, timeliness and completeness. If certain projects are able to be completed with lessening certain tasks, decreasing days of tasks, or if certain processes require more days to be completed; these changes can be applied to these templates.

Scheduling

Scheduling enables the project owners and assigned departments to plot their activities with their corresponding time frames. This advises project owners of the feasibility of the project in terms of time as it allows them to see if their project launch date is achievable. This also dictates when tasks should be started, finished, and who is assigned to perform it.

RACI (Responsible, Accountable, Consulted, and Informed) Chart

TEI follows RACI as their responsibility assignment matrix on projects. They assign RACI to each and every task and the system will be able to capture that. This will allow the team members to be well-informed with who to follow-up for updates and who to inform for the succeeding tasks. In addition, this will also help in providing permissions to certain features as not all tagged as responsible can do what the consulted can, and so on. This allows control in what users of the system can do.

The role assignment is done by the department heads and supervisors, and on occasion by executives. Each task is assigned one (1) employee as responsible, and multiple employees under accountable, consulted, and informed. It is prohibited to assign any executive member as responsible for a task.

The RACI chart would be able to allow access to certain users that have certain permissions. This controls the capabilities of all project team members as not all members have the same capabilities as others, depending on their role within the project. Those Responsible, Accountable, Consulted, and Informed each have their different functions within a project. These permissions are not seen in off-the-shelf systems as it usually allows the same capabilities to everyone involved in the project.

Gantt Chart

Gantt charts are used to visualize all the information from the scheduling function. Gantt charts will reflect the tasks and its time frame. The system will be able to translate all the text data from the schedule and generate a Gantt chart, basically a visual representation of the schedule input.

Workload Assessment

Workload assessment informs supervisors and project owners of how many projects a certain individual is currently handling and their current progress, whether the individual's participation is just about to begin, is currently in progress, or is about to end. The tasks that are included are those of which that are planned, ongoing, and delayed, whether the employee is assigned as

responsible, accountable, consulted, or informed. This will help supervisors with their distribution and assignment of tasks on projects. They will also be prompted if they persist to assign a task to an individual whose project workload threshold is reached therefore advising the project owner or supervisor to assign another individual.

This empowers managers and supervisors to monitor and control workload of their department members. This allows them to not overwork or overload their department members to ensure that each project task assigned to them pertaining to the different projects they handle will reach their desired KPIs of accuracy, timeliness and completeness. PMS systems that are available in the market today do not have these capabilities as they only monitor project progress and nothing pertaining to the people within the project.

Project Monitoring

This module provides a platform for projects to be properly tracked based on progress and timelines. This also ensures that everyone involved in the project are informed with the status of the project, and if there are any adjustments to the target dates. This also provides insight for succeeding task performers on when they could initiate their task, and who to follow-up on.

Task Prioritization

Task prioritization provides insights to the individual on which task they should perform first based on the given time frame of the task and the whole project. There are instances wherein employees are involved in multiple projects and have tasks lined up, and this function will help them decide which tasks to accomplish first. There would be a list of all projects the employee is currently working on as well as their tasks and their respective due dates and from there, the employee can assess which tasks to accomplish first. The tasks are ordered according to their target end date. Tasks that are due in two (2) days will be the first ones visible in the dashboard and in the tasks page.

Project Progress

Project progress allows users to declare complete tasks and be able to automatically inform succeeding tasks that their prerequisites are finished. The system will also require reasons for delay once it detects that an individual finished a task beyond the expected time frame. Moreover, the system will also prompt task performers that their tasks are approaching their deadline based on the set threshold depending on the total duration of the task. This also tracks the overall progress of each project and could provide information to either the top management or the project owner to support business decisions.

Document Tracking

Document tracking covers the exchange of documents involved in the project. This function ensures that everyone involved in the project has access to the same unified version of documents. This also prevents repeatedly printing of documents as it can be downloaded from the system. It also covers receiving confirmation when documents are required to be viewed by individuals in the project. It also serves as a central document repository that is specific to a certain project.

Team Gantt Chart

Team Gantt chart provides an overview of all the tasks assigned to a department on a project. It displays an exclusive Gantt chart of activities of a single department. This could be an aid for departments to plan their activities and time frame accordingly.

Team Gantt charts would help departments handle their workload as it would showcase all projects and project tasks their department are involved in. Team Gantt charts will also help the department plot out their activities to reach their deliverables and target dates in their respective project tasks. Off-the-shelf systems have the capability of generating Gantt charts but mostly through third-party tools, however, these Gantt Charts are of the whole project and not individualized per department.

Project Control

Project control covers the knowledge application and evaluation of completed projects to provide insights that will improve business processes and prevent any problems and delays from reoccurring.

Request for Change

Request for Change covers the requests of project stakeholders about certain processes that could be omitted or could be done simultaneously, processes that need more time or have extra time which can improve the performance of future projects with the same processes. Requests would require approval from supervisors, department heads, project managers, or executives.

There are two types of change requests, change performer and change end date. The ability to request for a change may be submitted by any task actor as long as they are assigned "Responsible". Submissions will be disabled two (2) days prior the target end date as a form of control.

