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**QUEUE MANAGEMENT IN A GOVERNMENT AGENCY:
THE CASE OF IRN**

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Relatório de Estágio apresentado à Faculdade de Ciências Sociais e Tecnologia da Universidade Europeia, para cumprimento dos requisitos necessários à obtenção do grau de Mestre em Management realizada sob a orientação científica do Doutor Luís Pedro Vilela Pimentel, professor auxiliar da Universidade Europeia

palavras-chave

IRN, Queues, Queues Management, Demand and Capacity Management, Case Study, Root Causes, Portuguese Citizen Card, SST.

resumo

Os organismos públicos são, em alguns casos, os únicos prestadores de serviços essenciais para os cidadãos, e muitas vezes sofrem com longas filas de espera e criticismo. Uma vez que as filas são o resultado da procura ser mais elevada que a capacidade de serviço disponível, a Gestão das Filas começa com a Gestão da Capacidade e da Procura. A Teoria e Psicologia das Filas de Espera contribuem para uma melhor experiência de espera, visando o conforto de quem aguarda e o normal funcionamento do serviço.

Este relatório de estágio analisa a gestão de filas de espera de uma agência governamental portuguesa. O estágio ocorreu no "Instituto dos Registos e do Notariado, I.P.". (IRN), uma agência governamental do Ministério da Justiça Português. A investigação deste relatório realizou-se na sede do IRN e no Departamento de Identificação Civil do Campus da Justiça.

A investigação deste estudo de caso utilizou entrevistas semiestruturadas como fonte primária de informação, complementada por observações diretas, participação direta, e documentação.

A análise das causas fundamentais identificou a falta de funcionários, o processo de envelhecimento dos cidadãos, a informação confidencial do CC, e a acumulação de serviços durante as restrições pandémicas como as causas fundamentais para as filas de espera nas conservatórias durante o período de

estágio. Foram também encontradas dificuldades de comunicação, longas filas de espera, falta de condições de espera, e elevada sobrecarga de trabalho.

As estratégias do IRN para lidar com as filas de espera foram o reforço da capacidade de serviço durante o pico da procura, a oferta de serviços digitais alternativos, a otimização dos serviços e melhorias na organização das filas nas conservatórias.

Os dados sugerem que as Tecnologias de Self-service (SST) podem melhorar as filas de espera, como tal, é apresentado um conjunto de sugestões para a implementação de SSTs nas conservatórias.

Keywords

IRN, Queues, Queues Management, Demand and Capacity Management, Case Study, Root Causes, Portuguese Citizen Card, SST.

Abstract

Public agencies are, in some cases, the sole providers of essential services to citizens and often suffer from long queues and criticality. Since queues result from higher demand than the available service capacity, Queue Management starts with Capacity and Demand Management. Queue Theory and Queue Psychology contribute to a better waiting experience, aiming at the comfort of those waiting and the regular operation of the service.

This internship report analyzes the queue management of a Portuguese government agency. The internship occurred at the "Instituto dos Registos e do Notariado, I.P." (IRN), a Portuguese Ministry of Justice government agency. The research for this report took place at the IRN headquarters and the Civil Identification Department of the Campus of Justice.

Case-study research was conducted with semi-structured Interviews as the primary source of evidence, complemented by direct observations, direct participation, and documentation.

The conducted root-cause analysis identified the lack of workforce, the citizens' aging process, the CC's sensitive information, and the accumulation of services during the pandemic restrictions as the root causes for the queues at the registry offices. Also, communication difficulties, long waiting

hours, lack of waiting conditions, and high human workload were found.

IRN's strategies to deal with queues were to reinforce service capacity during peak demand, offer alternative digital services, optimize services, and improve queue organization in the registry offices.

The data suggest that SSTs can improve queues; as such, a set of suggestions for implementing SST in registry offices is presented.

Contents

Abstract.....	iii
Contents	v
List of Abbreviations	viii
List of Figures.....	ix
1 Introduction.....	1
2 Literature Review.....	4
2.1 Queues and Queue Management.....	4
2.2 Queueing theory	7
2.3 Queue psychology	9
2.4 Demand and Capacity Management	11
2.4.1 Strategies.....	14
2.5 Public services digitalization.....	16
2.6 Self-Service Technologies (SSTs)	18
2.7 Root-Cause Analysis	20
3 Methodology	23
3.1 Research Questions	23
3.2 Research method	23
3.3 Data Collection.....	24
3.3.1 Interviews.....	25
3.3.2 Documentation	27
3.3.3 Direct Observations	28
3.3.4 Participant-observation	28
4 Internship Programme.....	29
4.1 Characterization of IRN	29
4.1.1 Historical Description	29
4.1.2 Mission, Vision, Values, and Objectives	29
4.1.3 Strategic and Operational Objectives.....	29
4.1.4 Workforce	31

4.2	Chronogram of the Internship Program	32
4.3	Description of the problem to analyze (queues).....	34
4.3.1	Pandemic Situation	35
5	Empirical Analysis of the problem	36
5.1	The problem with the queues at the Registry Offices	36
5.1.1	The queues at the registry offices and the CC services	37
5.1.2	How the interviewees perceive the queues	39
5.2	Customer Journey.....	40
5.3	Root-Cause-Analysis.....	45
5.3.1	Other systemic factors.....	49
6	Discussion and Critical Analysis	52
6.1	Measures Implemented by IRN.....	52
6.1.1	Chronology of measures	52
6.1.1.1	Before Covid-19 restrictions	54
6.1.1.2	After Covid-19 restrictions.....	55
6.1.1.3	During the internship.....	55
6.1.2	How the queues were managed during the pandemic.....	56
6.2	Implemented measures and their strategies.....	57
6.2.1	Results of the measures.....	58
6.3	Critics of the current situation, the key points.	58
6.4	Critical Analysis of Activity 5: Design and Implementation of outdoor Signage to organize the queues at DICCJ.....	60
6.4.1	Opinions on the impact of activity 5.....	63
6.5	Critic and Analysis of Interviewees’ suggestions to improve the queues.....	65
6.6	Why the implementation of SSTs at the registry offices might be the way to go.....	67
7	Recommended Solutions	69
7.1	Five technological measures for a Potential Future Service Landscape	70
7.1.1	Real-Time Affluence Map	70
7.1.2	QR-Code queue management	72
7.1.3	Self-Service Touchscreen	73
7.1.4	Self-Service Biometric Fastline	75
7.1.5	Urban Self-Service Kiosk	76
8	Conclusion	81

8.1	Limitations and challenges.....	83
	Bibliography	84
	Webgraphy.....	88
	Appendices.....	91

List of Abbreviations

BD- Board of Directors

CC – Cartão de Cidadão (Citizen Card)

CL - Citizen leaving

CQ - Citizen in queue

DICCCJ - Departamento de Identificação Civil Campus da Justiça

GAGCID - Gabinete de Acompanhamento de Gestão, Comunicação, Imagem e Design

HR - Human Resources

Hrs - Hours

IRN - Instituto dos Registos e do Notariado, IP

LC – Loja do Cidadão

M - Managers

Min – minutes

OO – Operational Objective

QUAR- Quadro de Avaliação e Responsabilidade

R - Registrars

RCA - Root Cause Analysis

RO - Registry Officials

Sec- Seconds

SG - Security Guards

SMS – Short Message Service

SO – Strategic Objective

ST - Senior Technicians

Vs. - Versus

List of Figures

- Figure 1 Queue configurations
- Figure 2 The four components of demand management
- Figure 3 Cost-Centric Demand Management Practices
- Figure 4 The different levels of a problem
- Figure 5 Doing Case Study Research: A Linear but Iterative Process
- Figure 6 Strategic Objective 6 Reduce waiting lines
- Figure 7 Citizen Emotional Journey
- Figure 8 Flowchart of CC renewal services
- Figure 9 Queues disposal diagram
- Figure 10 Organization of a waiting area into a queue
- Figure 11 Real-Time Affluence Map
- Figure 12 Process of CC renewal potential service time
- Figure 13 CC renewal through the Self-Service Biometric Fastline
- Figure 14 Urban Self-Service Kiosk

List of Tables

- Table 1 Queue Management summarized
- Table 2 Strategies for matching supply and demand
- Table 3 Summary of how digitalization of public services affects the public encounter
- Table 4 List of interviews
- Table 5 Chronogram of the Internship Activities
- Table 6 The main four scenarios of CC renewal
- Table 7 Chronology of implemented measures to deal with queues and peak demand
- Table 8 Service time and serviceability of the face-to-face service and suggested measures.

1 Introduction

Waiting in a queue for service is a frequent uncomfortable situation that most people experience throughout life.

Public service is known for long queues, and people often complain about the waiting conditions and waiting time. This internship report explores the phenomena of the queues at the registry offices of IRN, a government agency under the administration of the Portuguese Ministry of Justice.

Managing the queues in public agencies allows better public service to the citizens, facilitates the work of the public employees, and enhances the public sector's reputation. The present work aims to contribute to the progress of public service regarding the queues at the civil registry offices, the ones related to the services of the Portuguese ID card, namely Cartão de Cidadão (CC), since it is the document that encompasses all the Portuguese population.

The previous paragraphs mention a concern of management related to queues management. This concept has been studied theoretically, existing in literature, articles, and books with analysis of the problem and proposition of models to solve the topic under discussion. Thus, an internship was undertaken at Instituto do Registo e do Notariado I.P. (IRN), where this queues management topic was analyzed because queues management was identified as a big concern of the organization. Consequently, this internship report was done.

The queues occur all over the country; nonetheless, the present work focuses on the queues at the civil registry office of Campus da Justiça (DICCCJ) due to the proximity to the IRN headquarters where the internship took place.

IRN's reputation is connected with the CC and the long queues and waiting times, and the problem was aggravated by the covid-19 pandemic CC and the long queues and waiting times. The covid-19 pandemic exacerbated the problem. The internship coincided with the final stages of the covid-19 pandemic. This context offered the opportunity to explore the theme of queue management and challenged the author to perform case study research and find some possible solutions for the IRN case.

Queue management is not just managing the physical queues (Maister, 1984). It also involves forecasting peak demand and understanding the factors and the seasonality that leads to demand fluctuation even before queues are formed (Mudie & Pirrie, 2006). It also concerns the perceptions management of the citizens waiting in the queues and not just how fast the service is or what the best queue configuration is—having the ultimate mission of providing the best experience possible for the citizen who waits and the service providers. (Katz et al. 1991)

IRN applied different measures over the last years to diminish the queues; however, the problem was not solved, can, in fact, ever be solved? Part of this work is to understand it, arrive at an explanation of this phenomenon, and know if those measures were the right ones or if something else could be done.

The present work describes, explains, and proposes some measures to deal with the queues in the registry offices. With that in mind, the research questions to be answered are: Why are there queues at the registry offices? How have the queues been managed? How can the problem of the queues be solved to improve the service experience?

The present work is divided into eight chapters.

Chapter 2 presents a brief literature review on Queues, Queuing theory, Queue psychology, Demand and Capacity Management, Public Services Digitalization, Self-Service Technologies, and Root-Cause Analysis.

Chapter 3 presents the Research Methodology.

Chapter 4 presents the Internship program, describing the activities developed during the internship and the institution where the internship occurred. It also introduces the problem of the queues within the context of the organization under study.

Chapter 5 is dedicated to the Empirical Analysis of the problem. A more detailed explanation of the problem is presented with the data collected. The root causes of the queues at the registry offices are described, and a detailed description is given.

Chapter 6, Discussion and Critical Analysis, focuses on assessing how the measures implemented by the managers to deal with the queues and the peaks of demand are according to or not to the best practices present in the literature, also considering the interviewees' needs and the specific

context of IRN as a government agency. Activity 5 is also analyzed and commented on. This chapter sets the ground for the recommendations in the next chapter.

Chapter 7 presents the recommendations of the author of the present work to improve the queues and the service delivery by introducing five technological-based measures to a potential new service delivery landscape for the CC renewal service.

Chapter 8 presents the conclusions and limitations of this report.

2 Literature Review

Literature Review provides background for the study of the subject and proves that the author of a research paper knows the subject under investigation. (Yin, 2018). This chapter presents a brief literature review on Queues, Queue Management, Queueing theory, Queue Psychology, Demand and Capacity Management, Public Services Digitalization, Self-Service Technology, and Root-Cause Analysis.

2.1 Queues and Queue Management

Queues are the natural consequence of the incapacity of service to correspond to the superior volume of demand; in other words, the service rate is inferior to the arrival rate (Mudie & Pirrie, 2006). A queue is also a social phenomenon, as Yogesh and Shrivastav (2016, p. 1) state: “*Queues (or waiting lines) help facilities or businesses provide service in an orderly fashion. Forming a queue being a social phenomenon, it is beneficial to the society if it can be managed so that both the unit that waits and the one that serves get the most benefit.*”

Mudie and Pirrie (2006) state that there are three leading causes for the appearance of queues: when people attend a location before the opening hours, when there is a need to fetch up a transaction, and when there is a bottleneck that slows the flow of something.

“*The main goal of queuing management is to maximize the level of customer satisfaction with the service provided.*” (Nosek & Wilson, 2001, p. 277). Also, Mudie and Pirrie (2006) suggest that managers should consider the psychology of waiting in queues when dealing with queues.

Table 1*Queue Management summarized Self-elaboration.*

	Capacity and Demand Management	Queueing Theory	Queue Psychology
	Operations Management Supply chain; Services Marketing;	Operations Management; Mathematics; Services Marketing;	Perceptions Management; Services Marketing;
Objective	To minimize the queues by focusing on the causes that lead to them. Forecasting levels of demand and planning strategies for the demand situation.	To find the most efficient way to optimize the available productive resources given the characteristics of the service and to organize the physical queue.	Assume queues are inevitable and focus on the waiting conditions and perceptions to improve the waiting experience.
Phase	Pre-Queues	Queues	Queues
Data	Predicting and Planning	Objective reality	Subjective Experience
Key-words	Demand Patterns Match Demand and Capacity Forecasting Planning	Kendall's notation Queue discipline Queue configuration Efficiency	Waiting experience; Queue behaviors; Social Justice; Patience;
Problem level	Focus on the root causes that lead to the creation of queues	Focus on the queues	Focus on treating the symptoms of the queues.
Authors	Sasser (1976); APICS (2018); Mudie and Pirrie (2006) Walley and Jennison-Phillips (2017)	Zhang et al. (2016); Shastrakar et al. (2018); Yogesh and Shrivastav (2016)	Maister (1984); Larson (1987) Katz et al. (1991)

Table 1 summarizes the vision of the author of the present work based on the literature reviewed. Queue management has three focuses, Demand and Capacity Management, Queueing theory, and Queue Psychology. The first is worried about the pre-queues, forecasting demand variability, and the factors that will provoke the queues due to peak demand and defining the appropriate measures in managing demand and supply (Sasser, 1976; Mudie & Pirrie, 2006). The second, Queueing theory, focuses on optimizing the available resources and facilities through the most appropriate queueing system and configuration for the service provision (Zhang et al., 2016; Shastrakar et al., 2018); the third, Queues Psychology, focuses on the waiting experience, behaviors and psychological aspects of the people in a queue (Maister,1984; Larson,1987; Katz et al., 1991).

Regarding queues management and quickness of service transactions, *“There are two basic ways to approach that goal: through operations management and through perceptions management.”* (Katz et al. 1991, p 44.)

Perceptions management assumes queues are unavoidable due to the randomness of demand and focus on providing the best waiting experience to the customer by considering psychological principles, behavior patterns, and waiting conditions. (Katz et al.,1991). Also, the importance of controlling the queues is related to the satisfaction of the customer being served and the well-being of the staff that provides the service. Wirtz and Lovelock (2022) assert that technological evolution brought digital ticket systems and digital queue management systems, automating some processes and permitting the workers to focus more on the service itself. An extra advantage is that data is generated and further analyzed to improve the service. The author suggests five alternatives to manage queues without the cost of augmenting the service capacity through more staff and space. Reconfigure the queues and apply virtual waiting; implement additional queues according to price, importance, or urgency; improve the waiting experience by managing waiting time perceptions; use a reservation system; redesign service processes considering Self-Service Technologies (SST).

2.2 Queueing theory

Queueing theory is the mathematical approach within the Operations management field, which evaluates the formation of a queue and its related service. Queues models based on mathematics are employed to simulate real context and to evaluate real cases. It is focused on objective reality and looks out for the optimization of resources, service efficiency, and speed. It aims to find the most efficient ways to improve the service rate and optimize resource utilization. (Bhat, 2008)

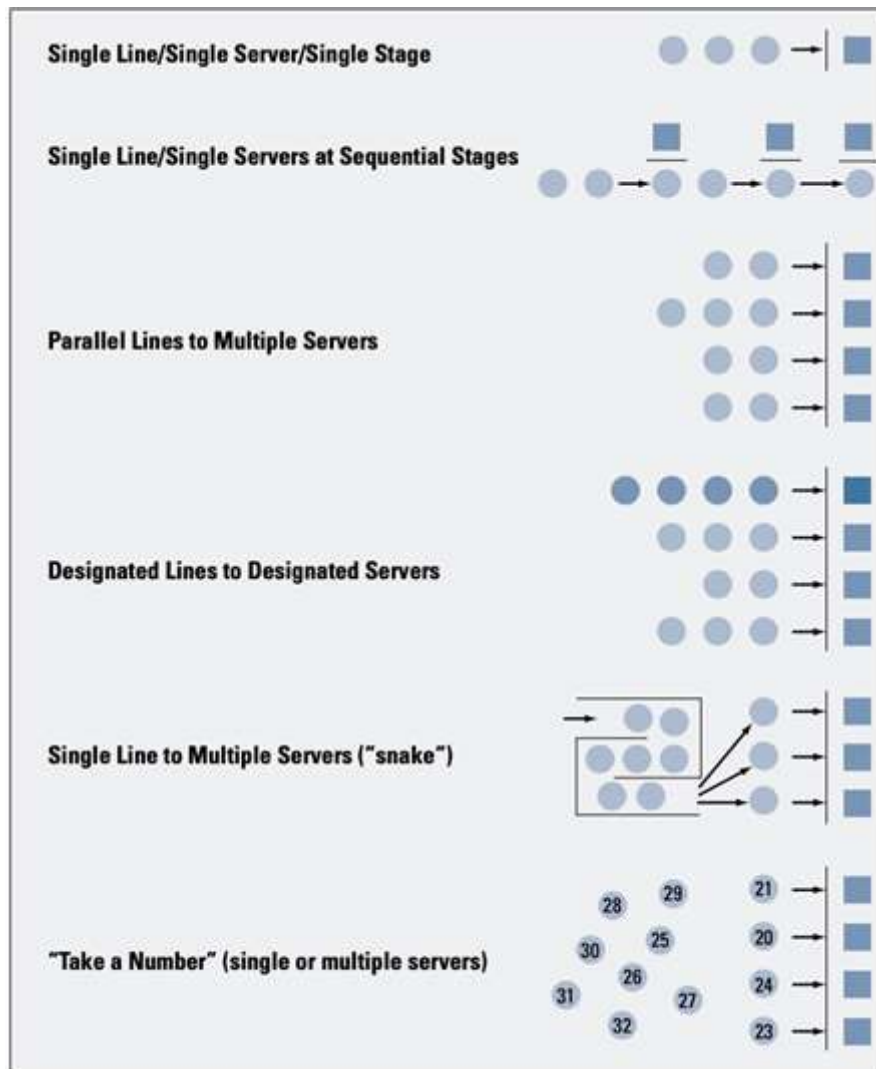
“In queueing theory, Kendall’s notation is introduced as the standard system used to describe and classify the queueing events” (Zhang et al., 2016, p. 4). The author also states that to describe a queue, the following are fundamental: the arrival distribution, the service distribution, the number of servers, the service discipline, the organization, and the size of the source.

Yusuf et al. (2015, p. 92) state, *“The queue discipline is the sequence in which customers or customers are processed or served.”* the primary service/queue disciplines are, First-Come-First-Serve (FCFS), Last-Come-Last-Served (LCLS), Service in Random Order (SIRO), and Priority Service (PS). First-Come-First-Served (FCFS)/ First-In-First-Out (FIFO) is the best system to ensure fairness and social justice because the first to arrive is first attended to, and the rule is only accepted to be broken when a priority service is also in place. Last-Come-Last-Served (LCLS)/ Last-In First Out (LIFO) is when the last to arrive is the first to be attended to. Service for Random Order occurs when independent of who arrives first. Priority service (PS) is a service that has priority over others; a customer can be considered a priority if meeting the criteria of a particular PS. He will be first attended to than people who first arrived but are not a priority. Distinct priority levels can be created according to customer segments based on urgency, duration of service, premium payment, and customer importance. Urgency occurs in hospitals where patients with more considerable life risk need to be first attended; queues for shorter services are available in supermarkets, for example, exclusive lanes for people buying less than a specific number of products; when a client flies in business class, the airline company offers a faster way to enter the flight than the economic class, people pay to be served faster; in many businesses, long-term clients with an exclusive loyalty program are immediately admitted jumping the queues. (Wirtz & Lovelock, 2022). A priority service can be either preemptive or non-preemptive; the first occurs when an ongoing service is interrupted to perform another service with higher urgency; the second

occurs when a priority service arrives, but the person has to wait for the ongoing service to be concluded. (Bhat, 2008)

Figure 1

“Queue configurations” Source: Wirtz & Lovelock (2022, p. 317)



As presented in figure 1, different queue configurations can be applied. Managers must choose the queue configuration based on the type of service and its characteristics, facilities layout, the volume of attendance, and client segment; since the queues' layout greatly influences the citizen's waiting experience, it must be configured accordingly. The Single Line to Multiply Servers allows better justice and social fairness. If one server is delayed, it will not impact as many people as the first case since the other servers will compensate for it; however, the workers may

not work as fast. Also, the queues with sequential phases can provide a fast way to operate when different tasks are needed. (Wirtz & Lovelock, 2022).

