



Lisbon School
of Economics
& Management
Universidade de Lisboa

MASTERS IN MANAGEMENT (MIM)

MASTER'S FINAL WORK

INTERNSHIP REPORT

**PROJECT MANAGEMENT INTERNSHIP AT CAPGEMINI
ENGINEERING**

BÁRBARA DIAS DA SILVA

MARCH - 2022

..



Lisbon School
of Economics
& Management
Universidade de Lisboa

MASTERS IN MANAGEMENT (MIM)

MASTER'S FINAL WORK

INTERNSHIP REPORT

PROJECT MANAGEMENT INTERNSHIP AT CAPGEMINI ENGINEERING

BÁRBARA DIAS DA SILVA

SUPERVISOR: PROF. DR. CAROLINA AFONSO

CO-SUPERVISOR (CAPGEMINI): DIANA LADEIRA

JURY:

PRESIDENT: PROF. JOSÉ MANUEL CRISTÓVÃO VERÍSSIMO

RAPPORTEUR: PROF. JOSÉ MANUEL NOVAIS SANTOS

SUPERVISOR: PROF. DR. CAROLINA AFONSO

MARCH – 2022

ACKNOWLEDGMENTS

I want to thank all the people who were part of this journey, supporting me, giving advice, or just listening to my worries. Without you, it would have been impossible.

To my parents and Lia, thank you for all the love and support, for being there when I needed and for helping me, each in your own way. Thank you for being an example, cheering me on, and encouraging me to follow my dreams, regardless of the obstacles. Thank you for everything you have taught me and will continue to teach me, and above all, for always believing in me.

To my family, especially my grandmother and aunts, thank you for all the trust, support, and for always listening.

To Professor Carolina Afonso, thank you for your guidance and for reading my numerous revisions.

To my friends, thank you for always being there in the good and bad times. Thank you for listening, giving advice, and always knowing what to say.

To Capgemini Engineering, and especially to Diana Ladeira, thank you for believing in me, for spending your time, and for contributing to the success of this internship and report.

Thank you to all the people who volunteered to participate in the interviews; your contribution and knowledge were essential for the accomplishment of this study.

SUMMARY

Project Management is a significant contribution to project success. Within it is capacity planning and resource allocation, which allows managers to monitor project demand with qualified capacity and resources, direct multidisciplinary groups, and distribute tasks throughout the project. Within this project, a necessity to plan and manage capacity and resource allocation emerged, and an internship project management role was created at Capgemini Portugal to execute activities and research this topic.

The present report seeks to study: (1) How to develop an efficient and effective capacity plan within project management? (2) Is it possible to learn how to manage projects and capacity through this internship? And with the results, create a proposal of capacity planning and resource allocation implementation for the organization.

The present study was conducted through a qualitative approach and a heterogeneous intentional sampling with professionals of Capgemini Engineering. Two semi-structured, one-to-one, internet-mediated interviews were carried out with experienced managers of the company.

The results allowed us to conclude that (1) it is necessary to consider the characteristics of the project and, using a mix of strategies and techniques, develop a plan that will best suit their needs. Additionally, (2) that with this internship, it is possible to learn to manage project and capacity through all of the activities executed, feedback received, studying, and the creation of this report.

Keywords: project management, capacity planning, capacity management, resource allocation

ABBREVIATIONS

PMI: *Project Management Institute*

PMP: *Project Management Professional certification*

PM: Project Manager

ISEG: *Instituto Superior de Economia e Gestão*

ITIL: Information Technology Infrastructure Library

KPI: Key Performance Indicator

FTE: Full-time equivalent

BU: Business Unit

SLA: Service Level Agreement

CSAT: Customer Satisfaction Score

IT: Information Technology

EVA: Earned Value Analysis

ÍNDEX

SUMMARY	<i>iv</i>
ABBREVIATIONS	<i>v</i>
CHAPTER 1 – INTRODUCTION	1
CHAPTER 2 – THE INTERNSHIP	3
2.1 The Company	3
2.2. Objective	4
2.3. Research Plan.....	5
2.4. Activities and Role Performed	8
CHAPTER 3 – LITERATURE REVIEW	10
3.1. Management.....	10
3.2. Capacity Planning	11
CHAPTER 4 – METHODOLOGY & DATA	15
4.1. Population Sample	15
4.2. Data Gathering	15
4.2.1. Characterization of Research Subjects.....	16
4.3. Data Collection Instrument	17
4.4. Ethical aspects.....	17
4.5. Data Analysis	17
CHAPTER 5 – RESULTS ANALYSIS	18
5.1. Interview Analysis	18
5.3. The Proposal	22
CHAPTER 6 – CONCLUSION	25
6.2. Limitations	25
6.3. Contributions.....	26
6.4. Future Research.....	26
REFERENCES	27
APPENDICES	29

INDEX OF FIGURES

Figure 1 - Organizational Chart	3
--	----------

INDEX OF TABLES

Table 1 - Activities and timeline	6
--	----------

Project Management Internship at Capgemini Engineering

Table 2 - Resource allocation terms.....	13
Table 3 - Characterization of the sample of professionals.....	16
Table 4 - Characterization of the sample in company	16

CHAPTER 1 – INTRODUCTION

This report is the outcome of the international internship performed to finalize the masters in management program at the Instituto Superior de Economia e Gestão (University of Lisbon). It has led to a learning agreement and protocol between ISEG and Altran Portugal, part of Capgemini Group, with its dates set beginning on November 2nd of 2021, and ending on February 15th of 2022, counting almost four months, in Portugal, located in the Lisbon Office at Parque das Nações.

The internship objective is the management of the ongoing project for the client, along with all the responsibilities detailed during this report that involves the planning, execution, monitoring, and controlling phases of project management. The main challenge of this report is researching capacity planning and resource allocation to create a solution, propose it to the company and current project manager, and, in the future, implement it according to project needs.

The tasks executed in the internship aimed to develop specific skills such as coordinating groups, monitoring project demand with qualified capacity and resources, directing multidisciplinary groups, and distributing tasks for each component of the project while aligning activities with project objectives.

Within this scope, a question arises: How to develop an efficient and effective capacity plan within project management? Is it possible to learn how to manage projects and capacity through this internship?

Through this internship, the project aims to contribute to the company's growth and development, applying project management with excellence in capacity planning and resource allocation. While the intern's participation in the company aims to promote a practical application of the knowledge acquired during studies and its implementation in project management with practical activities. Another benefit is to provide a multicultural experience, getting to know the people, culture, and ideals.

The lessons learned within the institution add value to the professional training, and, through the activities developed, it is possible to contribute to the growth of the project by managing the processes, bringing maturity and a systemic view of the events experienced during the execution of each stage, and presenting active contributions during the execution.