Performance Assessment

Performance assessment covers the evaluation of the project after it has been launched. The system is able to measure the timeliness, accuracy and completeness of completed projects. The measures and its corresponding computation will vary from each department. The system can also provide information on which department is causing most delays which top management and supervisors can use in assessing the actual reason for the delay. The system would be able to tell which department causes delays in projects as it would check if the target deadline was met and if there were prerequisites that were affected. This provides insights for process improvement that will affect future projects.

This is where KPIs would be monitored as each task's accuracy, timeliness and completeness would be assessed. It would be drilled down to each individual then collated to each department and eventually as a whole project. These KPIs would then be used

for process improvement as well as performance assessment of the project. As the system accumulates more data through time, there is a possibility that the system would learn that certain tasks cause delay and should be edited to better improve the process in order to meet the expected KPIs. Off-the-shelf systems do not have this capability as their main focus is the project at hand. The KPIs to be used will also be provided by TEI as they have the same KPIs of accuracy, timeliness and completeness, however, they are measured differently per department and per project.

Project Closing

Project closing covers the handling of completed projects. This is the accumulation of knowledge acquired from the project which can be used as reference for future improvements.

Report Generation

Report generation provides top management information on how the company and each department are performing in terms of projects. This also provides documents to explain the reason for any delays or problems that may have occurred. It also provides a basis for them if a process is encountering problems repeatedly which would need improvement.

Project Archives

Project archive is where projects are stored when they have been launched, or not executed at all. This provides access to past projects that might need replicating without having the need to encode each process again. It allows past projects to be converted to templates for it to be modified and then executed.

Completed or parked projects would be stored in the archives. Project Owners would be able to convert these projects to templates to be used in the future as well as make certain modifications to better improve the project and its respective processes. PMS' in the market today do not have the feature of being able to replicate successful or finished projects. This would

lessen work of making a new template for somewhat same projects with slightly different processes.

Features

Kernel will provide notifications whenever there is movement in the project such as moved and approaching deadlines, task completion and task assignments. It also allows email notifications as a redundancy for as not all users would always be logged into the system. Data visualization will aid users to immediately assess the progress and performance of projects. It would turn complex project data into easily understandable information through the use of charts and graphs. Project logs record all interactions within the project. It records the user, time and date for when action has been performed. User permissions restrict users who are not involved on certain projects and have limited to no access as each member and department have their own functions within different projects. In addition, only specific users are able to perform approvals on a project based on user hierarchy.

1.4.2 Problems

Difficulty in handling multiple projects and inequitable workload distribution will be addressed by the Project Initiation and Planning module, specifically the scheduling, Gantt chart, and the workload assessment functions. The scheduling and Gantt chart will provide aid to individuals who are having difficulty in handling multiple project as they have the system to refer to about their tasks and its corresponding time frame; this way, no project will be overlooked as all information is readily available. Consequently, notifications will also provide reminders for the users. On the other hand, the workload assessment function will alleviate the problem regarding inequitable workload distribution as it will provide a reference for project owners about the current workload of a department or an individual which will help them assess if a new project can be entertained or if the potential individual is capable of fulfilling the tasks.

Lack of project transparency, document mismanagement and incapability of handling project updates will be addressed by the Project Monitoring module. The Project progress function will provide

information to everyone involved in the project and its current status which will alleviate both the lack of project transparency and incapability of handling project updates. Moreover, the document tracking function will aid project stakeholders in storing documents that are related to the project. It provides a uniformed version for everyone as well. With that function, it will be able to solve the problem regarding document mismanagement.

Lack of monitoring and controlling will be addressed by both the Project Control and Project Closing modules. Both modules provide insights to the users on how they can improve future projects by providing information on where delays have occurred, what the reason are for those delays and which departments are causing the delay. Users are also provided the information if a given time frame is not enough to a certain task. With the help of all the functions under those two modules, especially the Performance Assessment function, the system is able to reflect all necessary data and determine the cause of delay or error, thus providing a basis for project and process evaluation.

1.4.3 Tools and Technologies

TEI hired, and are still hiring, developers whose expertise is the PHP: Hypertext Preprocessor (PHP) language. This language would make integration of all their systems less complicated to achieve their ultimate goal of making an online portal they call *One Data*, which would share a single database across all the systems they have developed and would be developing in the future to consolidate and provide performance insights to the top management of TEI. This would also be helpful as TEI's Management Information System (MIS) Department knows the programming language well and would have extensive knowledge of the source code and they would also be able to edit the code in the future to add modifications, modules, features and functions. Using PHP also entails that the system would be web-based, this would keep TEI within the trends of interconnectivity in team collaboration. This also automates the processes of TEI's project management. With the help of Bootstrap, the template for what the system's interface will look like can easily be designed. TEI has specified that they wanted to use the AdminLTE template. Cascading Style Sheets (CSS) will be used to modify the Bootstrap template. Atom.io is the programmers' choice of Integrated Development Environment (IDE) due to familiarity of the software.