2.3 Queue psychology

Queue theory explains why queues are formed and how waiting time varies and focuses more on improving the speed of the service but does not explore how the customer perceives and feels the waiting experience; therefore, this section explores the waiting time from the psychological perspective.

Larson (n.d) states: *“Often the psychology of queuing is more important than the statistics of the wait itself”* also, Maister (1984) mentions that it is not so much about the waiting time but how the waiting is perceived and experienced by the customer. The author also states that patience plays a huge role. Katz et al. (1991, p. 1) reinforce the idea that *“When it comes to customer satisfaction, perception is reality.”* Therefore, queue psychology is a crucial aspect to consider in queue management, the core of which is in the waiting experience and perception of it. Managers must focus on managing perceptions, also because: *“A major benefit of perceptions management is that it is often very inexpensive to implement”* (Katz et al.,1991, p. 1).

Larson (1987) and Obermeier et al. (2020) point out the sense of social justice as a crucial aspect of regulating people’s behavior in queues. The customer expects to be treated equally and does not expect other people to have a different or faster service unless meeting certain conditions like seniority, pregnancy, women with small children, or being handicapper. The waiting experience is a critical part of a customer experience in a queue and is deeply connected to perceptions management. Managers should aim to provide the best comfort and fairness possible for the customers waiting for their turn to be served (Katz et al.,1991). Wirtz and Lovelock (2022) state that the comfort of waiting is related to the conditions of the waiting area, such as order, available distractions, good smell, calm environment, acceptable noise levels, protection from weather elements, as well a suitable temperature. It is different to wait one hour on foot in a loudly outdoor area than waiting indoors, seated on a couch while watching tv or reading a magazine. These are markedly different experiences in terms of comfort.

Wirtz and Lovelock (2022, p. 315) present ten principles of waiting perception based on Maister (1984):

1. Unoccupied time feels longer than occupied time.
2. Solo waits feel longer than group waits.
3. Physically uncomfortable waits feel longer than comfortable waits
4. Pre-process and post-process waits feel longer than in-process waits.
5. Unfair waits are longer than equitable waits.
6. Unfamiliar waits seem longer than familiar ones
7. Uncertain waits are longer than known, finite waits.
8. Unexplained waits are longer than explained waits.
9. Anxiety makes waits seem longer.
10. The more valuable or important the service, the longer people wait.

Impatient customers may act in ways that compromise the normal functioning of the queues, such as when a customer arrives, sees a long queue, is unwilling to wait, and decides not to join; it is called balking. It is called reneging when a customer stays in the queue for a while and decides to drop out. It is called jockeying when a customer switches from one queue to another, intending to be served faster. Also, it is called collusion, when a group of customers decides to arrange an agreement where just one person stands in line so they can join it right before their turn. (Alam, 2021).

These behaviors can lead to conflicts between customers and staff in the waiting area, negatively impacting the service functioning. Managers must consider these principles when facing disorganization and behavioral problems in queues to work on solutions to mitigate lousy behavior and improve customer satisfaction. (Wirtz and Lovelock 2022)

Katz et al. (1991) provide ten recommendations for managers to improve the customer waiting perception and waiting experience:

- 1) Do not overlook the effects of perceptions management.
- 2) Determine the acceptable waiting time.
- 3) Install distractions that entertain.
- 4) Get customers out of line.
- 5) Only make people conscious of time if they grossly overestimate waiting times.
- 6) Modify Customer arrival behavior.
- 7) Keep resources not serving customers out of sight.
- 8) Segment Customers by personality type.
- 9) Adopt a long-term perspective.
- 10) Never underestimate the power of a friendly server.

Nowadays, technology allows customers to wait in a virtual queue. This option offers convenience and solves many of the problems of the physical queue. It is also more transparent and trustworthy since the system cannot be tricked once the information is there. (Wirtz and Lovelock, 2022)

2.4 Demand and Capacity Management

Demand and Capacity Management are part of the broader scope of the supply chain. Demand is the volume of requested jobs waiting to be served. Demand is rarely steady; its variability contrasts with the steadiness of the service capacity. This may lead to the underuse of resources during low levels of demand and the accumulation of services during peak demand. (Croxtton et al., 2002) Also, “*Whereas capacity management is a response to demand, demand management is an attempt to shift demand.*” (Mudie & Pirrie, 2006, p. 161)

Kotler and Keller (2007) referred that service is inseparable, intangible, perishable, and variable. The perishability factor is often mentioned as the main challenge in the services industries since the service cannot be stocked; it has to be consumed at the same time it is provided, so queues are

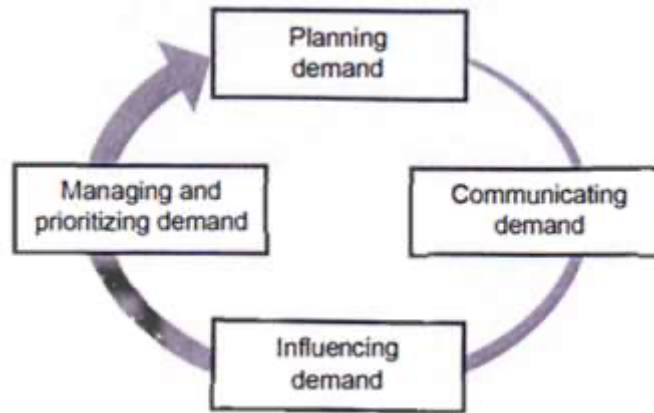
created; therefore, service industries are more sensitive to the peaks of demand than product or manufacturing industries.

Demand and Capacity Management also aims to avoid the creation of queues, or at least minimize them, thus working primarily with a planning and prevention mindset through forecasting the peaks and lows of demand and preparing adequate measures to implement. It also aims to have a flexible system to answer to the variability of demand in the most efficient way possible, neither too many resources, which leads to underuse of resources and higher costs, nor overuse of resources which leads to exhaustion and queues. However, it is harder to influence demand than to alter supply because demand is related to the external initiative of the customers; therefore, it has a higher level of randomness. At the same time, service capacity is known, controllable, and usually steady. (Croxtton et al.,2002)

The demand peaks occur when the demand rises to a volume above the central tendency of the demand. The problem with this circumstance is that the service capacity is steadier and does not fluctuate as much as the demand levels; thus, when the demand surpasses the level at which the service operates at its total capacity, it generates an accumulation of services and people have to wait in a queue Also, the demand can vary between patterns and randomness, however, even when the patterns of demand are regular and known, it is impossible to predict the exact time a sudden rampant service demand will appear. Also, even with a reasonable precision level, it is sometimes impossible to do much (Mudie & Pirrie, 2006).

Figure 2

The four components of demand management Source: (APICS, 2018, p. 6)



“Demand needs to be planned (and forecasted), communicated, influenced, and prioritized” (APICS, 2018, p. 1). Explaining Figure 2, Planning is based on the forecasting of future expectations while meeting organizational objectives; Communicating is based on the principle that the sooner the information arrives, the better and it is concerned with the communication with all areas of business and parties involved to guarantee changes in time, Influencing the consumer to meet the sales goals of the organization and also to influence the suppliers and service or process development, Managing and prioritizing allows a service provider to optimize capacity by establishing a hierarchy of services based on the importance of actions and customers when the capacity is not enough for the demand. It is also mentioned that demand forecasting can be done in the short (item-level), middle (operational-level), and long-term (strategic-level).

For Mudie and Pirrie (2006), there are three patterns of demand variability: regular, random, and regular with random fluctuations. The authors also state: *“Demand for services can fluctuate in such an unpredictable way that capacity is either unable to cope or grossly underutilized.”* They also state that it is impossible to guarantee no queues all the time. (Mudie & Pirrie p. 160)

2.4.1 Strategies

For Sasser (1976), one can either alter demand or control supply (Table 2). For the first strategy, the author suggests: pricing to attract customers to low-demand intervals, developing nonpeak demand, setting complementary services so clients can have alternatives, and creating a reservation system, all of which intend to smooth the peak demand or alleviate the operational bottlenecks. In the second strategy, the author suggests increasing consumer participation in reducing the workload of the employees, the reinforcement of the service capacity through part-time employees for the busiest times of the business, maximization of efficiency during peak demand by focusing on the essential tasks of the service, sharing capacity with other service providers, and investing in augmenting the facilities and capacity.

Table 2

Strategies for matching supply and demand, Source: Based on Sasser (1976, p.137)

Altering demand	Control supply
Creating reservation Systems	Increasing consumer participation
Developing complementary services	Using part-time employees
Developing nonpeak demand	Maximizing efficiency
Pricing	Sharing capacity
	Investing in expansion ante

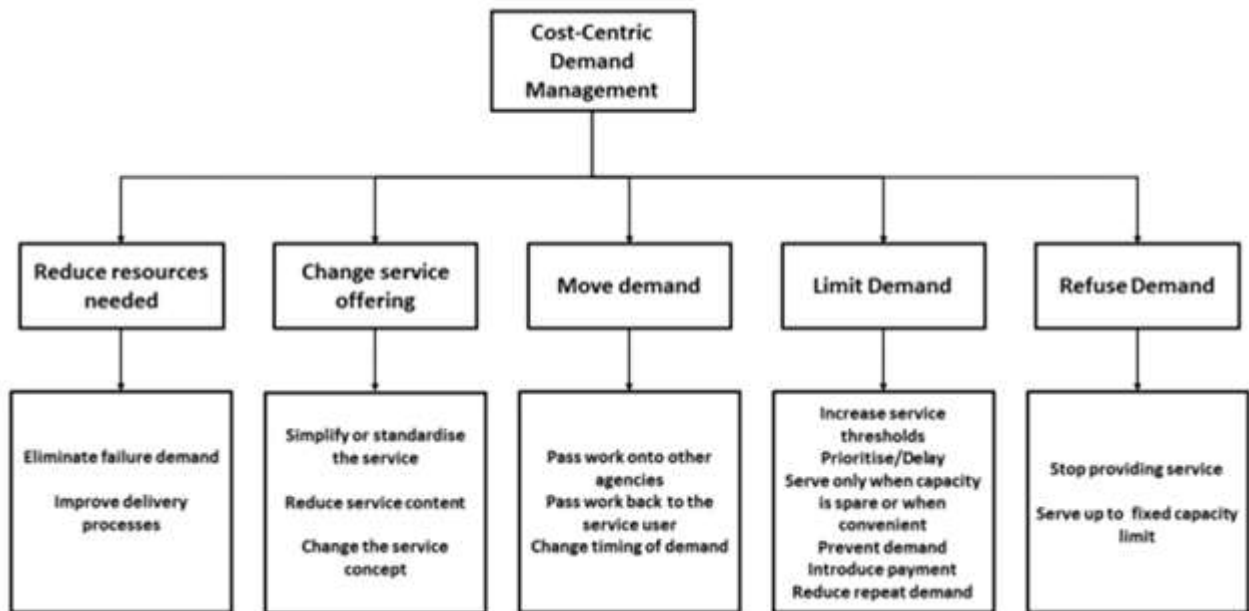
Mudie & Pirrie (2006, p160) complement Sasser's (1976) ideas, suggesting augmenting the opening hours, incentive workers to perform faster, multiskilling the workers to allocate them when needed, and outsourcing human resources to raise capacity. To match demand, the authors complement by suggesting offering mobile services to alleviate the facilities and communicate the demand with the customers so they can better decide and regulate expectations.

Walley and Jennison-Phillips (2017) point out the core difference between private and public sectors contrasting the revenue-centric and cost-centric approaches; while private companies seek

profitability, public agencies are solely focused on the citizen. Nonetheless, public agencies must report expenses and meet financial objectives, and costs must be well managed since many of the funds available come from the taxpayers, if not all. Pricing is changing the price according to the conditions of the market, envisioning better profits; therefore, it is not adequate for the public sector since public services focus on the citizen and not profit. Also, many public institutions are the only providers of a specific service, so there is no sense of competition.

Figure 3

Cost-Centric Demand Management Practices Source: (Walley & Jennison-Phillips, 2017, p.4)



As shown in figure 3, cost-centric demand management for public services focus on five group practices: reduce resources needed, change in service offer, move demand, limit demand, and refuse the demand. The author also referred that the idea of a Cost-Centric approach seeks long-term sustainability of the resources. It also aligns with the concept of Perceptions Management (Katz et al.,1991) since both intend to have a high impact while minimizing the costs through actions that require low investment. The difference relies that the first is focused on managing demand and capacity. In contrast, the latter is focused on the experience of the natural aftermath of the peak demand, the queues, and how the waiting experience can be improved. Therefore, they might be integrated. The public and private sectors have different approaches when faced with an

increase in demand; while the first sees it as a problem, the second sees it as an opportunity for profit.

2.5 Public services digitalization

The evolution of public digital services followed the logic of paperless public services by offering new digital alternatives that substituted traditional analog services. As years pass by, more technologies are implemented, and the digital governing transformation matures the existing models through change, modernization and innovation. Barcevičius et al. (2019). The authors also state that the digital technologies at the center of public services digitalization are “*artificial intelligence, predictive analytics, robotics and automation, IoT, geospatial data, blockchain, and open government data.*”. The authors also state that success relies not upon the technologies themselves but on how the governments understand the needs of the citizen and combine those technologies to deliver value to specific real-context needs.

Table 3

Summary of how digitalization of public services affects the public encounter
Adapted from Lindgren et al. (2019, p. 433)

<p>Digitalization facilitates the automatic exchange of information and citizen self-service.</p> <p>Provides additional communication channels</p> <p>Changes the place of government from an official setting to almost anywhere, but specially to citizens' homes.</p> <p>Changes the roles of the actors involved and adds new actors related to the technology that can affect the interaction</p> <p>Enables 24/7 access to government services and changes citizens' expectations of government response.</p> <p>Enables proactive services in which the initiation is performed by the technology</p>

For Lindgren et al. (2019), the digitalization of public services allows citizens to start the process through self-service on alternative channels, freeing the citizen from the government's physical space. The authors also state that digitalization has the potential to work 24/7 and quickly transfer information through automation. (table 3)

Independent of the technologies available, digitalization's core of public services is the digital ID, meaning how easily a person can prove their identity when utilizing digital services. (Clark et al., 2016). “A Digital identity is a collection of electronically captured and stored identity attributes that uniquely describe a person within a given context and are used for electronic transactions.” (Clark et al., 2016, p. 11). The authors explain that some attributes are time, age, home address, gender, fingerprints, face recognition, handprint, and iris scans (biographical and biometrical data). Also, the attributes and credentials provided by the governmental provider are necessary to authenticate a person claiming his identity. Once the authentication is validated, the citizen can use the digital services and benefit from its advantages. The authors claim that different levels of assurance are needed when dealing with different digital identity services. A decent digital ID system should ensure Universal Coverage, Appropriate and Effective Design, and Building and sustaining trust. Albania, Chile, Finland, Estonia, India, Moldova, and Nigeria are some countries that implemented Digital ID.

Barcevičius et al. (2019, p. 20) identify four types of digital innovations in governments: “Internal process (administrative, system, organizational); External process (governance innovation, Policy Innovation; Service (or Product Innovation)” as presented in APPENDIX 4. The author also points out Portugal as one of the pioneer countries in public services digitalization, alongside the United Kingdom, Australia, and Estonia.

Although public services digitalization provides many benefits, there are also ethical concerns. Mainly the potential for private life intrusion and control. An additional concern is that the transition to digital services is expected to reduce the workforce numbers and replace a workforce specialized in IT and digital technologies. (Lindgren et al., 2019)

2.6 Self-Service Technologies (SSTs)

Djelassi et al. (2018) state that the progress in information technology and systems allows for new ways of service delivery through self-service, in which the customer actively participates in executing the service or is helped in the decision-making process through the tools provided by the service provider. Yang and Park (2011) state that SSTs appeared as a way to replace conventional employee-to-client service.

SSTs can be differentiated into Passive vs. Active, where the first group informs the user and assist it without requiring interaction, and the last, which requires a higher interactivity level (Verhoef et al. 2009 as cited in Djelassi et al., 2018). Hossain et al. (2019) differentiate SSTs as mobile, online, and retail interactive kiosks and self-checkout. Chen et al. (2021) distinguish SSTs between conventional and AI-based, which may contain technologies like machine learning, neural language processing, face recognition, voice interaction, and others. The author also states that SSTs are trending in different industries because companies have realized the advantages of the present technology: a good level of customization, reduced operational costs, faster service, convenience, higher efficiency, and more reliability. SSTs can be easily applied to services that can be standardized, but at the same time, a certain degree of customization contributes to a better experience and user satisfaction.

Regarding the relationship between retail SSTs and queues, Kokkinou & Cranage (2012, p. 1) pointed out the *“Potential to Reduce customer waiting times in a service delivery process.”* The authors also state that the number of resources, the number of arrivals, the processing velocity, and the rate of failure are the main factors that affect the waiting time and service capacity. (Djelassi et al. (2018) state that user experience with the SST influences waiting time satisfaction, regardless of wait time reduction. For Hossain et al. (2019), SSTs enhance customer satisfaction independently of their type. Wirtz and Lovelock (2022) highlight the SST's primary benefits for the customer, convenience, time-saving, quicker service, timing flexibility, better waiting experience and time perception, location flexibility, greater control over processes, better prices,

and smaller fees. Hossain et al. (2019) highlight that users do not depend on local facilities to perform many services. They can go to an ATM to complete a transaction, use their home computer, and even through the mobile.

SSTs adoption depends on the motivation and learning process of the potential users. One of the first concerns to appear in the early stages of SST implementation was how to guarantee the trust and loyalty of the users without having the human element in the service. People were not used to it. Therefore, firms would have to assess what factors are determinants for the SST service evaluation from the users. This question is still important nowadays; the companies able to clarify it possesses the ability to improve their SST and gain a competitive advantage. Introducing new users through active support and a satisfying first contact is relevant to ensure high adoption rates and users' ability to perform a service themselves later. Without initial help, the users might have a negative experience if they cannot use the SST or have many errors and a slow service experience. (Djelassi et al., 2018).

Wirtz & Lovelock (2022) asserts some drawbacks to SST adoption; some people prefer the traditional encounter because of the human factor involved. Also, it may be difficult to recover from customer errors, and people have to repeat the process and call assistance, often generating frustration and blaming the service provider. Nonetheless, there are some guidelines to ensure good service quality and implementation of SST. First, an SST should be a better alternative to the existing service. Otherwise, people will not adhere since they do not see clear advantages and benefits. *“In sum, customers love SSTs when they are easy to use, perform better, are more convenient, and are cheaper than the alternative of being served by a service employee. However, not all customers are comfortable with using SSTs.”* (Wirtz & Lovelock, 2022, p. 285)

Chen et al. (2021) suggest that managers of public services choose an AI-based SST with attractive aesthetics and good personalization of the proper content distribution to the correct person at the appropriate time to achieve a more positive user experience. Also, a good design and intuitive experience are essential.

2.7 Root-Cause Analysis

Andersen and Fagerhaug (2006) state that the nuclear part of a problem is its root cause and a root cause analysis is what allows to reveal it. The authors suggest a two-step approach to dealing with a problem, the first step is to identify the cause or causes of the problem, and the second step is to find ways to eliminate these causes and prevent them from reoccurring.

According to Barsalou (2015), RCA is useful for assessing complex problems and can be performed to solve a problem or to identify improvement opportunities. RCA is not a single technique but an investigative process that uses several tools (APPENDIX 3); therefore, the investigator must select the tool that best fits the needs of the problem at hand. Yap and Melder (2017) state that there is a wide variety of tools specific to different industries and situations; thus, there is not one single root cause analysis tool but many; the authors emphasize the five most popular RCA tools: the Five Whys Technique; the Tree Analysis; the Fishbone or Ishikawa diagram, the Run charts, and the Pareto Analysis.

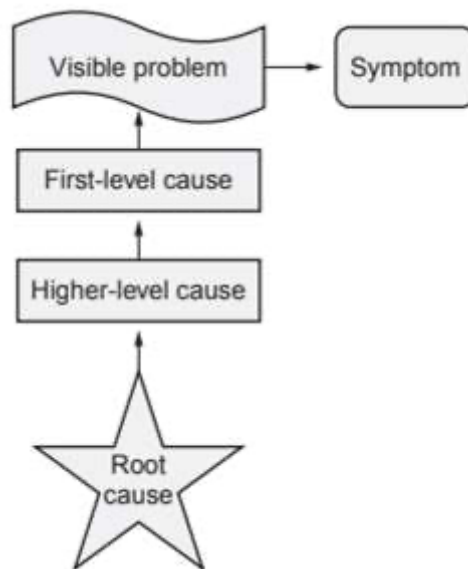
RCA originated from Ishikawa's seven classical tools (1985), conceived for quality control (Andersen & Fagerhaug, 2006). RCA was also adopted in industries with the risk of severe impacts, such as hospitals and the nuclear industry. Although widely used in the medical care industry to determine the nature of errors, it is also used in other sectors to approach a problem and set the ground to initiate the process for arriving at possible solutions. The potential for problem-solving and creativity evolved further than quality control, risk assessment, and error analysis, originating different RCA techniques, each created to answer a specific type of problem. Since a problem can have many sources and contributing factors, thus more complexity, it must be addressed with a technique that better answers it. (Barsalou, 2015)

Williams (2001) presents the use of RCA in hospital service. According to the author, the process should follow a protocol with defined steps where assess why an error occurred. If something fails, it is possible to identify the origin of the problem through an RCA to learn from it and reduce the risk of reoccurring. It also supports the decision to select counteractions to minimize the effects of the mistakes in case it happens. The author also states that RCA techniques can reveal a problem's

broad view and particularities. According to Andersen and Fagerhaug (2006), problems have several levels and causes. It is essential to differentiate those levels and causes, understand their logical chains and how they affect each other, to focus on identifying and solving the root causes.