Regarding academia, it is possible to see that studies are constantly done on project management and on the companies that have implemented project management methodologies,

Project Management Internship at Capgemini Engineering

indicating that those organizations can complete projects on time and within budget. Furthermore, these numbers are rising, and there has been a 5% increase in goals delivered within the original budget (PMI 2021 Pulse of the Profession® Report, 2021). Nevertheless, many methodologies involve capacity management and planning. At the same time, most studies focus on only one type, mostly related to operations management or whatever area the article is focused on. This report brings together literature from recent authors in more than one study area, contributing to academia.

Therefore, this work divides into five parts:

The first and second parts are the introduction and internship, a description of the company and its goals, the internship objectives, main activities and timeline, research problem, and expected contributions.

The third part is dedicated to the literature review, studying various authors and pieces to contextualize project management, the importance of capacity planning, and resource allocation.

The fourth part is the methodology and data collection that will impact the final results of this report.

The fifth is the development of the interviews organized by categories, along with the proposal of the capacity plan, considering project limitations and the activities execution.

The sixth part is the conclusion based on the internship results, the knowledge obtained, and the research questions answered.

CHAPTER 2 – THE INTERNSHIP

This section of the report presents the company and structure of the project, the internship objective and research plans, and the activities performed within a specific timeline. It successfully demonstrates the evolution of activities and growing responsibilities taken on by the intern.

2.1 The Company

Capgemini is a multinational company created in France, known for being a global leader in consultant services using technology to deliver digital solutions and innovate. The company has more than 52000 engineers and scientists worldwide, with a total of 5 global engineering centers and participating in more than 30 countries. These include very young people that are, on average, 32 years old and indicate that the company has a very diverse atmosphere with more than 80 nationalities present among all employees. It has been growing steadily and is very well ranked, recently achieving first in the "Everest Group Engineering Services Top 50™", a list of the 50 most prominent providers of engineering services ("Announces 2021 list of top 50 engineering services providers", 2021).

Capgemini provides services across ten industries and has set its sights on getting even higher and even better, with a new focus on the sustainable intelligent industry era. The leading competitor can be considered one of the "big four" firms, Deloitte, which is a top consulting company in the world, along with those that have a specific focus on technology, such as Accenture, IBM, and Wipro ("Gartner, Inc.", 2021).

The central values that shape the company and its culture are Honesty, Boldness, Trust, Team Spirit, Freedom, Fun, and Modesty. These show that the business considers empowerment, integrity, a desire to grow, fairness, respect for diversity, inclusion, and simplicity, essential elements. It is a good fit with the culture being sought out by the intern, focusing on soft skills to improve during this period, such as teamwork, communication, initiative and autonomy.

The Capgemini Group acquired Altran Portugal and, in 2021, announced that they would launch a new brand called Capgemini Engineering which would use Altran's knowledge and experience in engineering with research and development, along with Capgemini's digital manufacturing expertise. Although the company has many sectors and sub-branches, the intern reported directly to Capgemini Engineering, which will, from here on out, be referred to as

Project Management Internship at Capgemini Engineering

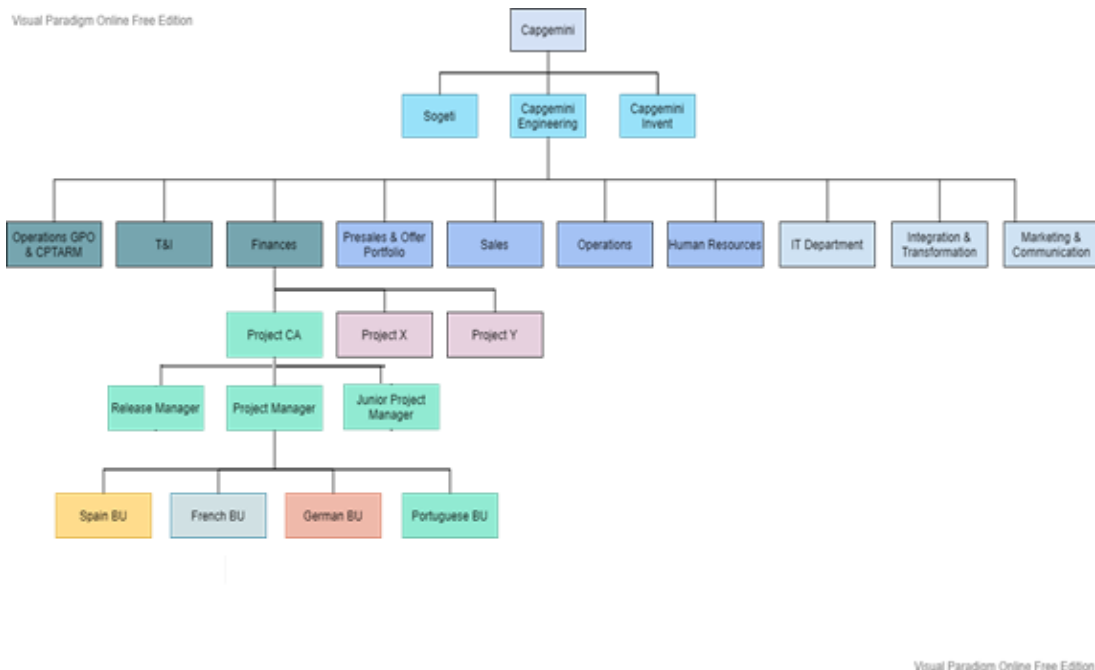
Capgemini.

In Portugal, the core services offered by the organization are:

- Product & Systems Engineering - designing and testing complex systems and products.
- Digital & software - focusing on client experience and innovative products.
- Industrial Operations - transforming the client's operations and making very significant improvements.

Figure 1

Organizational Chart



This internship will be in the Finance sector with a client in the banking industry. Within the project, the focus is taking care of the planning and supervising of five business units in four different countries: France, Portugal, Spain and Germany. In the Organizational Chart (Figure 1), it is possible to see the sectors within the company.

2.2. Objective

The main objectives of this internship are to plan and oversee the execution of the project so that it is within budget and on track while planning and allocating necessary resources, along with

Project Management Internship at Capgemini Engineering

keeping the stakeholders involved and aware during the whole process. All of this is within the confines of a company's goals and vision, using digital tools for project management, budgeting and reporting.