GitHub will be used for versioning and trading of source codes from one developer to the other. Lastly, MySQL will be used for the system's database as requested by TEI; since their goal is to combine multiple systems, they aim to use one big database. TEI's MIS Department will also aid the developers in the naming conventions and database design to make sure it conforms to the company's regulations. As systems, such as this Project Management System and the Task Management System of the other group, reach its completion, TEI will consolidate all the Dashboards of each system into one mother Dashboard to present the users immediate information of all the systems in one screen.

As for how Kernel would interface with the existing systems TEI currently has, the actual integration of the systems would be handled by TEI, but it would interact with the proposed task management system to be done by another team, in the sense that Kernel would be limited to only project tasks while the task management system would be limited to day-to-day tasks, such as ticketing. As TEI aims to develop *One Data* by combining Kernel with the other systems in place and to be developed, they request the developers preferably use certain technologies such as PHP and MySQL to make the integration process easier.

1.4.4 Users

The users of Kernel will encompass the entirety of TEI which is composed of seven (7) departments namely Facilities Administration, Finance, Human Resources and Office Admin, Management Information System, Marketing and Business Development, Procurement, and Store Operations which are composed of more or less seventy (70) employees and three (3) top managers. They will all have access to each and every function and feature and are required to use the system as specified by the top management. Users will access the system using their corporate email address, which will also serve as their username. The actual users of the proposed system have expressed their support towards the implementation of the system as it would aid them in making projects more successful. Advertising and Promotions Head, Mr. Jiggy Villamin had said about the added work of encoding in the proposed system is, *"But if what, it would only take ten minutes of my time every day just to set that, but it would ensure me that I will get my deliverables on time, that's not really a problem"*. He would rather add ten (10) more minutes of his time, every

day, doing the right thing rather than doing it wrong and a whole lot quicker (*Refer to Appendix I for March 12, 2018 Interview*).

1.5 Research Objectives

General Objective

The project aims to develop a Project Management System to aid in monitoring and controlling projects.

Specific Objectives

The general objective can be detailed into three (3) specific objectives that would work together to achieve the goal of the project as follows:

- To identify and assess the problems encountered in managing projects and their corresponding causes,
- To design a solution that will support the project team in managing their projects, and
- To develop a systematized way of monitoring and controlling projects.

1.6 Significance of the Project

By utilizing a PMS, it will help ease the delay of project execution. TEI has no standard operating procedure when it comes to planning projects and managing them. They tend to go about their own project tasks and they hardly ever update the other concerned departments on the current project status unless their attention is called. With the help of the PMS, project status as well as project tasks that were done and those that need to be done will be seen by each and every member that is part of the project, providing interdepartmental transparency and avoidance to miscommunications.

By automating some of the processes, project members would have to update project tasks which would then update project status. By having an update on the project status, the project owner can gauge whether or not the project would be delayed which could give them ample time to rectify any task that could help speed up the delay. With proper use of the system, projects will be

documented, which can then provide data that will aid in the analysis and improvement of their current processes.

It also provides interdepartmental transparency within projects so as to have all concerned departments in a single project on the same page about the current status and of its tasks. It would also help in knowledge transfer; In circumstances where the supervisors knowledgeable on the complete process or team members who have a vital role in the project, leave the company, replacements and the teams left behind can easily adapt to the loss as the process has been documented. The system would also provide project owners, department heads and administrators a platform to monitor and control projects as they would have a bird's eye view of which task have yet to be done and which departments cause delays. Lastly, the proposed PMS will provide TEI with project documentation, something that TEI lacks in their current processes. Documenting projects give more leverage for future projects, help gauge what went wrong and where improvements can be made.

The ICT trends discussed above will help support the project management processes of TEI as digitizing the business processes will serve as systemizing it which helps in documenting, monitoring and controlling of these processes. This also allows for collaboration and transparency among project team members as they would have access to the project's progress and documents with it being connected through the cloud. As the system accumulates more and more data, it would be able to pinpoint areas of improvement by analyzing which processes and which departments cause delay based on historical data.

The proposed PMS would also help TEI get one step closer to their vision of having *One Data* in the future.

1.7 Scope and Limitations of the Project

The proposed project management system that will be made for the company is flexible, meaning, the system should be able to adapt to the needs of the user depending on the project they have. Although not all departments have their own departmental projects, all departments will still be part of the scope of the system since there are projects, such as opening of a new store, where all departments have their own activities and tasks that they need to accomplish with regards to the completion of the project. In addition, all processes, activities, and tasks involved in a project in all departments will be included in the scope. The

resources that the PMS will handle are only that of manpower or people resources; financial resources will not be integrated to the system.

The limitation of the project is the monitoring of the day-to-day tasks of an employee and the ticketing for requests, concerns, and processes that may occur outside of the project. All processes of all the departments that are not related with the project they handle, such as, the payroll for Finance Department, market research for Marketing Department, ticketing for Wi-Fi connectivity issues for MIS, repairing of broken air conditioner for Operations, will not be included.