Figure 4

The different levels of a problem Source: Andersen and Fagerhaug (2006, p. 5)



Andersen and Fagerhaug (2006) state that managers will probably focus on treating symptoms without awareness of the real problem. This not only does not solve the problem but can also worsen its effects bringing new troubles. Also, eliminating first-level causes have temporary effects. The consequences are wasted time, money, and effort in trying to solve the wrong aspect of the problem. The authors also state that there is a hierarchy of problems starting with symptoms, followed by first-level causes, higher-level causes, and root causes. The symptoms are evidence of problems and not the problem, Higher-level causes, while first-level causes, and finally, root causes generate the problem. Understanding the logical relationships of cause-effect allows for better identification and description of the problem.

Andersen and Fagerhaug (2006) affirm that the Five whys technique is perfect for identifying cause-and-effect chains; it is simple to use and find the root causes but requires creativity and extensive knowledge of the problem. This is one of the most popular RCA techniques due to its simplicity. The technique is to ask five times ‘why?’ until arriving at an answer that explains the problem, and the next ‘why?’ does not add any value to the explanation. The last valuable answer is probably the root cause. Nonetheless, a problem can have several root causes.

3 Methodology

The chosen Research methodology sets the type of data to collect, where to collect and how to collect it. It is necessary to decide on the research questions to select an adequate research methodology since the objective of methodology and research methods is to arrive at the answers to the initial research questions. Selecting the appropriate methodology is expected to lead to better results and findings. (Yin, 2018)

3.1 Research Questions

Considering the primary goal of this work, previously identified, the research questions to be answered are the following:

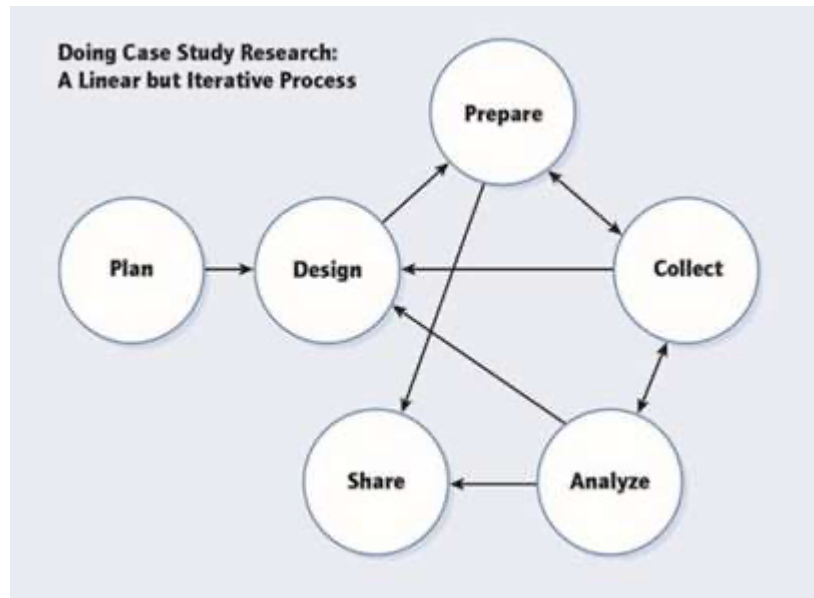
First, why are there queues at the registry offices? Second, how have the queues been managed? Third, how can the queuing problem be solved or improved so that citizens and the front office can have a better service experience?

3.2 Research method

Yin (2018 p. 2) states: “...you might ... choosing case study research, ... when (1) your main research questions are “how” or “why” questions, (2) you have little or no control over behavioral events, and (3) your focus of study is a contemporary (as opposed to entirely historical) phenomenon...”. A case study was conducted since the research questions are formulated as “Why” and “How” and require an extensive explanation of the current queues at the registry offices.

Figure 5

Doing Case Study Research: A Linear but Iterative Process Source: Yin (2018, p. 1)



The development of this work research followed the approach illustrated in figure 5. Yin (2018) also indicates six sources of evidence for data collection (APPENDIX 5), each with respective strengths and weaknesses. Different research methodologies have their primary source of evidence which other sources of evidence can complement according to the research needs; the author of the present work took that into account for selecting data collection sources of evidence, as explained next.

3.3 Data Collection

The primary source of evidence was Interviews, complemented by: Direct Observations, Direct Participation, and Documentation, as suggested by Yin (2018) for case study research.

The civil registry office of the Campus of Justice (DICCCJ) was the site for data collection regarding interviews with citizens, front-office workers, and direct observations. The site field was selected due to the proximity to the headquarters where the internship took place and because it is the most relevant registry office in Portugal, according to Manager 4.

3.3.1 Interviews

Distinct Semi-Structured interviews were conducted (APPENDIX 7) at IRN headquarters and the civil registry office of DICCCJ.

A definition of semi-structured interviews is given by Brinkmann & Kvale (2015, p. 6), as cited in Denzin & Lincoln (2018, p.1002), *“It is defined as an interview with the purpose of obtaining descriptions of the life world of the interviewee in order to interpret the meaning of the described phenomena.”*

Table 4*List of interviews*

Interviewee	Number of interviews	Local	Date	Time
Citizen in the queue (CQ)	10	DIC-CJ external waiting area	08/09/2021	35 min
Citizen leaving (CL)	6	DIC-CJ external area	08/09/2021	20 min
Security Guards (SG)	2	DIC-CJ	08/09/2021	10 min
Registry Official (RO)	4	DIC-CJ	10/09/2021	15 min
Registrar (R)	2	DIC-CJ	10/09/2021	20 min
Senior Technician 1 (ST1)	1	Headquarters	07/10/2021	10 min
Senior Technician 2 (ST2)	1	Headquarters	07/10/2021	15 min
Manager 1 (M1)	1	Headquarters	12/10/2021	20 min
Manager 2 (M2)	1	Headquarters	12/10/2021	40 mi
Manager 3 (M3)	1	Headquarters	13/10/2021	25 min
Manager 4 (M4)	1	DIC-CJ	20/10/2021	1hr 10 min
Manager 5 (M5)	1	Headquarters	21/10/2021	15 min
Total number of interviews: 31			Total Time: 4 hrs 55 min	

Table 4 shows the 31 semi-structured interviews conducted with a total time of 4 hours and 55 minutes. The interviewees are ten citizens in the queues (CQ) waiting to be served at DICCJ, and the six citizens leaving (CL) after being served were conducted on September 8, 2021. The selected answers are presented in Appendices 9 and 10. Semi-structured interviews were also conducted with two Registrars (R), four Registry Officials (RO), and two Security Guards (SG) from DICCJ. Five Managers (M), and two Senior Technicians (ST) from the headquarters, were also interviewed. The dates are presented in Table 4, and the selected answers can be found in APPENDIX 10.

3.3.2 Documentation

The documents utilized as a supportive source of evidence were some institutional reports, government documents, news, and press releases.

Institutional documents from the IRN website (<https://irn.justica.gov.pt/>):

- QUAR from past years;
- Plan Activity from past years;
- Report Activity from past years;
- The Social Balance from past years;
- News and Press releases from past years;

Internal reports:

- Inquiry to the Citizen in Campus of Justice (Internal report)
- Online Corporate Image (Internal report)

News, Press Releases, and documents from external public sources:

- Eportugal website (<https://eportugal.gov.pt/>)
- XXIII Portuguese Government website (<https://www.portugal.gov.pt/pt/gc23>)

3.3.3 Direct Observations

The direct observations occurred on August 18, 2021, and September 3, 2021. Alongside the field notes, some photos were collected and selected. (APPENDIX 12)

The field observations were annotated after the implementation of the signage system in the exterior area of the DICCCJ. The field notes were divided into two groups, the indoor and outdoor spaces.

3.3.4 Participant-observation

Participant observation took place in IRN headquarters at the GAGCID office during two team meetings, the first on July 5, 2021, and the second on July 14, 2021, both related to the development and implementation of activity 5.

4 Internship Programme

4.1 Characterization of IRN

4.1.1 Historical Description

The internship took place at the Instituto dos Registos e do Notariado, I.P. (IRN), a Portuguese government agency of the Ministry of Justice. IRN was established in 2007, succeeding the extinguished Direção-Geral dos Registos e do Notariado (APPENDIX 1), and has four significant areas of service: civil registry, land registry, commercial registry, and automobile registry. IRN is approved by Decree-law number 148/2012 of 12 July, as for the Statute, and the organizational and flexible units are settled by decision number 628/2013 of November 2012.

“Whenever a citizen needs to submit proof of relevant legal facts related to a life event, IRN issues certificates, being the only entity entitled to do so.” <https://irn.justica.gov.pt/en-gb/About-IRN/About-us>

4.1.2 Mission, Vision, Values, and Objectives

IRN has four areas of intervention, civil registry, automotive registry, land registry, and commercial registry. The mission of IRN is to provide services in those areas, guaranteeing legal authenticity, safety, and security to the citizen regards their identity and property. Also, it regulates, controls, and inspects notarial services. IRN values are trust, rigor, proximity, innovation, valorization of internal resources, cooperation, and partnership. The present work focuses on the queues at the civil registry office of the Lisbon Campus of justice (DICCCJ).

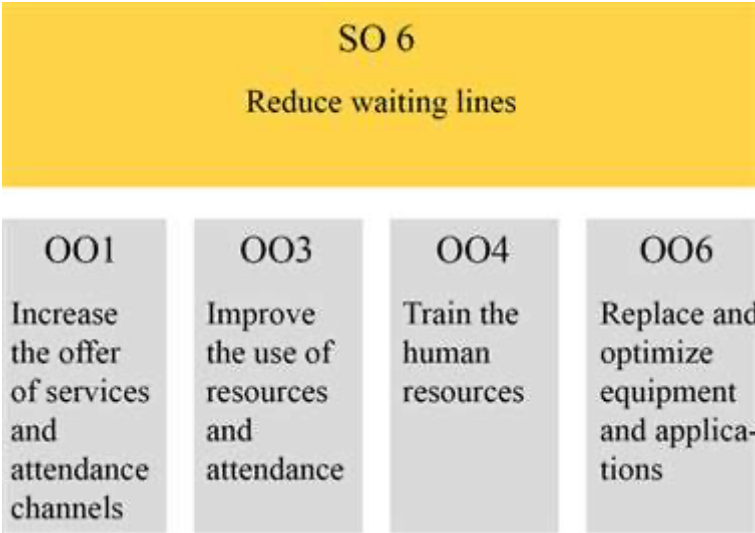
4.1.3 Strategic and Operational Objectives

IRN has seven strategic objectives (SO) and eight operational objectives (OO), tracked through key performance indicators (KPI). (QUAR 2019)

Strategic Objectives (SO): SO1 Happier human resource (oo4; oo5; oo6; oo7); SO2 Optimize the management of material and financial resources; SO3 Improve internal organization (oo2; oo6); SO4 Increase the dignity of the working and attendance spaces (oo6; oo7); SO5 Guarantee timely responses and technical and legal quality (oo1; oo3; oo6); SO6 Reduce waiting lines (oo1; oo3; oo4; oo6); SO7 Strengthen IRN's image, fostering social, political, economic, and international relations (oo8). **Operational Objectives (OO):** OO1 Increase the offer of services and attendance channels; OO2 Create tools to improve the internal working efficiency; OO3 Improve the use of resources and attendance; OO4 Train the human resources; OO5 Operationalize the changes in remunerative position, progression, and change of level or step; OO6 Replace and optimize equipment and applications; OO7 Improve the facilities; OO8 Strengthen cooperation and promote transparent relations with stakeholders.

Figure 6

Strategic Objective 6 Reduce waiting lines Adapted from QUAR2019



As shown in figure 6, there are four OOs that support SO6. Each Operational objective has specific KPIs to keep track of the progress toward the objectives determined by the board. Reducing queues

(waiting lines) is a primary strategic objective and is thus essential to the organization under study. For the interest of the present work, the focus will be the SO6 Reduce waiting lines. Waiting lines will be treated as the term queues, often used interchangeably.

4.1.4 Workforce

The IRN workforce is a topic of discussion since it follows two conjoined trends, workforce aging and reduction. IRN is the leader of the aging trend of public administration workers in Portugal, with the registry officials (RO) having the highest average age of 56,1 years also the registrars (R) in the fourth position with an average age of 53,8 years.

https://www.dgaep.gov.pt/upload/DIOEP/2022/BOEP22/DGAEP-DIOEP_BOEP_22_20220624.pdf

Regarding the volume of the workforce, the number of registry officials dropped from 4458 in December 2011 to 3641 in June 2021. (BEAP 2021). IRN's Social Balance 2021 presents a workforce deficit of 2198, being 1300 relative to ROs, 623 Administrative assistants, 210 Rs, and the rest divided by different job positions (APPENDIX 2). The leading cause for the unfulfillment of these job positions is the non-opening of the public tender. Three hundred fifty-four people await the results of the public tender, only around 16% of the workforce deficit. According to the Social Balance 2021, the total number of IRN workers is 4700 (December 2021), composed of 3560 ROs, 538 Rs, 429 Technical Assistants, 97 Operational Assistants, 54 STs, and the remaining other positions. Also, as published by DGAEP, there was a dropped in the available workers in the two most relevant job positions within the context of this work. Between December 2011 and December 2021, the number of ROs dropped from 4568 to 3698; the number of Rs dropped from 675 to 545. The numbers of IRNs Social Balance 2021 and DGAEP statistics do not match, but the information from the DGAEP website shows the reduction trend of workers. Regarding the data, the Social Balance is seen as the most legit. For M2 and M3, the workforce shortage is the critical factor for queue creation due to the diminishing service capacity at the registry offices.

4.2 Chronogram of the Internship Program

Table 5

Chronogram of the Internship Activities- Source: Self-Elaboration.

Activities	June				July				August				September				October			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1) Review and Improvement of the institutional website.	■	■	■	■																
2) Review and improve REGISTO Brand Book.				■	■	■	■	■												
3) Implementation of MUIPs on Metro Stations of Lisbon and Porto –communication campaign.					■	■														
4) Research document for future Communication Campaigns								■												
5) Design of outdoor signage for organizing the queues at DIC-CJ.						■	■	■	■	■	■									
6) Creation of a digital magazine.							■	■	■	■	■	■	■	■	■	■				
7) Creation of a podcast.													■	■	■	■	■			
8) Development of solutions for the queues at the registry offices.					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Activity 1: Review and Improvement of the institutional website

The objective of this activity was to improve the recent institutional website (<https://irn.justica.gov.pt>). This activity was performed alongside the coordinator, one senior technician, and another trainee of the GAGCID department.

Activity 2: Review and improvement of REGISTO Brand Book

REGISTO brand book is a relevant document that provides the guidelines for interventions and implementation of design and equipment at any IRN registry office and for creating communication content across all the available media and platforms. The brand book was helpful for the development of activity 5 (Design and implementation of outdoor signage at DICCCJ).

Activity 3: Communication Campaign for the CC Online Renewal –Application of MUPIs in the Metro Stations of Lisbon and Porto

The objective of the intervention was to reinforce public awareness regarding the CC automatic renewal. At the time of the request, the registry offices were operating through appointment, but many people were not able to schedule on a close date due to high levels of affluence; therefore, the purpose of the campaign was to inform people so that part of the demand could migrate to the alternative online service. Given that purpose, the coordinator asked for a proposal to implement 50 MUPIs at Lisbon and Porto metro stations.

Activity 4: Research document for future Communication Campaigns

With the conclusion of activity 4, the GAGCID coordinator requested a study on the territory, demography, transportation, and mobility patterns of the populations from six geographical areas of Portugal. Those were: Braga, Coimbra, Cascais, Seixal, Almada and Faro. The aim was to create a consultation document to support future communication campaigns in the selected regions.

Activity 5: Design and implementation of outdoor signage at DICCCJ

The reopening of the spontaneous services on June 14, 2021, led to massive queues and disorganization at the entrance of the DIC-CJ due to the accumulation of services during the pandemic, so the vice-president of IRN asked the GAGCID department to develop a signage system to organize the queues and better manage citizens' expectations. The queues were reorganized, considering the type of service appointment and priority. This activity is a central part of this work; therefore, it will be analyzed and discussed.

Activity 6: Creation of a digital magazine

In the past, there was an internal magazine exclusively for IRN employees. However, the idea arose to bring this historical magazine back and make it available to the external public. This project aligned with creating a podcast and improving the brand book as a set of measures to reinforce the brand and external communication with the stakeholders.

Activity 7: Creation of IRN podcast

This project was born from the idea of making another means of information available to the citizens and taking advantage of the growing trend of Podcast streaming. The idea was to select the episodes' themes based on the ecosystem that IRN is inserted and its nature of activities and prepare the conditions for further development.

Activity 8: Development of recommendations for the queues at the registry offices (the basis of this work)

The GAGCID coordinator challenged the author of this work to present some recommendations on how to solve or improve the problem of queues at the Registry Offices.

4.3 Description of the problem to analyze (queues)

IRN's reputation is linked to the CC and the long queues for its renewal. The queues at the registry offices are a well-known problem that has always existed and was aggravated with the covid-19 pandemic. Queues occur at the Registry Offices, the designated facilities where the citizens can request and perform the services in the traditional service encounter. The actors involved in the registry office services are the citizens who request the service, the registry officers who provide it, the registrars that manage the registry office, and the security guards who help to maintain the order. The CC document encompasses all Portuguese citizens, and its renewal is the most significant contributor to the volume of service demand in the civil registry offices.

A more detailed description and analysis of the queues, registry offices, and the CC renewal service is presented in chapter five.

4.3.1 **Pandemic Situation**

The Covid-19 pandemic led to several emergency and calamity states in the following periods:

1st Emergency State period March 19, 2020 – May 2, 2020

2nd Calamity State period May 2 - November 2, 2020

3rd Emergency State period November 9, 2020 – April 30, 2021

4th Calamity State period April 30 - May 30, 2021

During the emergency states, the registry offices were shut. Moreover, during the calamity states, the registry offices worked only by appointment and had limited capacity. There was a sense of urgency for the IRN managers to put viable solutions in place since a considerable volume of services was starting to accumulate. Therefore, pushing the decision-makers to implement new service delivery and operations. This will be further explained in more detail.

5 Empirical Analysis of the problem

5.1 The problem with the queues at the Registry Offices

The reputation of the IRN is associated with long queues, the problem is well-documented, and managers are aware of it. Forecasting is a recurrent practice since the CC has an expiration date; managers know upfront the volume of CC renewals to be made. Nonetheless, there is no specific department to deal with the queues; instead, it is a macro-process involving different departments, hierarchical levels, and even different players.

Most of the interviewed managers believe the queues are something that can be solved (M1, M2, M4, M5). However, M3 thinks that the queues can be controlled but not solved and that the organization's focus should not be on solving the queues but instead of controlling peak demand. Managers see queues at the registry offices as a frequent phenomenon that is part of the normal operations of IRN services. (M2; M3).

Managers 4 and 5 emphasize the measures implemented throughout the years and the effort of IRN to improve the services keeping in mind the best interest of the citizens. In contrast, Manager 2 states: *“In my view, not much was done to solve the queues. When a big problem occurs, it is assessed through governmental intervention, so I do not see IRN as responsible for the big decisions; yes, we have improved the waiting conditions in our service facilities at Campus da Justiça. Still, I do not see much more than that.”*

Also, when asked about the causes of the queues, most managers believe the personnel deficit is at the core. Regarding the main concerns, M4 is worried about the IRN's reputation and feels injustice, stating: *“(…)it is not always like that (…) the narrative passed in the news is unrealistic and unfair.”*. As for M1, communication must be taken seriously, and M5 focuses on governmental support. The managers' opinions divide when asked about a possible once and for all resolution. Some believe that queues can be managed and controlled but not wholly solved (M1, M3, M5). Others are more optimistic and believe in technology implementation (M4). Nonetheless, the general opinion remains that a solution will come and is merely a question of time. Also, although

the interviewed managers do not share the same vision of ending the queues, they all agree that the issue must be tackled.

5.1.1 The queues at the registry offices and the CC services

The CC renewal encompasses the Portuguese population and is the highest-demand service, so it is hugely relevant to the creation of queues. The CC is a proof of identity through legal documentation and verification that accompanies the individual throughout his life and must be renewed every five years until age 25 and every ten years. It contains personal information and biometric data such as facial photos, fingerprints, signatures, parents of the individual, and other numbers attributed to the citizen (social security, fiscal, and health system). IRN is responsible for managing the identification of the citizens through CC emission, renewal, and database management. The traditional CC renewal takes place at the Registry Offices of IRN, and it is performed by a Registry Official (RO) with the contribution of the citizen. Registrars (R) manage the registry offices and supervise the service. The registry offices vary in size and service type according to the size of the population where it is located. In the least populated areas of Portugal, a single registry office may have services from the four different areas of service: civil, land, commercial, and automobile. While in the most populated areas have many registry offices, each specific to a particular service area, such as the civil registry office. Also, rural areas do not have as expressive queues as urban areas.