This opportunity has its primary function as a project manager, to execute activities such as: carrying out and coordinating the technological projects under their responsibility; ensuring compliance of project deliverables and customer requirements; ensuring the continuity of the development of projects to guarantee the perfect management of the human resources involved, including their participation; representing the company in the records of technological achievement of projects and, fundamentally, customer satisfaction. At the same time, achieving one of the goals of utilizing the interns' theoretical knowledge and contributing to the company by relieving the service manager and release manager who have been taking care of these activities.

In conclusion, the project contributes to the intern's professional development and, consequently, to the growth and development of the company by applying project management with excellence in capacity planning.

Additionally, there are benefits to experiencing the culture, learning more about the Portuguese Republic, and developing critical communication and interpersonal skills such as active listening, leadership and flexibility.

2.3. Research Plan

The research problem proposed by this internship is the research of capacity planning and resource allocation methods to develop a capacity plan to be used during 2022. Considering the literature review and the interviews performed to gather the experience of other managers with capacity planning and resource allocation in similar projects. This problem arose due to the need for a platform to keep track of allocation, hours and days worked, vacations, holidays, release planning, workload estimation, and to deliver up-to-date reports. The current form of management was insufficient, as it directly affected the project with a lack of personnel, and necessary skill set, going over budget because the resources available had to work overtime and impacting the deliveries, along with burnout occurring in one of the team members.

Therefore, two main questions must be answered: How to develop an efficient and effective capacity plan within project management? Is it possible to learn how to manage projects and capacity through this internship?

To answer this, the internship was executed along with the final work to propose a solution to

Project Management Internship at Capgemini Engineering

the previously mentioned problem, with hopes that the company will implement it after the internship is over.

Table 1

Activities and timeline

Type	Preview for Internship Timeline	Start Date	End Date
1.Scoping	Information and Documentation Gathering & Process Acquisition	02/11/2021	02/11/2021
2.Knowledge transfer	Hardware & Access account requirements (Laptop, Access credentials, corporate tools overview)	03/11/2021	03/11/2021
2.Knowledge transfer	Capacity management tool 2021, Data exploitation, Basic usage overview	04/11/2021	08/11/2021
2.Knowledge transfer	Capacity Management: Vacation management process, Time tracking, new resources, Adjustments/Review reporting process coming from Capacity Plan	09/11/2021	11/11/2021
2.Knowledge transfer	Review of corporate tools access and usability Time tracking & Applicational Access (Cloud Drive e Timesheet software)	12/11/2021	14/11/2021
2.Knowledge transfer	Reporting on Capacity: Analysis of tool content & Main indicators, Skills necessary	15/11/2021	16/11/2021
2.Knowledge transfer	Organization Overview (Team & Project presentation), storage Structure analysis/ Content browsing, processes and workflow (Work model, KPI, SLA, Team man)	17/11/2021	21/11/2021
3.Shadowing	Hands-on review of Capacity management: Data explained, Information description and usage, Q&A	22/11/2021	12/12/2021
3.Shadowing	Monthly alignment with Financial Controller, Monthly meeting with Service Delivery Manager (align BU delivery with budgeted capacity), Weekly capacity review meeting with SPOCs	22/11/2021	12/12/2021

Project Management Internship at Capgemini Engineering

	Meeting on capacity alignment, Vacation alignment		
3.Shadowing	process & Review of delivered capacity (Budget alignment, Distributed cost assignment, Cost assignment criteria)	22/11/2021	12/12/2021
3.Shadowing	Capacity Management Tasks, Project Manager activities	22/11/2021	12/12/2021
4.Reverse Shadowing	All activities in reverse shadowing	13/12/2021	02/01/2022
5.Research	Capacity Plan forecast and tasks for 2022	03/01/2022	09/01/2022
5. Research	Management Meeting, Workload Review, Tasks and Resources for 2022	10/01/2022	16/01/2022
5. Research	Skills necessary, FTE per BU, allocation, vacations, holidays and budget forecast	17/01/2022	23/01/2022
5. Research	Tool for Capacity Plan	24/01/2022	30/01/2022
5. Research	Interviews and Processing of Interviews/Resource Acquisition	31/01/2022	06/02/2022
5. Research	Release management merge, Dashboard and Report	07/02/2022	09/02/2022
5. Research	Capacity Plan forecast and tasks for 2022 (Fine-tuning of predictions, Adjustment of allocations plans)	10/02/2022	13/02/2022
5. Research	Weekly adjustments, Review for 2022 figures, Budgeting Service and Change requests, Capacity adjustment to match activities	14/02/2022	14/02/2022

At the beginning of the internship, a timeline was created regarding the development and adaptation/training time spent in each activity within each phase: the training week, shadowing week and reverse shadowing.

The first phases contemplate training, reviewing the existing documentation, learning the work, and meeting the team and stakeholders. After this, activities are executed by the intern with increasing independence within the reverse shadowing and research phases.

2.4. Activities and Role Performed

This internship is a project management role, and with it, the opportunity rose to execute many activities directly related to management, such as: extracting KPIs and creating relevant reports to the business, tracking execution, organizing management and team meetings, working alongside partner companies who participated in the development of the project, learning corporate tools to conclude tasks, participating in the project phases, user management tasks and others.

In Table 1, it is possible to see the timeline and main activities performed during the project. However, most of the tasks mentioned are directly related to capacity management and resource allocation. Due to this, some of the functions focused on project management are not described.

The company indicated this timeline to achieve the internship goal within the internship time frame.

There are five types of phases displayed in the content:

Scoping: This is related to Information and Documentation Gathering & Process Acquisition, that is, gathering everything necessary to start learning about the project, company, and client.

Knowledge Transfer: This considers any training necessary on the activities mentioned, learning the processes and what is currently implemented, reading up on the existing documentation, and meeting the team, stakeholders, managers, and interested parties.

Shadowing: All the activities mentioned are executed by the manager responsible while the intern is closely observing to enable the researcher to learn more about the role and how the company works.

Reverse Shadowing: In this phase, the intern executes the tasks mentioned while being observed by the manager that participated in the shadowing. It is the ideal moment to start putting everything learned into practice and ask questions that may not have come up previously.

Research: This phase indicates that the intern is working on tasks for the project more independently since the reverse shadowing is over while simultaneously researching the information necessary to propose the capacity plan for 2022. The results analysis chapter describes the proposal and more details about these activities.

Throughout these phases, it is possible to see the evolution of knowledge. Initiating with documentation analysis, getting to know the project, the existing processes, and acquiring the correct accesses to execute activities and actively participate. This was followed by analyzing the

Project Management Internship at Capgemini Engineering

tools, learning to operate them, and understanding the already available data. Taking the time to learn about the leave management process and time tracking, identifying company rules and guidelines regarding regular work hours, overtime, on-call, sick leave, legal leave, holidays and vacations. Additionally, it is necessary to absorb project data used as a basis for any suggestions made within the timeframe of the internship, such as current resources roles and skills sets, existing KPIs such as FTE per BU, metrics/reporting, capacity planning, and resource allocation information. Each BU has specific details for its execution, with differing locations, release schedules, methodologies and budgets, teams and project goals. All this while constantly communicating with the teams, managers, stakeholders, financial controller, and others involved in the project.