The cost of the CC varies according to the request type, age of the citizen, and delivery time requested. This is a way of segmenting demand by premium payment and sense of urgency.

<https://justica.gov.pt/Servicos/Renovar-online-o-Cartao-de-Cidadao#Quantocusta>

In the traditional CC renewal, the citizen is notified about the expiration date and to renew his CC in a registry office. The citizen goes to a registry office and performs the service with a registry official. The information collected, including name, birthdate, height, home address, contact, face photo, fingerprint, and signature, is validated and sent to IMCN with a printing request. When the printing is done, the IMCN sends it back to the Registry Office, where the data collection is done; the citizen is notified of the card's arrival and goes again to the registry office to pick up the document. This way implies two trips of the citizen to the registry office. However, with the CC

home delivery, automatic renewal, and online renewal, it might take only one or zero trips to the registry offices for the citizen to have their document.

Table 6

The main four scenarios of CC renewal based on CC services

Scenario	Renewal	Delivery	Visits
A	Digital	Home	0
B	Registry office	Home	1
C	Digital	Registry office	1
D	Registry office	Registry office	2

According to Table 6, in Scenario A, the citizen renews his CC through Digital alternatives (Automatic renewal, Simplified Renewal, Online renewal). This scenario occurs when the citizen is eligible for the online renewal and successfully receives the CC at home. When the citizen is not at home when the CC arrives, a letter is delivered to the mailbox so that he can pick it up at the CTT center (the entity responsible for the delivery). Although not very convenient, the trip to the CTT center also avoids visiting a registry office. In Scenario B, the renewal is performed at the registry office, but the delivery can be done at home. It often occurs when the citizen is an adult younger than 25 years old and when a citizen is requesting the 1stCC. It can also happen when the citizen schedules the entire family. In Scenario C, the citizen performs the renewal through digital service but receives it at a registry office. This scenario often occurs when: The citizen is not at home when the postman arrives to deliver the CC and cannot pick up the CC at the CTT center, so the CC goes back to the registry office. Another case is if the citizen deliberately asked to pick it up at a registry office. In Scenario D, the citizen has to perform the renewal at a registry office and needs to pick it also at the registry office. This scenario often occurs when occurs the renewal of a minor. Also, when something goes wrong, like in the first situation of scenario C. The best-case scenario is scenario A because the citizens do not need to visit a registry office. The worst-case scenario is scenario D since it takes two visits to the registry offices.

5.1.2 How the interviewees perceive the queues

The prominent critics of the front office are related to the volume of work due to the lack of personnel. As stated by RO2, *“I think we have many workloads to compensate for the lack of HR.”*. Outdated equipment is also criticized, *“The equipment is old and outdated, sometimes the software stops, and we need to restart the computer...”* (RO2). These problems negatively impact the service rate and contribute to augmenting the queues and workers' dissatisfaction. Registrars 1 and 2 also highlight the lack of HR as a critical problem (APPENDIX 10).

Managers 2 and 3 criticize the **lack of personnel**. The **lack of governmental** support is also pointed out since it directly affects the management of the registry offices and, consequently, the queues; as M5 states, *“I think the government should have informed us more than just one week in advance of the reopening date of the spontaneous service.”*. Moreover, M4 is concerned with the reputational damage of the queues.

The citizens have the **perception that the queue does not advance**, *“... The queue does not advance.”* (CQ1), and *“I arrived at 7.30 am, and I still have a lot of people in front of me.”* (CQ6). They also **complain about waiting for too long**, *“they told me my name will be called, but I am waiting for an hour.”* (CQ7); *“I have been waiting for 2 hours.”* (CQ10), and *“... to wait 2 hours to be attended for a service that takes 2 or 3 minutes is not acceptable.”* (CL2); and that the **waiting conditions** are not *“It is painful to be here waiting; we are in 2021 and still have to wait in a queue? ...”* (CQ3); and *“They could at least give us reasonable waiting conditions instead of making us wait in the sun.”* (CL2). The **lack of support/information** is also a motive for complaining, *“There should be someone here providing us information”* (CQ4); *“Why the security agent does not provide me with information?”* (CQ5); *“I do not understand, they told me my name will be called, but I am waiting for an hour.”* (CQ7), *“I am distraught! There is no one to help?”* (CQ10); with some citizens being **uncertain whether they will be attended** to, *“... I do not know if I am going to be attended.”* (CQ2); and *“I do not know how much time I will have to wait; should I quit? And try another day? ...”* (CQ4). Some citizens also mentioned the **difficulty of scheduling** an appointment, *“It was not easy to get an appointment, and the date available was two months after.”* (CL5), and *“I could not schedule the service for a date that I needed, so I came here”* (CQ1); highlighting the **inconvenience of attending DICCJ**, *“I missed my classes today.”* (CL1) and *“I*

took a day from work to come here...” (CQ2). The **payment** is also criticized, “...*why do I have to pay so much?*” (CL4), and “...*we have to pay for a service that should be free!*” (CL6).

As for the positive aspects, the citizens emphasize the **Attendants’ quality of service and ability to empathize**, “*The attendant listened to me; that was nice of her.*” (CL1); “*The attendants seem to know the pains of us citizens...*” (CL3); and “*The only good thing about the service was the person who attended me.*” (CL6).

5.2 Customer Journey

A customer journey analysis is helpful to “...*identify critical touch points (“moments of truth”) throughout the customer journey that have the most significant influence on key customer outcomes.*”. (Lemon & Verhoef, 2016, p. 82)

A customer journey (APPENDIX 6) was composed at the end of the GAGCID team meeting on July 14, 2021. along with the GAGCID coordinator to help the development of activity five and also answer research question 2 of this report. The expertise of the GAGCID coordinator, some insights from the interviews collected, and the field notes were the contributors to composing the following customer journey analysis. The objective of analyzing this customer journey was to identify the most unpleasant points throughout the different phases of the citizen when attending the civil registry offices. APPENDIX 6 illustrates the generic customer journey of the citizen when performing a spontaneous service at the registry office of the Campus of Justice (DICCCJ). The user story is about João, a fictitious person who needs to renew his CC and decides to attend the DICCCJ spontaneously. Other user stories could be applied, such as priority service, with or without an appointment, highly urgent, and people who used the alternative channels but ended up going to the registry office for some reason. Still, the focus was to analyze the most generic customer journey and understand the citizens' steps, behavior, thinking, and feelings who attend the civil registry offices.

Figure 7

Citizen Emotional Journey Source: Elaborated along with GAGCID coordinator

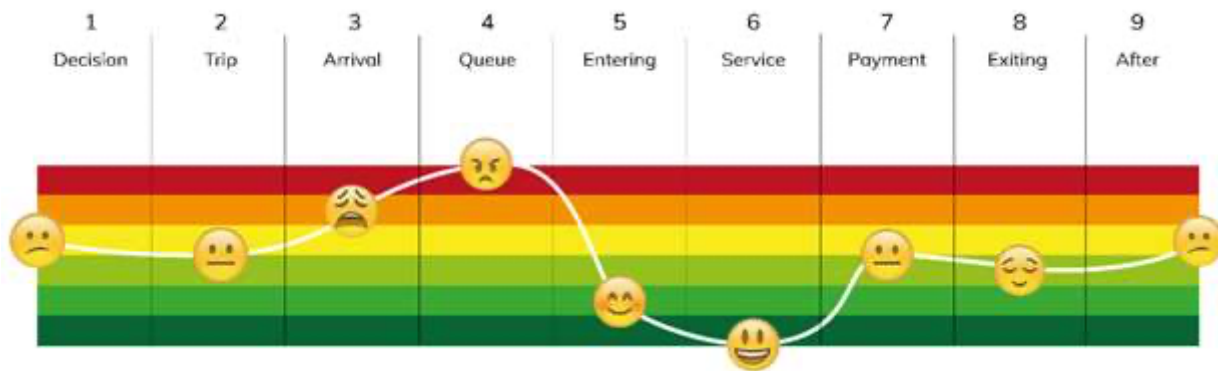


Figure 7 represents the variance of the emotional state through the different steps identified. Emojis expressing human emotions are reinforced by the different colors of the horizontal bars. The red rectangle on top is the most unpleasant emotional state, and the green rectangle on the bottom is the most pleasant emotional state. This tool identifies the pain points, understands them, and focuses on developing solutions to improve the customer service experience.

The customer journey was divided into nine phases: **Decision, Trip, Arrival, Queue, Entering, Service, Payment, Exiting, and After**. A description of each follows; for a more detailed explanation, consult APPENDIX 6.

The **decision phase** is when the citizen decides what to do concerning the service, when, where, and which channel to use. During the decision-making process, the prepurchase phase, as in Lemon and Verhoef (2016), the citizen is prompted to get informed from different sources, such as friends and familiars, and will also surf the internet and call the IRN call center. Additionally, it will account for previous experiences and insights from media, such as tv news, radio, and other sources. This is when the expectancy of the service is created, and the decision is taken. The citizen will first consider the nearest location options. If he thinks it is too crowded, he will consider other locations with less affluence, thus focusing on convenience and the waiting time. If a particular registry office is known for being looted, the citizen may decide to go to another location with fewer queues. The **trip** phase occurs after the decision is taken and the citizen is on the way to the registry office; it is the start of the purchase phase, as in Lemon and Verhoef (2016). Some anxiety

may arise from the expectancy previously created. The citizen questions if the queues are long and if he will get a ticket to attend. Therefore, this phase is characterized by high uncertainty levels. The **arrival** phase is the moment when the citizen arrives at the registry office location. The citizen sees the long queues and confirms the previous expectancy; he knows it will take longer to be served and may question if it is better to try another day (balking). Desperation is what characterizes this step.

The **queue** phase is the most unpleasant part of the journey due to the waiting and unpleasant conditions. Anxiety, frustration, and boredom are present. People get angry and complain, and conflict may arise. (CQ3; CQ6; SG1; SG2; M4). When **entering** the service, the emotional state turns positive; the long waiting time in the queue is finally over, and the citizen feels enthusiastic about being attended, as CL1 stated: *“The waiting was complicated until I finally entered the building; I was excited when about to be serviced.”*. In the **service** phase, the citizen is served by a registry official. It is usually the most emotionally positive moment for the citizen not only because the need is being satisfied but also because the registry officials give full attention to the citizen, as stated by RO3, *“People arrive at us after waiting hours outside, and we know they are suffering, so we try to comfort them and show consideration during the service; we often speak of daily things with the citizen, topics that have nothing to do with the service.”*. In contrast with the moment in the queue, where the citizen feels a bit lost without the support of someone to inform them, during the service, the citizens feel heard and even compliment the registry officials: *“The attendant listened to me; that was nice of her.”* (CL1) and also, *“The only good thing about the service was the person who attended me.”* (CL4). The **payment** is a moment of dissatisfaction because people often argue that the service must be free, *“we have to pay for a service that should be free!”* (CL6), and some even ask, *“...why do I have to pay so much?”* (CL4).

Exiting is a relief moment because the service is done. Nonetheless, the citizen questions the time spent during the journey, and some point out the discrepancy between waiting time and the service time, as stated by CL2: *“I am relieved because it is done, but to wait 2 hours to be attended for a service that takes 2 or 3 minutes is not acceptable.”*. In the **After phase**, the postpurchase phase in Lemon and Verhoef (2016), the citizen is finally at home and rethinks the service experience. Usually, the citizen waits to be contacted again to pick up his CC at the same registry office, but in

this case, the citizen chooses to receive it at home, so he reflects on when he will get it and how long it will take (APPENDIX 6). The general feelings are doubt and uncertainty on the arrival of the card, as stated by CL5: *“I do not know how much time I will have to wait to receive my CC... .”*

The customer journey phases in descending order from the most unpleasant to the most pleasant one:

1. Phase 4 Queue
2. Phase 3 Arrival
3. Phase 1 Decision; Step 9 After
4. Phase 2 Trip; Step 7 Payment
5. Phase 8 Exiting
6. Phase 5 Entering
7. Phase 6 Service

The customer journey analysis points out the moment of waiting in the queue as the most critical, reinforcing the idea of the need to assess the problem of the queues at the registry offices.

5.3 The queues at DICCCJ

Currently, the queues are organized in a first-in-first-out system for spontaneous arrivals. It also has priority services for seniors, pregnant women, people with babies, and urgent cases of people needing the CC to travel within 48 hours. There is also a queue for scheduled services.

5.3.1 Behavior in the queues of DICCCJ

Regarding the main negative behaviors in queues, jockeying is impossible since there is no more than one queue for the same service modality, as shown in APPENDIX 12. As for renegeing, although not so easy to identify, according to SG2, there are some cases of people that do not attend the queue and try either another registry office or try it another time. Balking occurs less because people already expect to wait in queue for long periods. Collusion occurs frequently, and it is the leading cause of verbal conflict and physical confrontations (SG1). The most frequent behavior is

reneging; collusion and balking is the least frequent. For M4, these negative behaviors can hurt the service's normal functioning and damage the reputation of IRN; therefore, it must be a priority to address.

Direct Observations were taken at DICCJ in the outdoor and indoor areas to analyze the service and queues.

Outdoor Area

1. There are often big queues before the opening hour.
2. The peak of the queues usually occurs during the morning and after 5 pm.
3. Citizens in the queues often sit on the floor, take off their shoes, and some bring a portable stool to sit on during the wait.
4. People wander around looking for someone to answer their questions, mostly related to urgency and misinformation about service options and how to proceed.
5. During the interviewees with the citizens, other citizens who were not being interviewed noticed that someone was paying attention to other citizens and started to ask for help to answer their doubts. More and more people were coming until the point that the author of the present work had to stop the interviewing.
6. Citizens seem able to interpret the queue diagram and know where to go in the waiting areas.
7. Security Guards often inform the citizens in the queues.
8. Sometimes, there are police officers present.

Indoor Area

9. Only 15 citizens are allowed to wait inside due to the pandemic restrictions that limit the waiting room capacity to 1/3.
10. Depending on the hours, there are between 5 to 10 empty balconies of 25. During lunchtime, there are fewer balconies available.

11. Registry Officers can empathize with the citizens; in most cases, the citizen is well served and collaborate; even when unsatisfied and angry from being in the queues for a long time, they often end up smiling during the talk.
12. Citizens and counter attendants have difficulties using biometric data collection equipment, especially during fingerprint collection.
13. The average time of the CC renewal service is 5 minutes.
14. People tend to dislike the photo and ask to repeat it.

5.4 Root-Cause-Analysis

A Root-Cause Analysis was conducted to help answer the first question: Why are there queues at the registry offices?

The RCA was done through the 5-why technique to discover the root causes behind the queues and better understand the relationship and the logical chain of the problems and their effects.

The collected data suggest the following root causes for the queues at the registry offices of IRN: Aging, CCs confidential information, personnel deficit, outdated systems and equipment, and the Covid-19 pandemic.

Figure 8

Flowchart of CC renewal services Source: Self-Elaboration.

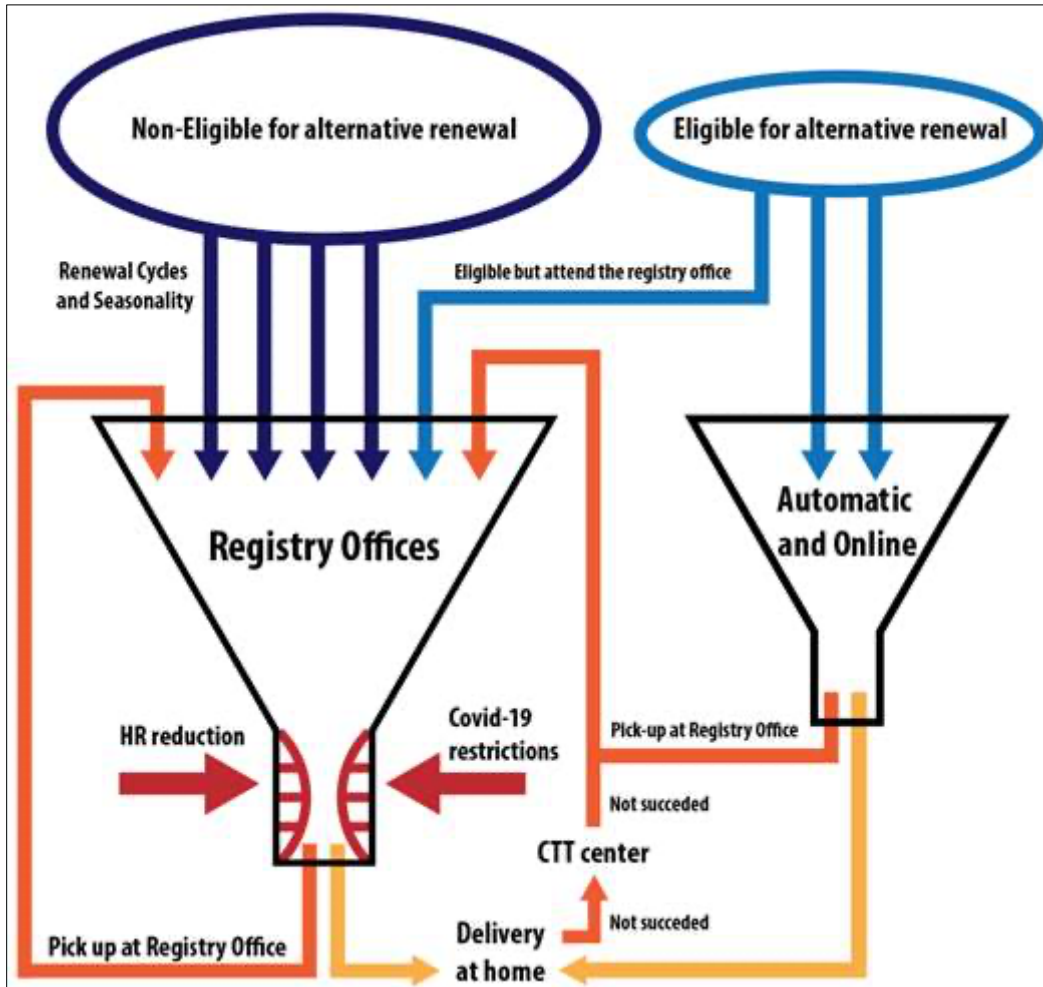


Figure 8 illustrates how the CC renewal demand is transformed into service. It starts from all the Portuguese population divided by eligible or non-eligible. The eligible citizens can choose either the alternative renewal methods (Automatic and Online) or the renewal at the presential services. Some qualified people may attend the Registry Offices by choice, urgency, or lack of information. Although there are places other than Registry Offices, such as Lojas do Cidadão (LC), the focus is the first since IRN controls it. The arrows represent the flow stream and will vary by demand patterns and factors like seasonality, as indicated in the figure. The figure also illustrates how the HR reduction over the years has diminished the service capacity at the registry offices.

Additionally, the pandemic also restrained the services. The renewal at the Registry Offices may imply two visits, the first for the renewal and the second to pick up the document. The delivery at home and the alternative services can occur without any trip. In the case of alternative renewals, it implies delivery at home unless the citizen asks to pick it up at the designated facilities. Although there was a reinforcement on delivery points, these are temporary, so they are not present in figure 8. The figure also shows what happens when the CC is not delivered to the citizen and ends up at the facilities of the delivery agency (the CTT). If the citizen cannot pick up the document, the document will get back to the registry office, informing the citizen. It is also illustrated the primary constraints, relations, problems, and solutions of the CC renewal service and how the demand can flow depending on the situation. A detailed explanation and the root causes follow.

The **aging process** changes the biometric features of a person. Face and body proportions rapidly change till the age of 25, then changes occur more slowly. This is why the CC has an expiration date (ST2). Therefore, for people under 25, updating the CC every five years is necessary, but after the age of 25, it is only required to renew it every ten years, leading to renewal cycles of demand. These lead to renewal cycles peaking every five years. Since the expiration date is known, the IRN managers know when are the peak years.

Also, when the CC renewal implies collecting biometric data, it is necessary to confirm the legal authenticity and keep the information secure and inviolable, thus requiring more control of the process. **Personal information** must be preserved and protected from identity theft (ST2). To guarantee the application of those principles, certain services can only be addressed exclusively at Registry offices. The CC online renewal and automatic renewal are only eligible to around 40% of the population because they can only be done if the following criteria are met: People under 25; 1st CC for Immigrants; Biometric data not in the database; Need for change Biometric Data. The CC renewal for people under 25 can only be done at a registry office because it requires higher assurance. Other situations like the 1st CC for people obtaining Portuguese nationality, loss of the CC, and recovery of the digital key (ST2). Also, highly urgent situations when a citizen is about to travel in less than 48 hours can only be requested at the registry offices of DICCJ or LC Porto. These situations limit the range of digital alternatives, leading to more affluence in the registry offices. The limited scope makes the personnel deficit more critical because the more services

depend on traditional service encounters, the more dependent on the number of registry offices available; thus, the effects of the shortage of people are more problematic.