The activities consider all client business units and personnel, full-time employees and contractors, and the yearly workload and budgets negotiated between companies.

CHAPTER 3 – LITERATURE REVIEW

The literature review in this report is focused on aspects of project management with an emphasis on capacity planning and resource allocation, considering different methodologies and goals.

3.1. Management

Using project management in companies is a safe methodology in the current market since it presents innovative strategies to direct resources through new tools. Project management has become critical to organizations because the managers can direct the activities and goals formally and strategically (Novo, Bianca; Landis, Eric A.; Haley, Mary Lewis., 2017).

A project can be defined as an enterprise that creates a plan for executing a specific service, product, or results, usually achieved by people, with limited deadlines and budget, that may be tangible or intangible. As in any other enterprise, there must be planning, programming, control and execution phases for these activities (Sanchez, F., Micaelli, J., Bonjour, E., Monticolo, D., 2019).

Process and project management are present in large organizations and industries, led by a manager who has the support of a project team and is responsible for identifying which processes are suitable, along with the level of requirements for each one. The manager must carefully check each process's inputs and outputs, identifying the applicable measures (Novo et al., 2017).

In practice, project management follows the main characteristics of a life cycle: beginning, middle and end. Planned by a team of professionals, executed and controlled, delivering products, services, or results, and separated into stages, with progressive evolution and limited resources, a well-planned scope, among other aspects (Sanchez et al., 2020).

To be successful and effective, one must think about the entire life cycle, contemplating all stages and phases, they are initiation, planning, execution, monitoring, and control, along with the closing process (Mishra, 2020).

In the initiation process, processes are performed to define a new project or a new project stage, where authorization is required to start either one (Sanchez et al., 2020).

In the planning process, the necessary resources are gathered to organize the project scope, outline objectives, and define the line of action to meet the project's goals (Sanchez et al., 2020).

Project Management Internship at Capgemini Engineering

In the execution, the manager directs resources to achieve the requirements defined in the proposed planning (Project Management Institute, 2017).

In monitoring and control, the processes are necessary to track, analyze, and control project progress and performance, perceive areas that will require changes, and initiate the identified updates (Sanchez et al., 2020).

Finally, the closing process is the official completion of the project or stage, where all processes are brought together to complete activities and verify the integration of all elements, supporting the alignment and connection with other processes to meet the final product (Project Management Institute, 2017).

Implementing project management is essential for any organization with a vision of growth and the intention to remain, and thrive, in a highly competitive market. Not applying project management concepts will result in delays for companies, as there will be a lack of administration and interaction in all processes involved in the project (Sanchez et al., 2020).

Within this, project scope management is essential, as the new project is created through an identified demand that will be organized and detailed through the application of tools and techniques (Mishra, 2020). Along with time management processes that are crucial in developing a schedule using associated tools and techniques. Controlling and monitoring the time of each activity in the project, providing order and success in the proposed objective. Time is a significant rival for projects, as its defined period has to flow as documented in the schedule. If the time exceeds, then scope, cost and quality management will also be affected (Kerzner, 2009).

The tools and techniques used in cost management are essential in managing projects and daily activities. Applying these tools and techniques makes it possible to create a differential in the job market, as the project is built correctly, with all the essential information for budget control and updated information of identified project needs as time elapses (Wysocki, 2013).

While quality management comprises the organization's processes and activities that determine the quality assurance policies, objectives and responsibilities. Existing quality management tools and techniques support project processes so that quality is continuously monitored, controlled, and defined as necessary throughout the project (Mishra, 2020).

3.2. Capacity Planning

Capacity planning seeks to satisfy current and future demands. It is a fundamental responsibility of the production management activity. A good balance between capacity and

demand can generate high profits and lead to satisfaction. Planning and controlling each function and breadth of the business requires small operations to fulfill the essential business requirements (Gadekar, 2017).

In any event, capacity describes the size of the operation, but it does not represent the processing capacity. The time factor must be added when using the term capacity to describe processing capacity. Capacity is, therefore, the maximum level of value-added activity in a given period of time that the process can perform under normal operating conditions. As such, decisions made in planning capacity policies in a short time frame will affect several performance aspects, such as the balance between capacity and demand (Gadekar, 2017).

Every methodology has characteristics that differ and adapt to each circumstance more than others. The organizations will identify with a particular methodology according to their needs (Novo et al., 2017).

Klosterboer (2015) indicates that in ITIL, the primary purpose and goal of capacity management is to avoid waste. Anything that leads to a loss of money is considered a waste, such as computer resources, hardware, software, data and energy. Making sure that these resources are being used and not simply sitting idly, even though it is still functioning, leads to a more sustainable environment. Other goals of capacity management include having available resources for planned deliveries by reclaiming and redistributing unused resources, estimating and forecasting the workload, and predicting demand to implement resources promptly instead of having a production stopped while the acquisition is in progress. Ultimately, with the costs saved on the items mentioned, it is possible to allocate this money to new growth opportunities that help the company expand.

According to Hendriks, M., Voeten, B., & Kroep, L. (1999), when considering resource capacity and allocation, using the rough-cut-capacity-planning method, it is necessary to consider long-term, medium-term, and short-term resource allocation. As seen in Table 2, these three depend on one another, with different frequencies, purposes, and outputs. The long-term allocation represents the business plan, with department goals, budgets, and capabilities, accounting for a broader view. At the same time, the medium-term allocation considers the project portfolio with project executions, objectives, resource priorities, and changes based on rough estimates of the workload/demand. Finally, the short-term allocation indicates the specific activities and the resource assignments of "day-to-day planning" within the medium-term allocation.

Table 2

Resource allocation terms

Allocation	Purpose of the plan	Document Output	Frequency	Timeframe
Long-term	Required capabilities for developing a Business Plan	Department plan, budget per capability	Every year	5 years
Medium-term	Rough version of capacity planning for the project portfolio	<ul style="list-style-type: none"> . Portfolio review of projects to execute . Decisions for group leaders . Effects on the project milestones . Rough allocation as the basis for the short-term allocation 	Every 3 months	1 year
Short-term	Operational assignment of resources	Assignment of tasks of medium-term resource allocation	Every 2 weeks	6 weeks

Note. Adapted from Human resource allocation in a multi-project R&D environment by Hendricks *et al.* (1999).

The organizational objectives and priorities for capacity management must be defined, such as department accounts, available resources, SLAs and CSAT. The next step is to focus on forecasting the demand for capacity, using data recorded from previous years, planned future activities, or business activities that the whole organization does, or a mix of these, depending on the available information (Hendricks et al., 1999).

With limited resources, accepting unplanned demand can take a nasty turn, negatively impacting productivity. In a rapidly changing economy that requires managers to adapt, this becomes very difficult (Mishra, 2020). The project portfolio management assists in the selection of the projects that best fit the company's mission while considering the capacity limits such as resources and demand, risks and value. Additionally, it also aids when facing scope creep, these continuous or uncontrolled changes, by indicating that it can be averted if care is taken when the scope is being defined and also by focusing on the "critical few", thus avoiding under sourcing (Levine, 2005).

While Proud (2013) mentions that the key to capacity planning is simplifying matters and using the necessary information to make decisions. One of the main techniques is Pareto's Law, which has proved its efficiency in various fields, "Pareto's Law tells us that 80% of our results typically come from just 20% of our efforts" Proud explains. He recommends utilizing both together to "yield the highest benefit", using planning to identify bottlenecks and the reasons for them, and afterward, applying Pareto's law to determine what would be the best solution.

Kestenholz (2020) states that when searching for resources to allocate in capacity planning, it

Project Management Internship at Capgemini Engineering

is critical to consider the person's role. Managers find this problematic because they often search for a specific skill, but the key is not to stray from this rule. An example would be: if a resource is employed as an IT director, that is the primary job description, and financial analysis may be one of many skills.

Tools are used in capacity management since it is ideal to have ongoing monitoring. Implementing the detailed tracking of the workload and resource changes according to the project methodology is necessary. However, automation is highly suggested when there are many activities and rather complex requirements (Mishra, 2020). Meanwhile, Levine (2005) clarifies that tools such as Open Plan or Microsoft Project are essential for tracking, calculating, storing and sorting data related to the resources within all project stages. Ideally, they are used to produce the necessary plans, with cost estimates, resource availability, project schedule, and knowledge performance indicators, with management updating the data and the platform as required. These tools also have KPI techniques to use for project evaluations, such as EVA, which, after analysis, can be used to rank projects, extract insights that lead to recommendations, create dashboards and balance capacity/demand.

In conclusion, through capacity management, the company becomes more competitive, as it will guarantee the fulfillment of the production plan and the completion of demand without delays in the delivery of its products. (Gadekar, 2017).

CHAPTER 4 – METHODOLOGY & DATA

This report is an exploratory field research with a qualitative approach. According to Saunders, M. N. K., Lewis, P., & Thornhill, A. (2019), the exploratory research study is characterized by observing facts and phenomena precisely as they occur in reality. The collection of data and, subsequently, the analysis and interpretation of this data, based on a consistent theoretical foundation, aims to understand and explain the problem searched. In this report, the data analyzed from the interviews focus on the real-life experience of each participant, alongside the literature review, to answer the research questions. The analysis uses the qualitative methodology from the participants' perspective as they answered the interview questions.

Qualitative research is defined as: capable of incorporating the questions of meaning and intentionality as inseparable from acts, relationships and social structures. In other words, qualitative research is focused on the social system of the phenomenon and is concerned with the universe of meanings, motives, aspirations, beliefs, values and attitudes (Saunders et al., 2019).

The main reason to use a qualitative methodology during this process is that the data obtained has more potential for an in-depth understanding of the topic. It is also necessary to consider the restrictions related to the time frame within which this study was conducted and accessibility restrictions.

4.1. Population Sample

The sample consists of 02 professionals that belong to Capgemini, both working in management but in different areas, with years of experience in resource and capacity planning. As such, it is considered non-probabilistic purposive sampling, being heterogeneous, since the focus was on professionals with different experiences on the key themes that would aid in the research problem solution (Saunders et al., 2019). The choice of technique was limited due to time and accessibility restrictions.

4.2. Data Gathering

Within the data gathering process, only primary data was gathered by conducting qualitative research in a semi-structured interview. According to Saunders et al. (2019), the semi-structured model allows the interviewer to have critical questions determined beforehand while focusing on the main themes during the interviews.

Project Management Internship at Capgemini Engineering

Data was collected through closed questions to identify the research subject and open questions relevant to the study's objective. The questions were asked in an individual, clear and understandable way, using language appropriate to the characteristics of the participants.

The interviews were conducted one-to-one and were internet-mediated, using Microsoft Teams, with an average duration of 45 minutes.

4.2.1. Characterization of Research Subjects

The sample for the interviews consists of a total of two participants. The interviewees have vast experience regarding the study subject, as seen in tables 3 and 4. Both participants were adults with expertise in the management field that work in Capgemini on different projects than the one contemplated during this study. Both have experience working with projects in the finance sector, one man with higher education, a post-graduation degree in management, and more than ten years of experience managing several projects. While the woman also has higher education, a master's degree in management, and more than ten years of project management experience.

Table 3

Characterization of the sample of professionals

Participants	Age	Sex	Education Level	Experience in Management
Participant 1	40+	Male	Post-Graduation Degree	Above 10 years
Participant 2	40+	Female	Master's Degree	Above 10 years

Table 4

Characterization of the sample in company

Participants	Current Role	Professional Certification
Participant 1	Transition Manager	Yes
Participant 2	Project Manager	Yes

4.3. Data Collection Instrument

The researcher built the instrument (Appendix A) based on the national literature and the advisor's experience. It consists of a questionnaire containing closed questions (the researcher defined the alternatives that the respondent could point out) who indicated the one that best suited their characteristics. It also consisted of open questions (they admit different answers from those interviewed), where each respondent could respond freely to the questions (Saunders et al., 2019).

4.4. Ethical aspects

Data collection was carried out in compliance with ethical precepts, ensuring each individual's privacy within the institution. Respondents were aware that the activity consisted of an interview applied through a questionnaire that would be transcribed in full and analyzed (Saunders et al., 2019).

4.5. Data Analysis

According to Saunders et al. (2019), data treatment is ideal when analyzing the data, and in the case of interviews, most are transcribed to use the verbatim accounts. As such, for an adequate interpretation of the collected data, it needs to be analyzed and read individually, raising the greatest needs and feelings of the research participants. Afterward, they are grouped into analysis categories, and these categories are used to establish classifications and aim to extract respondents' information, ideas, and expressions. Finally, it is structured with the explanations directly associated to the categories and analyzed during the results analysis. This process was completed without using specific software intended for data analysis.