M3 appoints **personnel deficit** as *“The key reason for the queues is the huge deficit of human resources. ...”*. There is a total deficit of 2198 workers, of which 1300 are registry officials (QUAR 2021). Also, the ongoing public tender only covers around 16% of the total deficit. (Social Balance 2021). M3 points out some of the causes of the workforce shortage: *“Many of our colleagues are aging and retiring; the others are bored, exhausted, and unmotivated since it is too much work for a few people...”*. Moreover, *“...it is not easy to hire people... The government believes that there are enough people and does not open public tenders as often. Also, public tenders are uneasy and take time. Finally, because the career is no longer attractive, the pool of candidates is insufficient for the job vacancies.”*

Outdated systems relate to the lack of interoperability between systems, which delays the transaction of information and analysis necessary to identify critical points. With those delays, some initiatives may take more time. As stated by M1, *“We have different informatic systems, instead of a common platform, and there is a lack of systems interoperability; it makes the processes slower both in the back and front office.”* **Outdated equipment** contributes to delaying the CC renewal service, *“The equipment is old and outdated, sometimes the software stops, and we need to restart the computer, which takes about 5 to 10 minutes.”* (RO2). The citizen is a co-author when renewing his CC. Still, there is no self-service available, which implies that the service capacity of the registry office depends on the number of registry officials, aggravating the impact of their shortage. Those are related to governmental policies and investment in the Portuguese public administration.

Contrary to the other systemic causes, the **Covid-19 pandemic** is an atypical event that prolonged in time and aggravated the existing queues phenomena, significantly contributing to the current queues crisis by provoking an extra accumulation of services. The **covid-19** led the government to declare emergency states and apply restrictive measures. First, it urged restraint on services by leading the government to close them. Later on, the services were reopened but only with an appointment system. Second, obliged to space restrictions, the waiting area inside the building can only have 1/3 of the total capacity of people inside; therefore, the queue in the outside area is more

extensive. The scheduling system ceased the queues at the registry offices but, in turn, clogged the telephonic lines and the schedules. Additionally, M4 asserts: *“The problem we face right now is that the pandemics coincided with a year of a huge volume of renovation; we usually prepare for these types of years because the cycles of renewal every five and ten years are known, but the pandemic situation made everything more challenging.”*

5.4.1 Other systemic factors

The demand levels vary by hour, day, week, and year. No data was collected on the variance within a month, and several **demand patterns** were identified.

As for the **daily demand pattern**, queues are formed before the opening hours (APPENDIX 12). Also, SG1 states: *“It is usual to have queues 2 hours before the opening time.”* Furthermore, SG2 reinforces the idea that *“...people come here at night to be first attended in the morning.”* The reason is that people are aware of the queues and want to guarantee they are attended to first and avoid spending much time in a queue; this behavior is encouraged and aggravated by the front office's good intentions. As mentioned by RO3: *“We advise citizens to arrive before the opening hours to avoid standing in queue for too long.”* this is a way of encouraging off-peak arrivals presented by Katz et al. (1991). R2 states that the peak demand during the day occurs at approximately 10 am and 6 pm, the first because there is a queue before the opening hours and people keep arriving, and the second peak occurs because many people leave their jobs at 5 pm and attend the registry office; also, lunchtime periods from midday to 2 pm are usually periods with smaller queues.

According to R1 on the **weekly demand pattern**, there is a tendency of higher affluence at the beginning of the week and gradually diminished, but that changed with the Open House on Saturdays, with the Saturdays registering the highest volume of visits when compared to the other days of the week. The reason is that it is more convenient for people to attend it on Saturday. No data was collected regarding the monthly demand pattern.

As for the yearly demand pattern, ST1 point out a seasonal variance; within a year, the highest peak demand occurs during the summertime, followed by the second and third peak demand during April and Christmas, both related to school vacations when parents decide to take their families to the registry offices. The summer peak demand is aggravated by the arrival of Portuguese

immigrants, who take the opportunity to renew their CCs in Portugal. Although they have options in their home countries, those services were crowded due to the pandemic.

There is also a **5-10 years demand pattern**, as stated by Manager 4: “(...) *cycles of renewal every five and ten years (...)*”. ST2 explains the origin of these cycles: “*The CC is renewed every five years till age 25, and then every ten years.*” this is related to the natural aging process of the citizens, as explained by the interviewee.

The low adhesion of alternative services and related complications

Only half of the 40 % eligible population for alternative renewals adhered to them by the internship time. The reasons for the low adhesion to the alternative CC renewal services: many people prefer to attend the registry offices, also people with an urgency to travel need to request the urgent or highly urgent service, and that can only be done in the registry offices. Other reasons are that people are aware of the delay in the INCM production line and do not want to wait so much to receive the CC. Others do not want to risk not knowing where their CC is. Some do not want their documents to arrive at home. Lack of awareness is also pointed out. Parents with kids also prefer to do it presidentially when they take the whole family to renew their CCs. (Manager 1)

CC Home Delivery Complications

At the time of the internship, IMCN could not match the rate of request for CC production, leading to a delay in the delivery. Another problem was that many people returned to presential work and were not at home when their CC arrived. In that case, the CC goes to the CTT center, and the citizen can pick it up. However, the CTT centers are open till 6 pm, and most people work till 5 pm, which, in the best case, gives a 1-hour window for the citizen to attend it. The inconvenient alternative would be to take a day off work. When the CC is not picked up at the CTT center, it goes back to a registry office, which augments its volume of visits. (Figure 8)

The awareness of the problem is a problem itself.

As previously stated in the daily patterns of demand, the citizens are aware of the problem and choose the solution that better serves their interests; they arrive earlier than the opening hours, aggravating the queues. This behavior is reinforced by the good intentions of the registry offices that suggest it.

Why are there queues at the registry offices? The queues at the registry offices are created because the service demand levels frequently surpass the service capacity. The demand levels are the number of visits and work requested by the citizens who attend a registry office, which vary in

patterns with randomness intervals, meaning that queues occur all the time since the registry office service level is steadier and has some limitations. Also, the service capacity has decreased in the presential service, and the implemented alternative digital services cannot fully compensate for it. The covid-19 pandemic aggravated the natural accumulation of services of the systemic causes by coinciding with years with a significant volume of renewals.

6 Discussion and Critical Analysis

This chapter analyzes how queues have been managed and compare the implemented measures with the practices presented in the literature.

6.1 Measures Implemented by IRN

The measures implemented by IRN can be classified into three main strategies, the first strategy was to reduce the service time, the second strategy was to reinforce service levels during peaks of demand, and the third strategy was to reduce the volume of visits to the registry offices, the last was highly relevant during the final stages of the pandemic situation.

Most measures focus on reducing the queues either through augmenting service capacity or diminishing the affluence of the registry offices through offering alternative services; on the other hand, Activity 5 improves the waiting experience by enhancing the waiting conditions and concentrating on perceptions management. Its analysis will be presented after the global measures.

6.1.1 Chronology of measures

Table 7 presents some relevant measures implemented to deal with the queues at the registry offices and peak demand. It also shows the measures implemented to deal with the accumulation of services from the Covid-19 pandemic. The measures are divided into three periods, before the pandemic restrictions, during the pandemic restrictions, and during the internship period, which overlapped with the final restrictions period of the pandemic.

Table 7

Chronology of implemented measures to deal with queues, peak demand, and accumulation of services. Source: Eportugal website; IRN website; and Portuguese Government website.

2021/10/02	Open Saturdays and extended hours in 9 LCs and DICCCJ
2021/08/27	Implementation of outdoor signage to organize queues in DICCCJ
2021/08/19	Open House on Saturdays for spontaneous CC services in DICCCJ
2021/09/02	Reopening of the Spontaneous Service LC
2021/06/14	Reopening of Spontaneous Attendance Service IRN
2021/06/02	Renewal of the CC assisted through a video call.
2021/06/01	The internship starts.
2021/05/18	CC Temporary delivery Counters – Quiosques Cidadão
2021/05/05	CC Automatic Renewal
2020/06/06	Simplified CC Renewal by SMS
2020/06/01	Reopening of LCs with appointment only
2020/05/04	Reopening of Registry Offices with appointment only
2020/03/17	The extension of the validity period of the CCs expired.
2020/03/19	The first emergency state due to Covid-19 starts.
2019/11/19	AI chatbot implemented in IRN website.
2019/07/18	Service of very urgent CC available in LC Porto
2019/06/20	CC Online renewal
2019/06/01	SMS Alert 60 days in advance of the CC expiration date.
2019/05/20	System update: reduction of average service time from 15 to 5 minutes

Explaining table 7 next is presented the measures taken by IRN managers and duly implemented:

6.1.1.1 Before Covid-19 restrictions

By May 20, 2019, A system update reduced the average service time from 15 to 5 minutes by reutilizing the data already available in the database; this optimization allowed a massive leap in service time and capacity. <https://justica.gov.pt/Noticias/Cartao-de-Cidadao-SMS-com-proposta-de-agendamento-a-partir-de-junho>

By June 1, 2019, IRN started to send an SMS alerting the end of the validity of the CC six months in advance, with the option to schedule the renewal. <https://justica.gov.pt/Noticias/Cartao-de-Cidadao-SMS-com-proposta-de-agendamento-a-partir-de-junho>

On June 21, 2019, the CC Online renewal allowed citizens 25 years or older to renew their CCs using a CC card reader and a digital key (chave móvel digital), avoiding more visits to the registry offices. <https://justica.gov.pt/Noticias/Cartao-de-Cidadao-Possibilidade-de-renovacao-online-vai-ser-alargada>

On July 18, 2019, the request for a very urgent CC became available in LC Porto. This measure helped people from the north of Portugal since they now have an alternative closer to home without traveling to Lisbon. It also allowed the reduction of affluence at the DIC CJ. <https://justica.gov.pt/Noticias/Cartao-de-Cidadao-muito-urgente-alargado-ao-Porto>

By November 7, 2019, an AI chatbot was implemented on the IRN website to help citizens search for the right information and suggest the best option to renew their CC. It was discontinued when the pandemic started because the constant changes would make the service inviable since it would need constant training. <https://justica.gov.pt/Noticias/Tem-duvidas-sobre-o-Cartao-de-Cidadao-A-assistente-Irene-pode-ajudar>

By May 4, 2020, the registry offices reopened with appointment only and some restrictions. <https://justica.gov.pt/Noticias/Conservatorias-reabrem-para-atendimento-presencial-com-agendamento>

6.1.1.2 After Covid-19 restrictions

On March 17, 2020, the Portuguese government decided to extend the validity of the CCs that expired on February 24, 2020, to be valid till December 31, 2021.

<https://eportugal.gov.pt/pt/noticias/validade-do-cartao-de-cidadao-e-outros-documentos-alargada-ate-31-de-dezembro>

By June 1, 2020, the Reopening of LCs with appointment services exception was made to the ones in Lisbon metropolitan area that opened on day 15.

<https://eportugal.gov.pt/noticias/reabertura-das-lojas-de-cidadao-a-1-de-junho>

By June 6, 2020, the IRN has simplified the CC renewal by allowing it via SMS.

<https://eportugal.gov.pt/pt/noticias/renovacao-do-cartao-de-cidadao-por-sms>

On May 5, 2021, the Automatic Renewal CC was made available.

<https://irn.justica.gov.pt/Noticias-do-IRN/Renovacao-automatica-do-Cartao-de-Cidadao-com-entrega-em-casa>

On May 20, 2021, the CC delivery was made available at temporary counters called “Quiosques Cidadão” from 8 am to 8 pm. These were implemented in areas with immense demand and more extensive queues. <https://justica.gov.pt/Noticias/Quiosques-Cidadao-mais-centros-de-entrega-do-Cartao-de-Cidadao>

6.1.1.3 During the internship

By June 2, 2021, the renewal of the CC by video call was available through scheduling on the Eportugal platform. The aim was to reduce the volume of visits to the registry offices.

<https://eportugal.gov.pt/noticias/servicos-online-no-portal-eportugal-com-apoio-por-videochamada>

By June 14, 2021, the registry offices started reopening spontaneous services. <https://irn.justica.gov.pt/Noticias-do-IRN/Servicos-de-Registo-retomam-atendimento-espontaneo-de-forma-faseada>

By August 21, 2021, the DICCJ started to open on Saturdays from 9 am to 3 pm for the spontaneous attendance of CC requests, renewal, and delivery, until September 30, 2021. <https://justica.gov.pt/Noticias/Alargamento-do-horario-do-IRN-no-Campus-de-Justica>

On August 27, 2021, IRN implemented a signage system to organize queues at DIC-CJ (activity 5) after the spontaneous service reopening on June 14, 2021, due to the need to manage the queues derived from the large influx that came from the backlog of services during the early stages of the pandemic constraints.

On September 2, 2021, the reopening of spontaneous attendance service at LCs thus, relieving the registry offices that had already reopened the spontaneous service on June 14, 2021. <https://irn.justica.gov.pt/Noticias-do-IRN/Servicos-de-Registo-retomam-atendimento-espontaneo-nas-Lojas-de-Cidadao>

On October 2, 2021, the Open House on Saturdays and extended hours from 9 am to 10 pm were made available in 9 LCs and DICCJ for renewal and delivery of CCs and Passports until the end of November. This measure was implemented to conclude the services accumulated from the covid-19 restrictions. <https://www.portugal.gov.pt/pt/gc22/comunicacao/noticia?i=casa-aberta-para-entrega-e-renovacao-do-cartao-de-cidadao-e-do-passaporte-arranca-a-2-de-outubro>

6.1.2 How the queues were managed during the pandemic

During the first Emergency State period (March 19, 2020 – May 2, 2020), the registry offices were shut; only online services were operating. In the first Calamity State period (May 2 - November 2,

2020). The 3rd Emergency State period (November 9, 2020 – April 30, 2021) shut the registry offices again. In the final Calamity State period (April 30 - May 30, 2021), the registry offices were operating appointment-only with exceptions to highly urgent and priority services. Some restrictions were applied: social distancing, limited service attendance volume, and reduced waiting room capacity to one-third. As mentioned, the Portuguese government decided to extend the validity of the CCs that expired on February 24, 2020, until December 31, 2021. The CC delivery at home was also a central strategy. The basic strategy was to limit the number of services to the available levels or capacity and only allow the services to be made by appointment by closing the spontaneous services to generic cases, with exceptions for highly urgent cases of people traveling. IRN has continuously developed a contingency plan and applied it during the pandemic crisis. The plan focused on limiting the offer, smothering the peak demand by delaying the service, and temporarily augmenting the service capacity during the peak demand while developing new ways of service—pandemic accelerated technological initiatives. Reopening the spontaneous service at the registry offices, Open Saturdays, extending service hours, and reorganizing queues with design signage were relevant measures to deal with the accumulation of services.

6.2 Implemented measures and their strategies

Temporary measures to reinforce the service capacity (Mudie & Pirrie, 2006) during peak demand included opening on Saturdays, Urban Kiosks, and extended hours. The measures to reduce the affluence of the registry offices are Automatic Renewal, Online Renewal, Simplified Renewal (SMS), Scheduling system, and CC home delivery; these measures are also a way of providing alternative services, changing the service concept, moving demand to alternative channels, and to increase consumer participation, as suggests Walley and Jennison-Phillips (2017) and Sasser (1976).

A way to Refuse demand (Walley & Jennison-Phillips, 2017) was to limit the number of spontaneous attendance tickets to the daily service capacity of each registry office, as shown in the poster stands in APPENDIX 13. The creation of reservation systems was applied, and registry offices worked only with appointments during the pandemic till the reopening of the spontaneous service. The services by appointment are a way of reservation systems and refusing demand, as in Mudie and Pirrie (2006) and Sasser (1976). As for ways of developing non-peak demand and

smoothing the demand peaks, also suggested by the authors, the measures were the Temporary Extension of the CC validity and communicating the CC renewal six months in advance through SMS. Activity 5 was a case of improving the waiting experience of the citizens through the improvement of the waiting conditions and management of their perceptions, as in Maister (1984) and Katz et al. (1991)

6.2.1 Results of the measures

By September 15, 2021, the SMS, online, and automatic CC renewals and the CC delivery at home avoided 2,210 million visits to the registry offices.

<https://eportugal.gov.pt/pt/noticias/cartao-de-cidadao-servicos-nao-presenciais-evitam-mais-de-2-milhoes-de-deslocacoes>.

The automatic renewal, the home delivery, and the online renewal avoided around 3 million trips to the registry offices from 2019 to January 24, 2022. Also, automatic renewal represented 36% of the CC renewals in 2021 and is expected to become the leading CC renewal service soon; non-presential services were 40% of the total renewal requests, against 21% in 2020, which means that adhesion to alternative services has grown.

<https://eportugal.gov.pt/pt/noticias/cartao-de-cidadao-atendimento-nao-presencial-evita-3-milhoes-de-deslocacoes-ao-irn>.

More measures, news, and information can be found on the following websites:

Eportugal.gov <https://eportugal.gov.pt/noticias>

IRN website <https://irn.justica.gov.pt/Media/Comunicados-de-Imprensa>

Portugal.gov <https://www.portugal.gov.pt/pt/gc22/comunicacao/comunicados>

6.3 Critics of the current situation, the key points.

Managers 1 and 5 point internal and external communication problems as factors that impact the management of the current situation. A practical external communication approach can improve service delivery by informing citizens about service changes and contributing to their adoption. At the registry offices, it is important to manage the expectations of people in the queue, as developed in activity five. Communication problems go deeper; the awareness of a problem should be the starting point for solving it. Nevertheless, as explained, the awareness of the queues has been an aggravating factor because there is not a system in place that can simultaneously benefit the individual and the collective. Communication with the government has also diffculted the management of the queues (M5).

Djealassi et al. (2018) and Kokkinou & Cranage (2012) affirms that it is expected that consecutive technological improvements and self-service implementation would reduce the necessary workforce to perform the services, and that would lead to a situation where the workforce shortage becomes irrelevant, with Manager 4 having the same opinion. However, that is not yet the case. The high number of positions to be filled portrays the reduced system capacity. At the same time, the ascending trend of the workforce's average age enhances the problem because if human resources are already in an effort, it is even worse with older staff.

The customer journey analysis reinforces the idea of assessing the problem of the queues at the registry offices. However, it is necessary to remember that every phase impacts the next one and that to improve the queues, it may be required to look at the entire system instead of isolating particular moments ((Lemon & Verhoef, 2016), remembering the causes of the affluence and working on them can set the right directions to go. Also, the focus should be on improving the experience of the citizens attending and the front-office staff that provides the service. The statement of CL6, "*The only good thing about the service was the person who attended me.*" go in line with the idea of Maister (1984) on how good attendance can minimize the hostile experience of waiting in a queue.

Given alternatives were especially relevant to diminish the number of trips to the registry offices. Alternatively, even allowing the service to be made without implying a single trip to the registry offices, such as the case of the citizens that could renew either online, automatic, or simplified and

choose to receive the CC at home, was, in fact, a prevalent measure during the pandemic peaks when people were working remotely.

Concerning the reopening of the spontaneous, the government also failed to communicate on time to the IRN top managers, leading to a reactive rather than a planned approach. Considering that the decision-making is shared among several agents, the responsibility for the results of the implemented measures should be shared accordingly. The pandemic forced the government and IRN to act fast on new implementations; this sense of urgency on crisis responsiveness has delayed more ambitious ventures due to their complexity, effort, time, and financial investment.

Manager 2 mentions that the tolerable waiting time for people is around 30 minutes. Moreover, that can be the reference to use as an acceptable target.

6.4 Critical Analysis of Activity 5: Design and Implementation of outdoor Signage to organize the queues at DICCCJ

Reopening the spontaneous services on June 14, 2021, brought massive affluence to the registry offices. The main reasons were the pandemic restrictions. Those led to an accumulation of services, and since the registry offices were working through appointments, many citizens were not able to schedule a service because the telephonic lines were crowded; the online scheduling was also complete, and the ones who were able to reach the telephonic lines only had the option to schedule a date months after the call, as mentioned by ST1 *“...the impossibility of reaching our telephonic lines, and of having to wait more than a month for an appointment.”* To aggravate the situation, there were some troubles with the CC home delivery, as mentioned in the root cause analysis.

The big rush to the registry offices caused a situation in which people with and without appointments were waiting at the door of the civil registry to be attended to. *“The reopening of the spontaneous service brought big confusion to the queues”* SG2. The disorganized concentration of people at the entrance led to a chaotic situation with recurrent conflicts and deterioration of the waiting conditions. Since there were no explicit limits and boundaries distinguishing the queues, many people thought they were being passed in line.

Therefore, there was a need to organize the queues, improve the waiting experience and conditions and manage the expectations of the citizens waiting to be served, as indicated in Maister (1984), Larson (1987), and Katz et al. (1991). To fulfill that need, the GAGCID department designed a signage system that was further implemented in the external waiting area of the DICCIJ. The implementation was concluded on August 27, 2021. (APPENDIX 15)

Figure 9

Queues disposal diagram Source: Elaborated with the GAGCID department



As shown in Figure 9, the solution implemented was to designate queues for specific services: A) Priority Service (dark blue); B) Service by appointment (yellow); C) Delivery without Appointment (orange); D) Request without Appointment (blue). This is a way of segmenting demand to facilitate operations and maintain the order of the waiting area, as in Wirtz & Lovelock (2022).