CHAPTER 5 – RESULTS ANALYSIS

The results are presented by the analysis categories, built from the content interpretation, and according to the research objectives.

5.1. Interview Analysis

To compose the results, the questions were arranged in 5 categories to support the answer of the research problem as objectively as possible:

Category 1 - Professional trajectory within the project area

To start the interview, the interviewees were asked to speak about their professional and academic trajectories. The response of the interviewees showed that they are trained in technical analysis, starting out with system development and data processing, and later on, migrating to the project management area - *“Programmer analyst and from there, quickly progressed to project and people management, is what has typically been my path. We're talking about 89... Yes, and since then, I've always managed people, projects, services.”* (Verbatim, Participant 1). This is due to the market opportunity itself and their own interest in the area, showing the different aspects that the market offers within the IT world – *“A couple of years it was necessary to manage small projects or small teams, they were even internal projects and had no visibility to clients. From then onwards, it grows in terms of the team's size to manage, projects, and services.”* (Verbatim, Participant 1).

Both professionals have a degree in management, and certifications that were acquired during their career (Table 4) that was a contribution to their knowledge to implement frameworks and methodologies, such as the PMP certification that both participants possess– *“Within the company we started to work on creating a project management office, to organize the work that we were doing. Then came the need for a PMP certification”* (Verbatim, Participant 2). Both participants show diversity in applying their work methodologies, one with a broader experience in many types of management, such as contract, project, portfolio and so on – *“From project and program management to people management and service management, contract management, transition management.”* (Verbatim, Participant 1) – with many sectors, while the other is more focused on project management for systems management.

Category 2 - Main difficulty in the management area

“The main challenge is to manage people, not the software development, having trust and empathy within the team makes the greatest difference, then the workflows” (Verbatim, Participant

2). – it is agreed by both participants that managing people is one of the main difficulties. They indicate that managing people is not only defined by those directly involved in the projects, such as the team members, but also stakeholders, observers, and others. Everyone must be aligned to reach the same goal, preferably with good interpersonal and technical skills to help in this achievement – ***“No two people are alike and therefore, usually what you have to do is to ensure that everyone is paddling in the intended direction.”*** (Verbatim, Participant 1). All these elements influence the way the project will be directed, with its success becoming strategic within the organization – ***“If it's not a team that goes in the same direction, it starts impacting the vectors: time, quality, and finance.”*** (Verbatim, Participant 1).

Participant 2 agrees but specifies that, within people management, the biggest challenge is to be empathetic with the non-fulfillment of distributed activities, which may happen for several reasons, while simultaneously working to replace the necessary resources and mitigate the situation – ***“This person had problems at home, or felt sick, or took a vacation, they needed to solve a problem and didn't go to work that day, and suddenly we have to relocate everything, using mainly empathy.”*** (Verbatim, Participant 2).

Category 3 - Difficulties in the transition, allocation of resources, and capacity in project management within the organization.

The interviewees mention three important points:

The first is indicated by Participant 1 – ***“Typically, I would say that the challenge is in the Balance... A normal project has to deliver on time, on quality and on budget and you have to be able to fulfill all these factors”*** (Verbatim, Participant 1). The balance is a big challenge, as it is connected to maintaining an equilibrium between the resources, budget and delivery quality. Based on the project's identified needs, the ideal scenario indicates that the deliveries should always be within a specific time frame, with a measurable quality, and without additional costs.

The second is related to the knowledge base, linked to the project and the resources roles/skill sets. Since specific projects may require particular human resources that are not readily available in the market, it is necessary to consider this when prioritizing tasks and deliveries, also contemplating that these resources will affect the budget when the initial planning is being executed due to potential cost increase. – ***“There are few people available with know-how, so they are paid very well and then it makes this type of balance very difficult because it is not always possible to negotiate a more expensive rate with a client, a sales rate and therefore you assume a higher cost.”*** (Verbatim, Participant 1).

The third is that, although a manager can plan a project to the best of their abilities, with a mix

or specific techniques that suit the project so that it may be theoretically perfect, it will still require changes and periodic revision during the process since there are many risks involved and issues that arise from the day-to-day business activities – ***“To put together a wonderful project plan, you have defined activities, the right people, everything is beautiful, and people say they do the tasks in X hours and it does it not happen”*** (Verbatim, Participant 2).

Category 4 – Techniques used for resource allocation and capacity planning. Within experience, which one has the best answer indefinitely?

A participant states that creating and defining the project documents is the key along with client partnership and communication - ***“Requirements gathering is essential to put together a plan, so you need to tell to your client that it takes time, that you need people, that you need an analyst who understands these requirements”*** (Verbatim, Participant 2). Obtaining a good gathering of requirements, then proceeding by estimating the workload, using the previous capacity for the team and project, determining the size of the tasks and knowing the skills sets and roles of the team so that you can allocate them accordingly is the best way to achieve project success. – ***“Estimate the workload, use your team's capacity history, this is very important and, over time, determine the size of the tasks”*** (Verbatim, Participant 2).

While another agrees but emphasizes that this must all be done with a focus on the pyramid of project management to have a balanced project that contributes to the company with profits – ***“Balance in terms of what is the failure of your project, ensuring that you can deliver on time and quality but also on budget and, therefore, the correct and adequate mix of the financial component.”*** (Verbatim, Participant 1).

Another strategy mentioned by both participants is that after analyzing the project, when allocating the resources, it is ideal to have a team that is mixed in terms of experience. To have a good mix of junior and senior resources while also taking into consideration the learning curve and time needed for each activity is ideal for a balanced scenario – ***“The strategy I use is to balance the skill and seniority that you have in a team, in a group of senior people supporting a group of junior people”*** (Verbatim, Participant 1). In this way, it is possible to deliver the project and gain customer satisfaction due to the results while simultaneously decreasing the costs to leave room for a higher profit. This also enables the people participating in the projects to gain knowledge and grow – ***“Both to meet the customer expectations with better quality, and less time, after all time is money.”*** (Verbatim, Participant 2).

The last point mentioned is that, even if the processes or tools are not well defined, with a capable team who is interested in the work and united to achieve the project goals, everything

will flow and the team themselves will help improve as necessary - ***“Even if the processes are not the best in the world. Best of breed, or the tools either, if the team is good, the team itself will help you develop the processes and tools and, therefore, things will flow normally, it will go well.”*** (Verbatim, Participant 2).

Category 5 - The technological tools to ensure assertiveness in the capacity plan and allocation of resources.