Three diagrams were implemented in strategic areas of the building so that the citizens arriving could recognize them and go directly to them. Poster stands and floor stickers with the colors of each queue were also applied. (APPENDIX 13), this design signage was developed with different colors and equipment so that people could rapidly orientate themselves and understand where to stand. The traditional poster stands with four faces inform the citizens about the queue for a specific service modality. Also, two poster stands to provide information on the expected waiting time (APPENDIX 13). This is not as great as a monitor with a dynamic information system or mobile real-time data, but it informs citizens and manages their expectations. Maister (1984) points out that it is essential to keep the client informed to avoid irritation and rudeness from them, as they do not like to be in ignorance and feel without decision power. An audio system was also implemented for calling the names of the people with appointments and for the citizens in proved highly urgent need of the CC or passport.

Figure 10

Organization of a waiting area into a queue. Source: Based on Activity 5

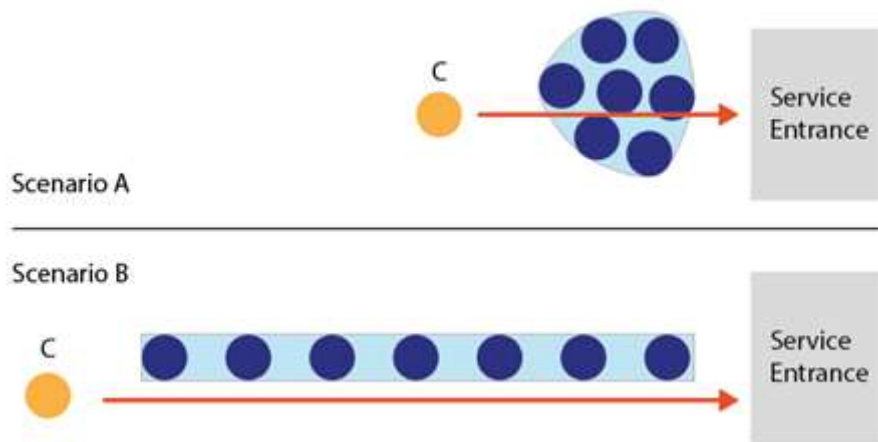


Figure 10 illustrates a simplified representation of DICCCJ's two scenarios, scenario A is before the implementation of activity five, and scenario B is after the execution. To simplify the example, the four queues were turned into one. Both scenarios present the same amount of people waiting to be served. Still, the different disposal and organization have significantly different effects. Scenario B is a better case of providing social justice and fairness, two relevant aspects that Larson (1987) and Obermeier et al. (2020) point out as a priority in a queue.

In Scenario A, there is no organization; people arrive and wait around the service entrance. There is no social distancing, so people are more compacted. The risk of conflict is higher since it is unclear who will be first attended to, and some people might want to pass in front of others. And even with ticket systems, the quality of the waiting conditions is not ideal because people often claim someone cut in line. Scenario B is more organized, with people waiting in a queue and respecting social distancing. However, the citizen that arrives, represented in the figure as a yellow circle with a C on top, sees a more extensive queue and has the perspective of being farther from his goal (the service entrance). This may give the false perception that it will take longer than scenario A and may encourage people to balk. A third scenario could be exemplified using stanchions and a snake-like queue layout, as pointed out by Wirtz and Lovelock (2022). Still, with the architecture of the DICCCJ, this last scenario is inviable since the space only allows vertical disposal around the building.

“The queues are longer than the previous summers, but perhaps it is just related to the fact that we cannot put so many people inside and also because the queues were not so organized, people used to get around the entrance like a semi-circle.” (R1)

Is the size of the queues a vital aspect of the problem? Probably yes, because not only can it influence decision-making due to visual perception, but it also might worsen the waiting conditions if people are exposed to sun, wind, and rain for hours. It is essential to manage citizens' expectations; if the citizens have easy access to real-time data or at least an approximate waiting time estimation, they can better decide whether to join the queue or not instead of relying on perceptions. Considering environmental factors, let us imagine that the exact area of concentration of people in Scenario A provides a shadow. In scenario B, due to the disposal of the queue, just the people near the entrance would be able to protect themselves from the sun. Pole stands and stanchions are a solution to organize the queues to optimize the space while offering flexibility to change the shape and organization of the queue. These were applied only near the entrance, as shown in APPENDIX 13.

6.4.1 Opinions on the impact of activity 5

To understand the impact of the implementation of the Signage system, opinions were collected from two security guards, four registry officials, and two registrars (APPENDIX 10), as also some citizens' opinions. (APPENDIX 8)

There is a unanimous opinion that Activity 5 has improved the service experience for citizens and workers. As stated, *“I believe the new organization of the queues contributes to a better organization...”* (SG1), also, *“...it seems that the waiting conditions were improved.”* (R2), *“I think the changes applied to the external waiting area are a success...”* (SG2). Only RO2 thinks that the citizen is the sole beneficiary of the changes, *“The recent configuration of the queues is helping the citizens but is also blocking our service entrance.”*

According to the interviewees, the specific improvements are *“...better organization, with more order and fewer conflicts.”* (SG1). Also, *“The outdoor signs are helping to harmonize the people waiting in the queues; people now know better where to stand, and orderly wait their turn and the queues advancement. ...”* (R2). People also seem to have better emotional states when experiencing waiting, *“After the new organization of the queues, the citizens seem to arrive less anxious.”* (RO4). Some also state **improved communication**, *“It has been easier to deal with the citizens since the diagrams were implemented.”* (RO1). Citizens are also **calmer**, *“...citizens are no longer constantly checking with the security guards since they know their turn will come when their names are announced.”* (R1). The interviewees also point out the **reduction of stress on workers** as an improvement of the reorganization of the queues since people are now more cooperative, *“Those changes helped us work better since people are now more cooperative.”* (SG2), meaning less pressure on the workers, thus a better work environment.

R2 gives a comparison of the current and previous queues organization: *“The outdoor signs are helping to harmonize the people waiting in the queues; people now know better where to stand and orderly wait their turn and the queues advancement. That is a huge difference from the time before the space intervention. People used to agglomerate around the entrance, making the different lines and order unclear, which frequently leads to verbal conflicts and physical confrontations.”*

However, although the **waiting conditions were improved**, there is still the need for an outdoor information point with people to clarify the citizens' doubts, *“There should be someone here providing us information”* (CQ4). However, that was not done as explained by R2: *“We know people are desperate for feedback, but we cannot create an information point near the queues because we cannot afford to allocate any of our registry officials; it would mean less service capacity, and we are already on shortage of people.”*. Also, R1 suggests: *“There should be one more queue for the highly urgent cases of people traveling within the next 48 hours.”*.

6.5 Critic and Analysis of Interviewees' suggestions to improve the queues

This part presents and analyzes interviewees' suggestions for dealing with the queues.

“Another alternative can be to reallocate human resources from the central services to reinforce the service delivery at the registry offices during the peak of demand.” Manager 2.

This idea follows the suggestion of multiskilling the workers, as suggested by Mudie and Pirrie (2006). The idea of temporarily removing personnel from where they are not needed and allocating them to reinforce critical areas providing flexibility during the peaks of demand has some implications. Firstly, it is necessary to identify the areas of more and less workload per employee and more extensive queues and waiting time. Secondly, the highest peak of demand occurs in the summer, and most of the workers intend to go on vacation, thus fewer available workers; does this imply the vacation policies to be changed? Will people be willing to change their vacation periods? Thirdly, will people from services with lower demand be willing to temporarily change to a more stressful service? If it is impossible to take people from other registry offices but the central services, are those willing to? If yes, is it necessary to change the working contracts? Since the ROs have specific training, do the reinforces have the capabilities to perform the tasks? Even assuming that all conditions are met, the best scenario would be to delegate the easiest and fastest task to the temporary reinforcements, which might be the delivery of CC at the registry office, thus, liberating the ROs to perform the CC renewal and other more complex tasks. Nonetheless, it is an option that Managers should analyze due to the implications and effort, so the trade-off might not justify it.

Reinforcement options, such as extended hours, more days opening, and others, are contingency measures already in place; they are temporary and adequate for peaks of demand crisis. Also, it takes a lot of effort from the workforce, which can bring troubles later on, thus not sustainable in the long term as a constant way of service. This is related to planning capacity and demand (Sasser, 1976), which is already in place.

“I like the idea of the self-service printing machine, not only because the citizen can do it himself but also because it eliminates the step of printing it at INCM.” (M2).

Although the printing machine prototype is a very attractive idea because it encompasses the whole supply chain of CC service, it is not considered an option since the idea is to bring novelty and not to work on already tried ideas and prototypes. This does not mean it is rejected, but rather not something that will be presented as a recommendation for this work.
<https://justica.gov.pt/Noticias/Levantar-Cartao-de-Cidadao-atraves-de-maquinas-self-service>

“... The solution might be integrating technology, communication, and good design.” (M2).

Although not a concrete description, the idea of integrating and not merely thinking about those parts individually is a powerful vision that might improve the services. Technology can increase service capacity, simplify tasks and processes, and provide convenience. Through communication, people are informed and know what is going on as quickly as possible, bringing awareness, decision power, and better management of expectations. A good design can facilitate communication and technology integration and usage and better waiting and service experience. Altogether can reshape service delivery, as indicated by Lindgren et al. (2019).

Hiring and Training Human resources

Hiring people is not as simple. On top of the governmental policy constraints explained by M3, the hiring process is not easy because the type of job requires a formation period. Also, M2 reinforces that not many people attend public tenders. Sasser (1976) suggests using part-time employees to augment capacity, but that idea is inadequate for this job because it requires working with confidential personal information and long training.

Mudie and Pirrie (2006) suggest incentivizing the workers to work harder, but considering the shortage of HR and their average age of 55 years, it does not seem reasonable. Also, measures like training staff, extra-hour incentives, and working on Saturdays? With fewer people doing more work, well-being can be compromised. Too much workload can demotivate and increase the potential for burnout. If, on the one hand, the years of experience bring quality and quickness, on the other, the people are not so capable of resisting consistently high levels of workload. Older workers are usually more resilient to change. Multiskilling the workers, can be highly valuable regarding demand fluctuation by allocating them according to where they are most needed. However, the workforce's characteristics and the organization's extension indicate that training HR is essential but probably does not help solve the queues at the registry offices. The reason is that there is a limit to reducing the service time only by training without redesigning the processes. Moreover, even since people perform the service, the times will vary significantly. Additionally, there is the question of having or not having the motivation to reach a higher work rate. These options would imply a change in the governmental policy regarding hiring and public tenders.

6.6 Why the implementation of SSTs at the registry offices might be the way to go

There are some clues on why implementing new SSTs might solve part of the queues' problem. When a citizen enters the registry office, he is attended to by a registry official, meaning there is no self-service option. This dependency on human labor is the weak point of the services system. The lack of human resources leads to constant effort from the staff, worsening with the peaks demand. With the possibility of augmenting the service capacity and transforming the citizens into the main contributor to the service, SSTs can be a suitable alternative to answer the main problem of IRN queues: the reduced service capacity of registry offices due to a workforce shortage. SSTs also have the potential to generate value and benefit the user and the workers providing the service by improving the service experience for both.

Also, R2 states: *“The informatics systems, and the machines that collect the biometric data, need to be substituted.”* so why not replace it? There is plenty of criticism regarding the biometric data collection machines; citizens and front-office staff claim that the equipment is outdated and the service gets delayed due to failures.

Some of the most successful measures implemented in IRN to improve service delivery and minimize queues are SSTs: the CC automatic renewal and the CC online renewal. These measures, complemented by the CC home delivery, significantly reduced the number of visits to the registry offices.

Many public services from different countries are being digitalized and improving the delivery of their public services with the latest SSTs, proven across different real contexts (Chen et al., 2021). Some relevant SSTs benefits, such as convenience, location flexibility, time-saving, enhanced waiting experience, and time perception, help diminish the problems of the queues and their related effects, as stated by Hossain et al. (2019) and Wirtz and Lovelock (2022)

SSTs have been present in Portugal in different industries for some years and are being more broadly adopted, meaning that people are familiar with them (APPENDIX 11).

7 Recommended Solutions

Part of the challenge was to imagine a potential future service landscape for the CC services. The selection of the recommendations starts from the needs and the critical points of the customer journey and the opinions extracted from the interviews. Then, it considers the success of the previous strategies of IRN to deal with the queues and the gap between the existing measures and the recommendations identified in the literature suitable for a government agency.

The set of recommendations is anchored on the idea of self-service and follows an innovative approach to the problem of the queues; since SSTs are available on digital platforms and mobile, the idea is to bring the SSTs to the presential service. The basilar idea behind this set of suggested measures is to involve the citizen in the production of the service to improve his satisfaction and reduce the human workload on the front-office staff, as indicated by Sasser (1976), Mudie and Pirrie (2006), Djelassi et al. (2018), Hossain et al. (2019), Chen et al. (2021), and Wirtz and Lovelock (2022).

The following set of 5 suggestive measures was selected due to the potential to improve the service experience and solve the identified problems: service incapacity, long queues and waiting times, poor waiting conditions, communication problems, lack of information, inconvenience, and elevated human workload, all issues related with the queues at the registry offices.

7.1 Five technological measures for a Potential Future Service Landscape

The five suggestions are a Real-Time Affluence Map, QR-Code queue management system; Self-Service Touchscreen; Self-Service Fast-line, and Urban kiosk. The author of the present work hopes that this set of suggestions contributes to building the path to a seamless customer experience, as suggested in Wirtz and Lovelock (2022) and Lemon and Verhoef (2016). Also, these measures align with the type of governmental digital innovations presented by Barcevičius et al. (2019). Regarding the benefits of digitalization, this set of recommendations affects public service by changing the actors involved with the citizen having the initiative to self-service, freeing the citizen from the traditional facilities, allowing 24/7 access, and providing an additional communication channel, and immediate transaction of information, as in Lindgren et al. (2019)

7.1.1 Real-Time Affluence Map

What if the citizens could know all the time how affluence is in all the registry offices and decide which registry office to attend? Suppose everyone can quickly know, all the time, what the levels of affluence are in all available service locations. In that case, the individuals can potentially choose what is best for them individually and, as a consequence, benefit the collective. It also helps to manage the citizens' expectations to let them know an approximate waiting time, which Wirtz and Lovelock recommended (2022).

This option gives transparency and 24/7 access and facilitates the transaction of information, as in Lindgren et al. (2019). It was previously explained that many citizens rush into the registry offices before the opening hours to guarantee they are first attended and that this selfish behavior aggravates the queues. This solution intends to minimize that pattern of behavior.

The primary action is to inform the citizen about the levels of affluence in real-time on the nearby services. This way, we show the citizen the range of options available in nearby locations to decide

on the most convenient one. Perhaps, he decides to go to the registry office with fewer queues and contribute to a better distribution of affluence to the available registry offices.

Figure 11

Real-Time Affluence Map Self-Elaboration Based on Waze

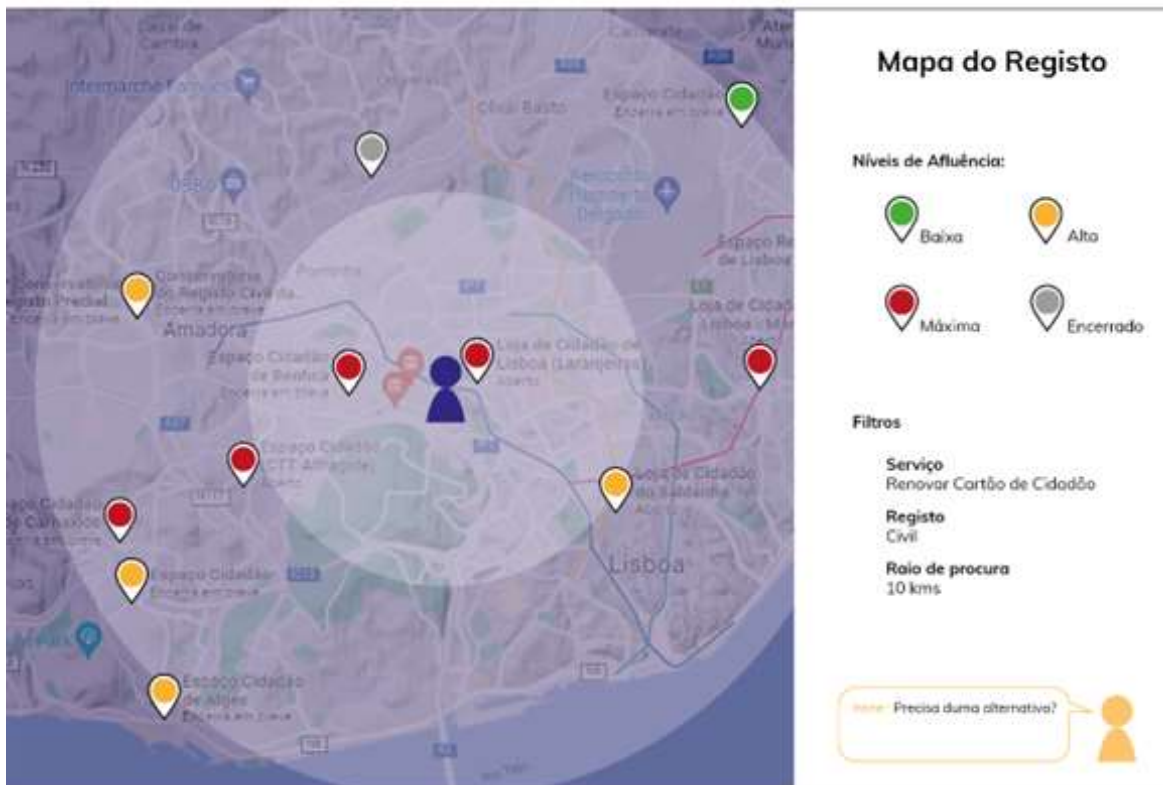


Figure 11 simulates the levels of affluence in the different registry offices within the diameter of the search. The levels of affluence are represented by green, yellow and red, thus suggesting following the traffic light system that people are already using. The gray color is for temporarily closed services. This idea was inspired by the feature of car traffic density from the Waze live map. (<https://www.waze.com/pt-PT/live-map>)

Here, 5G technology (Barcevičius et al., 2019) can make a difference since it is necessary to get real-time data to avoid lagging, additionally providing transparency and reliable data. Additionally, there might be an option to provide the intention of arriving at a service, like a pre-scheduling that the citizen can do at home. Thus, when arriving at the registry office, it confirms the ticket. This is

to avoid two situations: 1st, that people schedule and do not arrive, and 2nd, that incorrect information is provided during sudden demand peaks. To be more precise, if the map only confirms the level of affluence when people come, what would happen if many people start attending one place simultaneously? The option might be to reveal the number of people who intend to attend a service request online.

It would also be valuable if this interactive map could provide directions and time of arrival to a nearby registry office with less affluence and even suggest different options to arrive there, public transportation, micro-mobility, walking, and car trip. The main weakness of this system might be the people that arrive at the installations without performing the online request, which would make it difficult to have real-time data on how many people are moving to a particular registry office. Also, all locations should be technologically integrated (interoperability) to provide a national map. It could be interesting to have this available not only on the site of IRN, other public services websites, the registry offices, and urban screens, as in APPENDIX 11.

7.1.2 QR-Code queue management

What if people could wait wherever they want until they are called to be served?

A virtual queue can avoid the most painful part of the customer journey, waiting in a physical queue for hours (Wirtz & Lovelock, 2022). QR-code queue management system boomed with the arrival of the covid-19 pandemic because it allows avoiding the concentration of people by enabling the customer to occupy their waiting time with other tasks. It only takes a smartphone to scan the QR code and select the service.

An online or printed ticket is provided, as well as information about the expected waiting time and the number of people left; also, an alert will be sent to the phone when the time to be attended is near. As for the people who are not smartphone users or do not possess the ability to use this service, a staff member can help by providing a physical impression of the ticket and information about the time that the citizen will have to wait or the citizen will be attended in a balcony. This measure does not directly contribute to diminishing the level of demand or the service capacity; nonetheless, it can improve the waiting experience of the citizen, which in turn may contribute to a better service interaction between the registry office and the citizen and, consequently, a better service experience for both stakeholders. Given this, there is also potential to contribute to

improving the workplace environment and work satisfaction. Since people can wait outside without standing in a queue, it is easier to manage the outdoor area and also allows more space in the interior area, which in turn can allow the installation of self-service machines, thus augmenting the service capacity of the registry office, leading to space optimization.

Many QR-code queue management systems are available on the market. Nonetheless, it will be necessary to integrate the chosen system with the different technologies in place. Other digital ticket systems can also be good options.

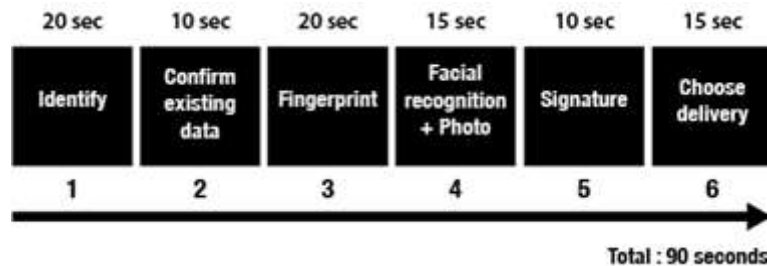
<https://qtrac.com/blog/how-to-improve-customer-service-with-a-queue-management-system/>

7.1.3 Self-Service Touchscreen

What if people could perform the service themselves at the registry offices? A self-service machine with a screen where people can perform the CC renewal, and the personnel supervise it and assist the citizen when needed. APPENDIX 16 presents the potential worker-to-citizen ratios, showing that fewer workers are needed than in the traditional one-to-one service, allowing the allocation of workers to reinforce other services. It frees the citizens' dependency on the workers. It makes the citizens the author of the service, permitting it to diminish the human workload of the employees and give control of the service to the citizen. Also, making service faster and with fewer errors and delays. This is ideal for situations that require more control and cannot be performed on digital services; it has the steps of the traditional CC renewal adapted to the technological equipment, including the instruments for biometric data collection and signature. This measure is inspired by the article on Biometrics by the Thales Group. www.thalesgroup.com/en/markets/digital-identity-and-security/government/inspired/biometrics

Figure 12

Potential service time of the Touchscreen CC renewal process Source: Self-elaboration, based on registry offices' CC renewal and inspired by Thales Group



Assuming that the processing time and the data collection are faster than the current equipment, Figure 12 estimates the total service time of the CC renewal through the touchscreen as 90 seconds (1 minute and 30 seconds), meaning a maximum of 40 renewals per hour and 400 renewals per workday (10 hours). The tasks are identical to the traditional service but adapted to an SST. The times are based on the opinion of RO2: *“As for data collection, it takes around 20 seconds for the fingerprint, 15 seconds for the photo, and 10 seconds to sign, but to confirm, substitute, and add information can take two or more minutes.”*. However, that will have to serve since it was impossible to obtain the authorizations to time each task of the CC renewal. Moreover, even if the data was available, this is a different system, so values would probably be other too.

The success of this measure depends on the simplicity of the navigability system. Providing an intuitive and smooth experience, good software with big icons and visuals, and the physical aspect following the best ergonomic guidelines are prime (Chen et al., 2021). The design of the equipment is quintessential for a good service experience and perceived value from the customer (Djelassi et al., 2018). The facial photo is a sensitive task, but ST2 states: *“Regarding the CC photo...there are multiple check phases; therefore, anything that goes wrong can be signaled so that the emission is canceled and the citizen can be informed of the need to retake it...”*. Nevertheless, the software should be equipped with an AI capable of filtering errors and guiding people through the process of facial recognition and photo capture to minimize mistakes and ensure good data collection.

This option is to be located at the registry offices and the urban kiosks; in the latter, the software can be updated to provide services from different public agencies. As for priority people, those will be served on a balcony, preferentially.

7.1.4 Self-Service Biometric Fastline

What if there was a superfast self-service system specific for CC renewal at the registry offices of the main urban areas? A CC renewal SST, equipped with the same biometric sensors as the touchscreen data collection, for implementation at the most prominent registry offices in the main urban centers of Portugal. However, contrary to the touchscreen option, where all the tasks of the process are in a single working station, in this option, the service is done through a track divided into different working stations corresponding to each task. With this system, the citizen can advance as soon as the person in front finishes the task. The system works as a flow, therefore is no need for much space in the waiting area, allowing for space optimization. As Wirtz and Lovelock (2022) affirm, speed makes all the difference.

Figure 13

CC renewal through the Self-Service Biometric Fastline Source: Self-Elaboration

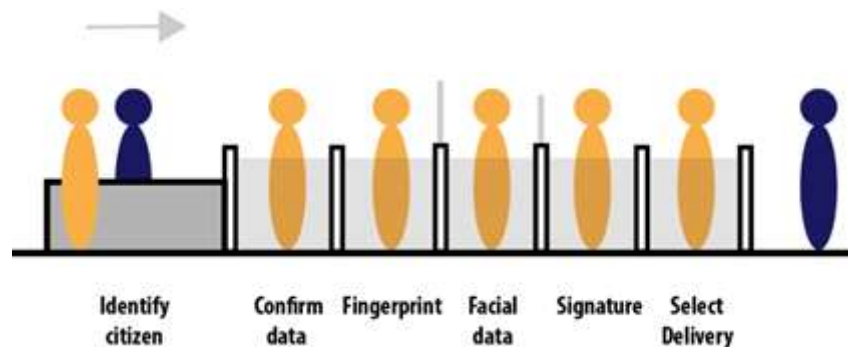


Figure 13 illustrates this measure —the same steps as the current CC renewal and the touchscreen solution. The main difference is that the Biometric Fastline is a multichannel multiphase queue system, while the traditional and the touchscreen are multichannel single-phase systems. In Figure 12, the touchscreen’s service time is 90 seconds; with the Biometric Fastline, the service time might go down to 20 seconds since the lengthiest task in a production line is often called bottleneck,

setting the time-of-service completion. With service being done every 20 seconds, one server can potentially perform three services per minute, 180 services per hour, and 1800 per work day (10 hours). As stated before, the times presented are based on RO2's opinion (time perception), which is not as precise as time records (objective measure). This does not intend to be highly precise but to illustrate the idea and its potential.

The service time can vary a lot depending on the design of the equipment, processing speed, easiness of use, and the ability of the citizen to use it. Optical turnstiles inspired this measure, <https://www.boonedam.com/en-us/products/optical-turnstiles>. Reliability is also crucial since errors delay the process (Chen et al., 2021). To minimize the possible impacts, there should be a single queue for the different servers available, this way, if one server fails or delay, the others will keep running, and people do not have to get stuck waiting. After a person confirms his identity, staff will signal which server the citizen should attend. If the citizen is already confirming data, they have no other option than wait. Nonetheless, when an error occurs and needs to be fixed, people should be able to exit through a lateral way with the help of a worker and restart the service on another server. To be implemented in the registry offices with the highest volume of CC services, this option can be a game-changer for the peak demand since it is focused on CC allowing it to liberate staff and allocate it to other services.

7.1.5 Urban Self-Service Kiosk

What if a physical self-service system was available after the closing hours of the registry offices in the most populated urban areas? This solution intends to provide convenience since many people take a day off from work to attend the registry office, as in the case of CQ2: *"I took a day from work to be here... ."* By being implemented in strategic public areas of urban centers and being available at a convenient time before and after the regular registry office schedule of 9 am to 7 pm. It can operate seven days a week, not restricted to the registry offices. It may run during the metro working hours to avoid unnecessary energy consumption and extra costs. The kiosk does not need employees, but the option of an assisted video call during a specific period of the day.

Figure 14

Urban Self-Service Kiosk Self-elaboration inspired by ATM banking

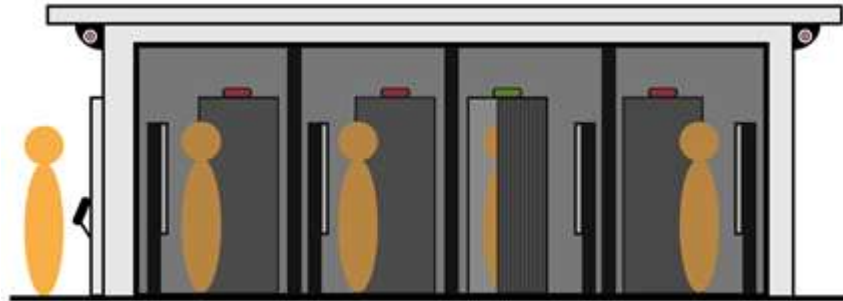


Figure 14 illustrates the urban self-service kiosk installed with touchscreen devices; transparency is applied to show how it could be on the inside. Three security steps might be in place, the first at the entrance, the second at the inside door, and the third at the touchscreen. It must be equipped with different surveillance cameras. It can be located in multimodal transportation centers such as Oriente (Lisbon); also in malls since both types of infrastructures offer surveillance and are also very visited by people. Security levels can be assured by selecting locations with surveillance systems. The second layer of security, and the most important, is the multimodal biometric confirmation of identity. According to ST2, the feasibility of this idea depends primarily on guaranteeing the legal principles of Inviolability, Authenticity, and Security. It is essential to ensure a controlled environment with protection against risks such as identity theft. Several authentication processes must be in place since “...it has to guarantee that the document is truly representative of the true individual as a citizen and that the process cannot be manipulated.” (ST2). This aligns with the idea of having different levels of assurance and authentication factors, as suggested by Clark et al. (2016).

People often complain about the CC photo and ask to repeat it, delaying the service time and making it a sensible part of the renewal. Contrary to the renewal at the registry offices, the citizen does not have the support of the ROs, so he can take more time and have accessories that make the photo unsuitable for the document. It is crucial to have an AI helping citizens and guarantee the necessary service quality and best data collection according to the guidelines suggested by Chen et al. (2021). ST2 explains that if a photo has an element that makes it invalid and passes through the

AI visual control, it will be verified by an IMCN worker before manufacturing the physical document. In the case of this last verification confirming the inadequacy of the CC, the document will not be printed, and the renewal will be invalidated. Then the citizen will be informed to repeat it.

ST2 clarifies what is necessary to implement this measure, *“In the first place, it is important to change the current law in vigor in a way that coadunate with the alternative services you present. In the second place, it is important to obtain the opinion of the entities which previously pronounced about the system in place.”*. On top of the maintenance costs, the rent is a point to consider since it will vary based on the selected location, and crowded places in urban areas usually have higher rent costs.

2. A potential future service landscape

APPENDIX 17 presents the potential impact of the set of five suggestions on the citizen's emotional journey when attending a registry office. Although there is no way to prove this a priori, the literature review supports the benefits and the potential of those measures to improve the pain points identified in the customer journey.

These recommendations require change at different organizational levels since a difference in the available technology implies a shift in how the service operates; therefore, it means hiring IT specialists and updating the training processes of the ROs. Regards finance, a way to go might be to look at the annual salary of the ROs and their service capacity and compare it with the performance level and costs related to the recommended SSTs. Also, excluding the QR-Code queues management, all the other solutions require tailor-made projects. The recommended measures aim to value creation to the citizen and workers in terms of improving convenience, communication, service capacity and the waiting experience.

Table 8

Service time and serviceability of the face-to-face service and suggested measures

CC presential renewal	Total average time per service	Maximum service rate per hour	Maximum service rate per workday (10hrs)
Balcony	5 mins	12	120
Touchscreen	1 min 30 seconds	40	400
Fastline	20 seconds	180	1800

Table 8 illustrates the hypothetical discrepancy between the current system and the potential measures. It would take 15 balconies to perform the same amount of service as a single Fastline. Also, as shown in APPENDIX 16, it would take fewer employees to operate the Fastline and the Touchscreen. As explained before, these times are not precise since it is not possible since they can also vary according to the user. One work day is equivalent to 10 hours since the registry office works from 9 am to 7 pm. Another factor not accounted for is the time of reaction of people. It may vary and impact the Fastline service rate.

Another point is to compare the Touchscreen and the Fastline. The first can be applied to the existing registry offices and the urban kiosk, the latter only to the registry offices. In a potential dispute, what would be the better option? Regarding service rate, the Fastline is 4.5 times faster. Nevertheless, since it has multiple phases, if we account for, say, 1 meter per phase, it means a total of 5 meters (excluding the balcony), so the question is, in the same 5 meters, would it be possible to have five touchscreen devices? If so, that will mean a service rate of 200 per hour, which surpasses a single Fastline. What about the financial aspect? Would five Touchscreens be costlier than a single Fastline? What about the reliability and the impact of error? Assuming the same level of reliability, the Fastline has a bigger impact of error since a malfunction on a single phase will interrupt all the processes, which means losing 180 services per hour. At the same time,

the Touchscreen would be only 40 service losses per hour. There is no available data to be precise on the comparisons above, but it is a valuable critical thinking exercise.

Nonetheless, in-person attendance should always be the preference for seniors and other groups with more difficulties with self-service. Also, a single queue for multiple servers should always be in place since it does not impact as much as numerous single servers in case of a delay.

8 Conclusion

IRN gives citizens essential services while suffering from workforce shortages and long queues as a public service. The registry offices have always had queues, aggravated by the accumulation of services during the pandemic restrictions. Measures have been implemented to manage and minimize the queues over the years, but the problem was not solved. Some measures were implemented during the internship, such as opening on Saturdays and reopening the spontaneous service, the intervention of activity five, and communication campaigns for alternative renewals.

This work identifies human aging and CC expiration, CC confidential information, personnel deficit and governmental policies, outdated systems and equipment, and the Covid-19 pandemic as the causes that lead to the appearance of queues, some of these causes. Furthermore, analyze the implemented measures compared with the best practices of queue management presented in the literature. Five potential recommendations were formulated based on self-service technologies to imagine a better service landscape that would meet the needs of citizens and IRN service providers.

Managing the queues at the registry offices is essential to provide good public services to the citizens, enhance the reputation of the Portuguese public sector and IRN, and improve the working conditions and satisfaction of the IRN personnel. With that in mind, the present work intends to answer the three research questions, why are there queues at the registry offices? How have the queues been managed? How can the queuing problem be solved or improved so that citizens and the front office can have a better service experience? Queues impact the service providers and the citizens, but the firsts have the competence to minimize the harmful effects of the citizens' waiting experience. For the citizens, waiting in the registry office queues is generally the most unpleasant part of the service.

The main strategies to deal with queues were to reinforce the service capacity of the presential services during the peak of demand by implementing temporary measures such as extending hours, opening one more day in the week, and providing additional locations for renewal and delivery of the CC. Also, to reduce the number of visits to the registry offices by giving alternative ways of

service, such as automatic renewal and online renewal, as well as delivery of the CC at home. IRN measures align with the ideas on demand and capacity management of Sasser (1976), Mudie and Pirrie (2006); Walley and Jennison-Phillips (2017); and APICS (2018). As for local measures, as in activity five, IRN successfully follows the principles of queues psychology and perceptions management from Maister (1984); Larson (1987); and Katz et al. (1991) as well as Wirtz and Lovelock (2022) to organize the queues, manage the perceptions of the citizens and improve their waiting experience at DICCCJ. Alongside those, communication campaigns inform the citizens about the new services and enhance the rate of adoption of those. Also, the optimization of services shared capacity with other public agencies and the constant seeking to implement new service delivery models with the adoption of new technologies in partnership with the government and other public agencies.

Due to the expiration date of the CC, IRN managers know in advance the peaks of demand and plan for it with temporary reinforcement measures. However, although there is a contingency plan, it is still insufficient to guarantee no constant reoccurrence of queues. The long queues during the internship period are explained by systemic factors and the accumulation of services during the Covid-19 Pandemic. This last obliged the IRN to rapidly implement alternative ways of service, with digital self-service at the center; such practices were already in development but would probably be implemented much later.

The human resources shortage and aging are trending in the Portuguese public sector, with the IRN registrars and registry officials leading. This problem is out of the scope of IRN decision-making; IRN can only signalize and request the opening of public tenders to the government. This limitation causes distress and dissatisfaction to workers and citizens since it causes service incapacity. As long as the alternative services do not cover enough of the demand to impact the reduction of the queues, and as long as there is no implementation of SSTs at the registry offices, the services will keep sensitive to the peaks of demand. The dependency on the number of available ROs is the central fragility related to the queues at the registry offices.

Although the primary strategy has passed from reducing the service time to reducing the number of visits to the registry offices by offering an alternative service such as the automatic renewal of

the CC and the CC delivery at home, the next step might be to provide self-service technologies at the registry offices. Self-Service Technologies, perceptions management, and effective communication can be determinants in informing the citizens and influencing their behavior in adopting alternative services and reducing the queues. Also, it augments service capacity and provides flexibility and convenience.

Combining a customer journey analysis, a root cause analysis, and a literature review helped develop the ground for the set of suggestions. Implementing the five suggested measures could change the current landscape of CC services, potentially reducing queues and waiting times, improving the service experience for citizens and workers, and reducing reliance on registry offices.

IRN has a great challenge other than reducing the queues and improving the service experience, which is dissociating its reputation from the long queues.

8.1 Limitations and challenges

This work has some limitations. Indeed, the case study was conducted on only one organization among many within the public sector, which means that the case study and the conclusions cannot yet be replicated. Also, within the organization under study, the data was collected in one registry office among a vast realm of registry offices. The selected registry office is atypical, with exclusive services and service capacity above the many others. The institution studied in this report is extensive, so this study did not cover many services due to a lack of resources and time. Another constraint was that some managers of relevant areas for the topic of discussion were not available for meeting due to the workload of the pandemic. Data access was also a challenge, IRN has many data confidentiality levels, and it was impossible to access relevant reports. Also, the internal documents that the author could explore were not granted permission for use outside the organization's environment and internship activities.

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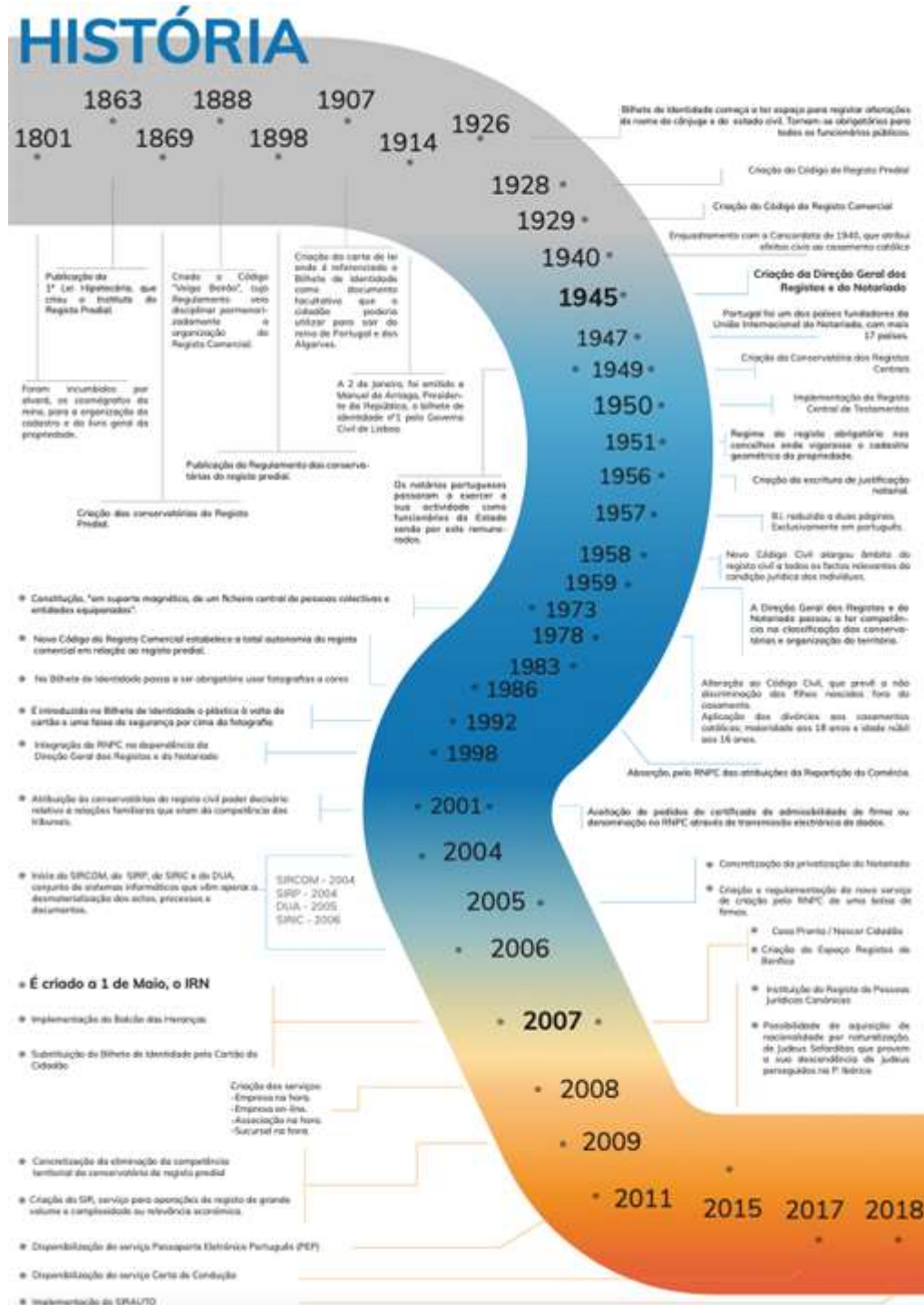
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Appendices