Respondents put in their speech personal characteristics on their form of management. One utilizes Excel effectively and efficiently, transforming observations into reality, showing that within needs, the tool meets and exceeds expectations – ***“With an excel properly used and taking into account the various parameters, you can get a good result, often better than the tool.”*** (Verbatim, Participant 1). However, they continue that, to use it, it is necessary to take into account specific information such as the number of resources being managed, the complexity of reports, and the time that will be invested in creating the detailed spreadsheets – ***“What is the handicap of this? Usually, it’s the time you need to invest until you have an Excel sheet until you have a tool that gives you all the aspects that you need to manage.”*** (Verbatim, Participant 1).

The second participant has a different opinion, they have the expertise of using Microsoft Project, showing that in the professional trajectory with projects, it is more efficient and faster to use a specific tool. As such, spending less time adjusting the tool and optimizing time in analysis – ***“Microsoft Project, you can do all your planning in Excel, but you have to be a master at Excel. Put together your project plan, put people in, then there are some modifications, if it's in Project, it's just two clicks to modify quickly, easily. In Excel, it doesn't happen that way.”*** (Verbatim, Participant 2). With changes instantly reflecting on other variables without much effort, such as the project critical path, allocation, capacity, budget and so on, the manager is able to save time and focus on other priorities – ***“Having a good management tool makes the difference with less work and updates to critical paths, it works with analysis.”*** (Verbatim, Participant 2).

The final point mentioned by the participants is that when considering a tool, the size of the team that you are managing is one of the main points to analyze, along with the advantages of that tool. With one of the participants emphasizing that the data can be managed anywhere but to acquire insights, proper data analysis is key and that is what makes the difference in each tool – ***“You can manage capacity with a simple Excel, a notepad, with whatever. After, the way in which you manage to extract and process the information is what differs. Obviously, it also has to do with size, we are not talking about managing capacity, for example, a team of three people or a team of 100 people.”*** (Verbatim, Participant 1).

5.3. The Proposal

This is a description of the proposal for the capacity plan creation to be used in the organization, it will be divided into parts by the activities necessary to create the plan, utilizing a culmination of the literature review, interviews performed to gain insight from experienced professionals, and knowledge gained during the internship itself, with a mix of techniques that suit the project since it is already underway.

Part 1 – Analysis and Forecasting:

Firstly, it is necessary to understand the business goals, project and client demand, requirements and capacity currently available within the team to, afterward, begin forecasting the workload for 2022. Secondly, once the business goals are defined, the demand and capacity should be analyzed from the documentation and project history to forecast the workload and the necessary resources to execute these tasks based on the previous sizing.

When the workload and demand are indicated, the current resources within the team should be analyzed to take into consideration the role, skills set, availability, vacations, holidays, and allocation based on the necessity of each business unit, it is also necessary to account for the experience of each resource due to the sizing of the tasks. Another requirement is to investigate the other types of resources for the project, such as: hardware, software, data, and so on.

These tasks will be supported with knowledge from the service manager, release manager, project manager and specialists. Two main points considered for the proposed strategies are: the client has agreed that the demand is forecasted to remain stabilized for the next year and we must also consider this when proposing the budget for 2022, since a significant increase in resources is not viable. In addition, this project is already underway since 2020 and is not expected to end in 2022, as such, it is a long-term project and capacity planning was requested for a yearly timeframe.

Part 2 – Implementation

With the analysis done on the previous phase, it is time to consider if there is a necessity to add new resources to the project, switch current resources or even remove them, this is for human resources and other types previously mentioned. This is a very important step as it will directly impact the budget and will involve other departments, for example:

- The human resource department, to begin a search internally and externally for the roles, requiring a selection, interviews and time to find the people.

Project Management Internship at Capgemini Engineering

- The IT department for access to the computer, software, current project data access, etc.
- The department of Finance & Governance that is requesting the project in the first place.
- Possibly others, depending on the need.

In this proposal, with the information mentioned previously, it should not be necessary to add or remove the resources as they are currently able to keep up with the demand, and have the necessary skills for execution. What is proposed is that: in case of fluctuating demand or unexpected problems, such as sick leaves, the resources can be moved between projects temporarily since they have the necessary knowledge for it, to mitigate the risks. With this, there is enough data to calculate the budget based on the hourly rate, the quantity of days projected for each resource, FTE for each BU, and so on, this is where the tool comes in to do the calculations based on the data inserted. This budget will be discussed with the business, the managers, the financial controller and once it is approved, changes will be allowed with the obtained approval.

Part 3 – Tool for the Capacity Plan

The tool proposed for the implementation of the capacity plan in this case is Microsoft Excel because the project is already using other specific tools that do not fit the requirements for capacity planning within it. The team is small and composed of only 11 people, as long as the necessary metrics are defined it is possible to tailor something specific that would be even more beneficial to the project. One of the risks to this point is that this alternative requires extensive knowledge of the tool but this is something that the manager in charge already has. Implementing a new software such as Microsoft Project is not feasible since to implement something of this size would require the complete migration of data that was in other systems to this one and may have a negative impact on the timeframe that management would be without this data, it is also necessary to consider the risks of delay in case of migration failure/errors, and the impact on the budget.

After the data has been acquired and inputted into the tool, the next step would be to determine the metrics used in the dashboards to extract the insights necessary from the tool. A few of these are:

- Yearly man-days per employee and allocation percentage to BUs
- Monthly and Weekly capacity delivered vs planned, per BU and employee
- Yearly capacity delivered per role vs estimated workload per role with the total for each

Project Management Internship at Capgemini Engineering

- Contracted service time vs workload delivered

In the reporting graphics, the main metrics to consider are:

- Burn rate per each BU
- Final delivery based on budgeted/estimated capacity
- Final delivery based on adjusted capacity
- Number of incidents identified vs resolved

Finally, it is suggested that the project manager responsible for the capacity plan allocate these resources and assign the tasks as indicated during the planning. Furthermore, that the PM, along with the management team, have weekly meetings to keep up with these projects and manage the capacity for the multiple business units, making adjustments as necessary, and incrementing, so that it is presented according to business needs.

CHAPTER 6 – CONCLUSION

This chapter describes the report's main conclusions, allowing us to answer the research questions mentioned in the research plan. Then, the academic and business contributions are presented, as well as the limitations that were noticed in the course of it and, finally, a set of topics for future research are suggested.

This internship and report were developed to answer the research questions while applying the knowledge acquired during my studies at university. Another main point was to research and deepen my understanding of project management, specifically in capacity planning and resource allocation, so that when creating the proposal offered to the company, it would also consider the project's current situation.

The results of this study make it clear that there are many different types of methodologies, frameworks, processes that can be used to create a plan and manage it, it is also noticed that the respondents use various technologies to implement their strategies. However, their skills and experience bring project management to a mature level and indicate that it is possible to mix these strategies to tailor a solution that best fits the environment, project, resources and capacity that will be used in the company. This brings us to the first question proposed in the report: "How to develop an efficient and effective capacity plan within project management?", where it is possible to emphasize that, to develop a plan it is necessary to consider the project itself, with its deadlines and requirements, the components of your team and your client, what is the methodology of work, the resources available, the demand estimated, and so on, to develop a plan using a single or a mix strategies that will best suit their needs.

In the second question: "Is it possible to learn how to manage projects and demand through this internship?", with all of the activities executed during the internship, working with project management, capacity management, and resource allocation, receiving training and evolving during the internship, receiving feedback, studying and creating this report itself, indicates that it is possible and it was a success.

6.2. Limitations

During this report, a few limitations were identified that influenced and conditioned its development, and these should be taken into account when considering the analysis. There were time and accessibility constraints in the present study, and non-probabilistic samples were used,

which indicates that the results obtained do not allow for the analysis of a general population. As can be seen, using qualitative research and the sampling mentioned, a more in-depth study was the objective, thus, it was necessary to interview people with experience and analyze the data gathered. The fact that the sample is made up only of experienced adults past their 40s can also be considered a limitation since it does not allow for a younger professional's perspective.

6.3. Contributions

The improvement of theoretical knowledge was fundamental for my professional trajectory, and through the actions performed it was possible to collaborate with the company's activities in all spheres. Participating in this project provided substantial growth in my professional practices, and also contributed to the company by proposing a solution to a problem that was negatively affecting the project. This report also contributes to academia by researching the topic in-depth, studying the difficulties, drivers, tools, the necessity, and the positive impact that this topic has on organizations.

6.4. Future Research

The relevance of the topic under analysis leads to identifying a set of relevant topics that may interest future researchers. According to the study of results, it is suggested that a quantitative investigation be carried out, with a significant sample of the project and demand history available in the organizational database, in order to quantify the data. Additionally, the proposal developed in this study could be implemented in another project within the company to understand if the results are coherent in different projects and existing industries. Finally, it is suggested that other management characteristics be investigated and explored, in addition to those selected for analysis in the present study, to verify whether or not these are associated and allow the improvement of project planning and project success.

Lastly, project management, for the clients served, was fundamental to reduce the risks of failure, control all the steps involved, as well as guarantee the quality of the results. It was possible to execute the projects efficiently, reaching the objectives and optimizing resources. These projects are critical for department growth within the company as the client is a multinational company with many more business opportunities in sight to develop.

REFERENCES

- Everest Group. (2021). *Announces 2021 List Of Top 50 Engineering Services Providers | Press Release*. [online] <https://www.everestgrp.com/2021-06-everest-group-announces-2021-list-of-top-50-engineering-services-providers-press-release-.html> [Retrieved: 2021/11/10].
- Gadekar, Mahesh. (2017). Project management for public goods—the case of Indian railway. *Aweshkar Research Journal*, 23(2), 38-77.
- Gartner, Inc. (2021). *Top Capgemini competitors and alternatives*. [online] <https://www.gartner.com/reviews/market/sap-application-services-worldwide/vendor/capgemini/alternatives> [Retrieved: 2021/12/02].
- Hendriks, M., Voeten, B., & Kroep, L. (1999). Human resource allocation in a multi-project R&D environment. *International Journal of Project Management*, 17(3), 181–188. [https://doi.org/10.1016/s0263-7863\(98\)00026-x](https://doi.org/10.1016/s0263-7863(98)00026-x)
- Kerzner, H. R. (2009). *Project Management: A Systems Approach to Planning, Scheduling, and Controlling* (10th ed.). Wiley.
- Kestenholz, P. (2020). *Five rules for resource demand and capacity management*. [online] <https://www.forbes.com/sites/forbestechcouncil/2020/08/10/five-rules-for-resource-demand-and-capacity-management/?sh=390a5de4793f> [Retrieved: 2021/12/01].
- Klosterboer, L. (2015). *ITIL Capacity management* (1st ed.). IBM Press.
- Levine, H. A. (2005). *Project portfolio management: a practical guide to selecting projects, managing portfolios, and maximizing benefits* (1st ed.). Jossey-Bass.
- Mishra, Anjay Kumar. (2020). Implication of theory of constraints in project management. *International Journal of Advanced Trends in Engineering and Technology*, 5(1), 1-13. <https://doi.org/10.5281/zenodo.3605056>
- Novo, Bianca; Landis, Eric A.; Haley, Mary Lewis. (2017). Leadership and its role in the success of project management. *Journal of Leadership, Accountability, and Ethics*, 14(1), 73-78.
- Project Management Institute (2021). *PMI 2021 Pulse of the Profession® Report* [online] https://www.pmi.org/-/media/pmi/documents/public/pdf/learning/thought-leadership/pulse/pmi_pulse_2021.pdf?v=b5c9abc1-e9ff-4ac5-bb0d-010ea8f664da&sc_lang_temp=en [Retrieved: 2021/12/10].
- Project Management Institute. (2017). *A guide to the project management body of knowledge (pmbok® guide)* (6th ed.). Project Management Institute, Inc.
- Proud, J. F. (2013). *Master scheduling: a practical guide to competitive manufacturing* (3rd ed.). Wiley.
- Sanchez, F., Micaelli, J., Bonjour, E., Monticolo, D. (2019). A step for improving the transition between traditional project management to agile project management using a project

Project Management Internship at Capgemini Engineering

management maturity model. *The Journal of Modern Project Management*. 7, 88-105.

<https://doi.org/10.19255/JMPM01906>

Saunders, M. N. K., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). PEARSON.

Wysocki, R. K. (2013). *Effective project management: traditional, agile, extreme* (7th ed.). Jhon Wiley & Sons.

APPENDICES

DATA COLLECTION INSTRUMENT

Dear Manager

We request your cooperation in answering these questions aimed at scientific research.

Part I - Identification

- 1. Gender: Male Female
- 2. Age: 18 to 29 years 30 to 39 years over 40 years
- 3. Time of experience as a manager
 01 to 04 years 05 to 09 years above 10 years
- 4. Graduation Level
 Specialist Master Doctorate

Part II – Topic-related questions

1 - How is your professional trajectory within the management area?

2 - What is the main difficulty within the management area?

3 - What strategy do you use to implement your capacity planning?

Project Management Internship at Capgemini Engineering

4 - Does the tool you use for the capacity plan make a difference? What is the tool used?

5 - How do you determine the technique used in resource allocation? Within your experience, which has the best results indefinitely?

6- What are the main success factors within capacity planning and resource allocation? Which one leads to a factor of greater difficulty?