APPENDIX 1 History of the IRN



APPENDIX 2 IRN Job Vacancies Source: IRN Social Balance 2021

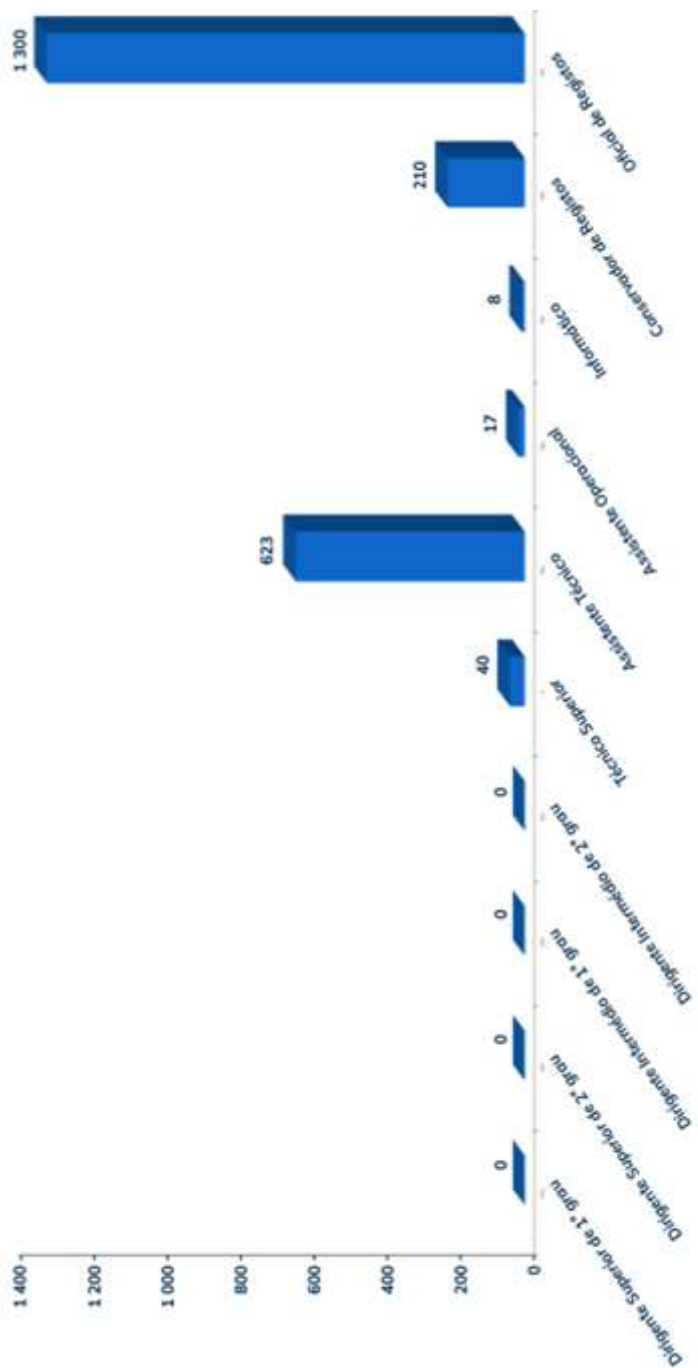


Figura 12 | Postos de trabalho previstos e não ocupados por grupo/cargo/carreira

APPENDIX 3 Root-Cause Analysis Tools and Techniques (Barsalou, 2015, p. 121)

Key: Hypothesis generation: ■ Relationship analysis: ● Process analysis: — Data collection: ‡ Decision making: +	
Tool	Use
Ishikawa Diagram	— ■
Check Sheet with Tally Marks	‡ ■
Check Sheet with Graphical Representations	‡ ■
Run Charts	‡ — ■
Histogram	■
Pareto Chart	■
Scatter Plot	●
Flow Chart	— ■
5 Why	●
Cross Assembling	●
Is-Is Not Analysis	●
Following Lines of Evidence	●
Stem-and-Leaf Plot	●
Box-and-Whisker Plot	●
Multi-Vari Chart	●
Matrix Diagram	●
Activity Network Diagram	●
Prioritization Matrix	+
Interrelationship Diagram	■ ●
Tree Diagram	■
Process Decision Tree Chart	■ ●
Affinity Diagram	●
Parameter Diagram	■ ●
Boundary Diagram	■ ●

APPENDIX 4 Types of Digital Innovations in Government (Barcevičius et al., 2019, p. 20)

Type of innovation	Focus	Goal	Incremental	Disruptive	Authors
Internal process (administrative, system, organisational) innovation	Improvement of quality and efficiency of internal and external processes. Creation of new organisational forms, the introduction of new management methods and techniques, new working methods.	To generate a notable increase in productivity or to drive down costs significantly.	Incremental improvements in the process, optimisation, taking the 'waste' out	Radically new processes introduced	Walker, 2014; Damanpour, and Schneider, 2009; Bessant et al, 2010; EY, 2017; Bertot et al, 2016; de Vries et al, 2016
External process (governance) innovation	Creation of new governance methods, involvement of new actors, new patterns of co-creation and interaction.	To address specific societal problems in a collaborative way, involving stakeholders to achieve better policy outcomes.	Incremental changes in governance means and methods	Introduction of completely new governance forms and actors	de Vries et al, 2016; Bertot et al, 2016
Policy innovation	Improvement in identifying the needs of constituents and shortening the time required to develop, test, implement and diffuse a policy.	To make timely decisions regarding policies that affect government employees and citizens.	Improved policies – e.g. at inputs or activities levels	Completely new policies introduced	EY, 2017; Bertot et al, 2016; de Vries et al, 2016
Service (or product) innovation	Creation of new public services or products or improvement of the existing ones.	To find new ways to offer and deliver services to citizens quickly in a manner that is easy to access, use and understand – and to do so in a cost-effectively.	Improved service/ product – faster, simpler, better quality, etc.	Completely new services/ products	Bessant et al, 2010; EY, 2017; Bertot et al, 2016; de Vries et al, 2016; Misuraca & Viscusi, 2014

APPENDIX 5 Six Sources of Evidence: Strengths and Weaknesses (Yin, 2018, p. 114)

Source of Evidence	Strengths	Weaknesses
Documentation	<ul style="list-style-type: none"> • Stable—can be reviewed repeatedly • Unobtrusive—not created as a result of the case study • Specific—can contain the exact names, references, and details of an event • Broad—can cover a long span of time, many events, and many settings 	<ul style="list-style-type: none"> • Retrievability—can be difficult to find • Biased selectivity, if collection is incomplete • Reporting bias—reflects (unknown) bias of any given document's author • Access—may be deliberately withheld
Archival records	<ul style="list-style-type: none"> • <i>[Same as those for documentation]</i> • Precise and usually quantitative 	<ul style="list-style-type: none"> • <i>[Same as those for documentation]</i> • Accessibility due to privacy reasons
Interviews	<ul style="list-style-type: none"> • Targeted—can focus directly on case study topics • Insightful—provides explanations as well as personal views (e.g., perceptions, attitudes, and meanings) 	<ul style="list-style-type: none"> • Bias due to poorly articulated questions • Response bias • Inaccuracies due to poor recall • Reflexivity—e.g., interviewee says what interviewer wants to hear
Direct observations	<ul style="list-style-type: none"> • Immediacy—covers actions in real time • Contextual—can cover the case's context 	<ul style="list-style-type: none"> • Time-consuming • Selectivity—broad coverage difficult without a team of observers • Reflexivity—actions may proceed differently because participants know they are being observed • Cost—hours needed by human observers
Participant-observation	<ul style="list-style-type: none"> • <i>[Same as above for direct observations]</i> • Insightful into interpersonal behavior and motives 	<ul style="list-style-type: none"> • <i>[Same as above for direct observations]</i> • Bias due to participant-observer's manipulation of events
Physical artifacts	<ul style="list-style-type: none"> • Insightful into cultural features • Insightful into technical operations 	<ul style="list-style-type: none"> • Selectivity • Availability

For better visualization, the page was divided and amplified:

User Story

João needs to renew his CC, and wants to do it presencial.
 He decides to go to the DIC-Campus da Justiça without an appointment.
 He arrives and decides to stand in line. He gets a ticket and is attended to.

Customer Journey

1 Decision	2 Trip	3 Arrival	4 Queue
<p>João thinks that the service will be full and that he will have to wait in a long queue.</p> <p>The subject browses the internet for the closest possible location to renovate his card, as well as the schedule to do so and information on the average waiting time.</p> <p>He does not want to use the automatic renewal service because he assumes that it will take a long time to receive it at home - sense of urgency,</p> <p>He asks his friends and relatives about closer alternatives with smaller queues.</p> <p>He may need to change some information.</p> <p>Although João recognizes a couple of cons, he decides to go to the Civil Registry of Campus da Justiça.</p> <p>Notes:</p> <p>People with 25+ years old and with no data change do not adhere to the automatic renewal service because:</p> <ul style="list-style-type: none"> - They may not want to receive at home because they have already returned to face-to-face work - They need CC/passport urgently. - People with low literacy levels and/or digital literacy - People without a CC reader - Citizens that don't know how to use the digital mobile key. - People that lost the Pin. - Has the pin blocked -The application is not user-friendly 	<p>What will the line be like?</p> <p>I'm going to lose all day to be attended.</p> <p>This is going to be a lottery.</p> <p>Will I have access to a ticket?</p> <p>There could be a way to get the ticket in advance and a way to know how long I will be waiting .</p> <p>Also, a closer place to take care of this.</p>	<p>Sees the queue and does not know at what time will be attended.</p> <p>Panics</p> <p>He gets worried that he might not get a ticket.</p> <p>Is there a system that can track the ticket?</p> <p>He talks to the security guard, because he sees no one available who can give him information.</p> <p>João gets a ticket</p>	<p>Talk to others and think: Why isn't this moving?</p> <p>Is there no one to answer and clarify questions? Is everyone asleep?</p> <p>Incompetence of the civil service. It's always the same thing. Measures, and more measures, and this is it.</p> <p>When will it be my turn?</p> <p>There are people who cut the line, and nobody does anything.</p> <p>Why don't we wait inside? Since they make us wait so long in the queues, the waiting conditions could be better!</p> <p>He thinks: Do I give up?</p>

5 Entering	6 Service	7 Payment	8 Exiting	9 After
<p>Finally!</p> <p>He Thinks : I just want to get this done so I can go home.</p> <p>Do I have everything I need (documents)?</p> <p>Will I be well and quickly attended to?</p> <p>Where should I go to be attended to?</p> <p>After all, there are empty counters. That's why this is not moving forward.</p> <p>Why don't they put more counters with people to attend?</p>	<p>It is attended by an empathetic and friendly employee and all questions are cleared up.</p> <p>The machines don't work they are not being able to take my fingerprints.</p> <p>The pictures they took of me are not good.</p> <p>I am left handed and had trouble signing.</p> <p>Do I have to come here again to pick up my CC?</p> <p>When and how will I receive my CC?</p> <p>If I ask to receive it at home how long will I have to wait?</p> <p>Can they send the CC in digital format ?</p>	<p>So expensive?!</p> <p>I do not want to pay -</p> <p>Do I have to pay right now?</p> <p>The service should be free !</p> <p>How can I pay?</p> <p>MB/Way, cash, check, ATM ?</p> <p>I have an exemption declaration issued by ISS, how should I proceed?</p>	<p>He thinks and comments on how long the whole process took</p> <p>João generates negative comments - Word to Mouth.</p> <p>He thinks it's finally solved, now all that's left is to receive the CC.</p> <p>Will I have to go through this again?</p> <p>Will they meet the deadline?</p>	<p>Awaits CC and Pin letter at home.</p> <p>The CC never arrives?</p> <p>Is there a problem?</p> <p>Who can I talk to for clarification?</p> <p>He goes to social media, websites and forums to ask for clarification.</p> <p>João thinks that he should have chosen to get the CC from the civil registry.</p> <p>Calls the IRN phone lines and contributes to their clog</p>

APPENDIX 7 – Interviews Scripts

Note: Semi-structured interviews were conducted; therefore, some freedom was given to the interviewees to comment on their experiences while maintaining the interview conversation within the topics of interest mentioned.

Citizens in the queue (CQ): Comments on their experience attending the Registry Office (DICCJ).
Waiting experience.

Citizens leaving (CL): Comments on their experience attending the Registry Office (DICCJ).

Security Guards (SG): Their relation with the queues, responsibilities, and how they see the implementation of activity five on DICCJ.

Registry Officials (RO): Main concerns and opinions regarding the service and the queues at the registry office. Also, their views on activity five.

Registrars (R): Main concerns and opinions regarding the service and the queues at the registry office. Comments on activity five.

Managers (M): How have the queues been managed, and why were handled that way? Are the queues an issue to be addressed or not? Their opinions, and critics, on what should be done or not. Priority of the queues as a problem to be solved (or not) within the context of the IRN. Other comments, feelings, and ideas.

Senior Technician 1 (ST1): What do people ask, comment, and do on social media platforms? Asking about communication, her role, and insights on external information regarding the CC services and IRN reputation.

Senior Technician 2 (ST2): CC legislation, rules, restrictions, connection with the CC service delivery, root causes of restrictions in CC renewal and delivery services.

APPENDIX 8 – Selected Answers from the Interviews with the citizens in the queues at DICCJ for CC services

Notes: Following the label of the interviewee, it is the information in parenthesis regarding the type of service and whether it was spontaneous or scheduled.

CQ1 (Service: CC Delivery, Spontaneous)

“I could not schedule the service for a date that I needed, so I came here”; “The queue does not advance.”

CQ2 (Service: CC Delivery, Spontaneous)

“I took a day from work to come here, and I do not know if I am going to be attended.”

CQ3 (CC Delivery; Spontaneous)

“It is painful to be here waiting; we are in 2021 and still have to wait in a queue. Why is there not a digital ticket?”

CQ4 (Renewal under 25; Spontaneous)

“Days before I came, I tried to call several times, but when someone attended, the call went down, I tried again without success, so I decided to come here.”; “There should be someone here providing us information”; “I do not know how much time I will have to wait; should I quit? And try another day? What do you think?”

CQ5 (1st CC; Scheduled)

“Why the security agent does not provide me with information?”; “Why are some people being attended before me?”

CQ6 (Renewal under 25; Spontaneous)

“I arrived at 7.30 am, and I still have a lot of people in front of me.”; “Waiting under a shadow is okay; I do not want to be here when the sun appears”; “I can only imagine how it is to wait here in the winter.”

CQ7 (1st CC; Scheduled)

“I do not understand, they told me my name will be called, but I am waiting for an hour.”

CQ8 (CC Urgent)

“I came from another service; they told me to come here since I am going to travel tomorrow.”

CQ9 (CC Urgent)

“I hope the service will be fast.”; “Will I be well attended?”

CQ10 (Delivery; Spontaneous)

“I have been waiting for 2 hours, and I am distraught! There is no one to help?”; “I wish I had gotten an appointment, now I would wait less time, but everything was booked.”

APPENDIX 9 - Selected Answers from the Interviews with the citizens leaving the Service after being attended at DICCCJ

Notes: Following the label of the interviewee, it is the information in parenthesis regarding the type of service and whether it was spontaneous or scheduled.

CL1 (Renewal under 25; Spontaneous)

“I missed my classes today.”; “The waiting was complicated until I finally entered the building; I was excited when about to be serviced.”; “The attendant listened to me; that was nice of her.”; “I hate the picture they took me.”

CL2 (Delivery; Spontaneous)

“I am relieved because it is done, but to wait 2 hours to be attended for a service that takes 2 or 3 minutes is not acceptable.”; “They could at least give us reasonable waiting conditions instead of making us wait in the sun.”; “But I am not surprised; Public Service is the same incompetence repeatedly.”

CL3 (Delivery; Scheduled)

“I do not understand why they scheduled me for this date when the spontaneous service is already available.”; “I waited months to get my CC.”; “The attendants seem to know the pains of us citizens; well, it cannot be easy for them either.”

CL4 (Urgent; Spontaneous)

“Since I am in an urgent situation, I expected to be attended faster, but they told me there were other people in the same situation, so why do I have to pay so much?”; “I also saw empty counters; why do they not put more people attending?”

CL5 (1st CC; Scheduled)

“It was not easy to get an appointment, and the date available was two months after.”

“Also, they should improve the communication; I had to call several times because no one was attending my calls.”; “I do not know how much time I will have to wait to receive my CC. I cannot receive it at home.”

CL6 (Urgent; Spontaneous)

“We have to wait for so long under the sun, and then we have to pay for a service that should be free!”; “I had only two options, and Lisbon is closer than Porto; nonetheless, both are far, they must open this type of service in other areas.”; “The only good thing about the service was the person who attended me.”

APPENDIX 10 - Interviews with the workers: Security guards (SG); Registrars (R); Registry Officials (RO); Managers (M); Senior Technicians (ST)

SG1

“Our job is to assure the safety and to guarantee that the service operates normally.”; “We do more than vigilance; we try to inform the citizens at the entrance.”; “It is usual to have queues 2 hours prior to the opening time.”; “Sometimes people work in a group so that people individually do not have to spend all the time in the queue, and; “ We are the first contact the citizens have.”; “The reopening of the spontaneous service brought big confusion to the queues.”; “I believe the new organization of the queues contributes to a better organization, with more order and fewer conflicts.”

SG2

“Our mission is to ensure an orderly entry of service, ensure the safety of employees and citizens, and ensure a safe environment at the entrance by identifying and regulating situations of greater emotional unrest.”; “Sometimes we see people come here at night to be first attended in the morning.”; “Many citizens see the queues and leave”; “When the conflict escalates, we communicate to the nearest police agents because we cannot always minimize the aggressiveness of some citizens.”; “I think the changes applied to the external waiting area are a success because there are fewer people constantly asking where to stay or how long it will take to be attended. Those changes helped us work better since people are now more cooperative.”

RO1

“People have difficulties registering the fingerprint; it is often repetitive because people are not able to do it the first try, and this not only delays the service but is a source of frustration.”; “Part of our job is to listen to people; some people like to talk a lot.”; “It has been easier to deal with the citizens since the diagrams were implemented.”

RO2

“I think we have a lot of workloads to compensate for the lack of HR.”; “The equipment is old and outdated, sometimes the software stops, and we need to restart the computer, which takes about 5 to 10 minutes.”; “As for data collection, it takes around 20 seconds for the fingerprint, 15 seconds

for the photo, and 10 seconds to sign, but to confirm, substitute, and add information can take two or more minutes.”; “People often complain about the facial photo.”; “The recent configuration of the queues is helping the citizens but is also blocking our service entrance.”

R03

“People arrive at us after waiting hours outside, and we know they are suffering, so we try to comfort them and show consideration during the service; we often speak of daily things with the citizen, topics that have nothing to do with the service.”; “We advise citizens to arrive before the opening hours to avoid standing in queue for too long.”; “I do not yet have an opinion on the changes in the queues.”

R04

“For me, the biggest problem is the workload.”; “People have some difficulties in using the machine for collecting biometric data, they often need to repeat it, but that is not the worse in terms of time waste. The biggest time waster is the software when accessing the databases and working on the computer system, especially when confirming the citizen's identity and preparing the system to collect the biometric data.”; “Sometimes we deal with angry people, exhausted, complaining; we need to manage that all day long.”; “After the new organization of the queues, the citizens seem to arrive less anxious.”

R1

“I have huge difficulties managing my collaborators during the summertime because it is always the peak of demand and many workers want to go on vacations or take a medical leave. It is a true challenge to deal with the circumstances of having the highest number of work volume and the lowest number of workers.”;

“The queues are longer than the previous summers, but perhaps it is just related to the fact that we cannot put so many people inside and also because the queues were not so organized, people used to get around the entrance like a semi-circle.”;

“We usually have more work at the beginning of the week, but with the Open House on Saturday, things changed, the volume of visits diminished on all the weekdays, while Saturday is usually the busiest day; I think it is just more convenient for people.”;

“At the current situation, we close the spontaneous service usually at 11 am, keeping up with the scheduled services, the priorities, and the CC pick-up services, then we close all services, and we leave the last working hour only for the citizens to pick up their CC.”;

“The audio system with microphone and speakers significantly improved our work because the citizens are no longer constantly checking with the security guards since they know their turn will come when their names are announced.”;

“There should be one more queue for the highly urgent cases of people traveling within the next 48 hours.”

R2

“Our facilities have 25 balconies, but usually we have 15 to 20 operating due to lack of personnel. We had even fewer balconies operating during the pandemic when we were only working with appointments, but that occasion is understandable.”; “We, Registrars, feel the necessity to have more train on managerial practices, since our background in law school some management formation would be a plus, mainly in crises.”;

“The informatics systems and the machines that collect the biometric data need to be substituted.”;

“Our registry officers often take some rest days due to burnout and emotional stress, and then we get even shorter in personnel which translates to less service capacity and bigger queues, I believe.”;

“The peak of the queues is usually at 6 pm, but at 10 am is also complicated.”; “The lunchtime period is when the queues start to diminish significantly, then they grow at 4 pm, and then they grow even faster at 5 pm. I believe this is related to the lunch period and the time people leave their work.”;

“We know people are desperate for feedback, but we cannot create an information point near the queues because we cannot afford to allocate any of our registry officials; it would mean less service capacity, and we are already in shortage of people.”;

“The outdoor signs are helping to harmonize the people waiting in the queues; people now know better where to stand and orderly wait their turn and the queues advancement. That is a huge difference from the time before the space intervention. People used to agglomerate around the entrance, making the different lines and order unclear, which frequently lead to verbal conflicts

and physical confrontations.”; “I am not the regular citizen that waits in the queues to be served, but it seems that the waiting conditions were improved.”

M1

“My perspective on the queues is to approach it based on prevention and communication. I also believe that simplifying the processes and a better internal organization between departments is important; much of the service improvements can start at the back-office.”;

“I believe we should implement new technologies to facilitate the clarification process of the citizens, but I do not have a specific idea to improve the queues.”;

“I believe communication can greatly influence the citizens' behavior since a well-informed citizen will not rush into our registry offices without first considering other alternatives.”;

“My team and I were responsible for understanding why only 20% of the population adhered to the CC automatic renewal since it encompasses 40% of the population. Our surveys revealed three main reasons: people do not want to receive their CC at home because they are back to presential work, so there is a probability that they are not at home when the CC arrives. Since the CTT services operate only until 6 pm, many CC ends up at the registry offices. The second reason is that people do not want to wait so long to receive it at home and risk not knowing where their CCs are because they are aware that there are expressive delays in the delivery; the lack of capacity of INCM cause these delays, the last reason is the fact that many people were not aware of this possibility.”;

“We have different informatic systems instead of a common platform, and there is a lack of systems interoperability; it makes the processes slower both in the back and front office.”

M2

“In my view, not much was done to solve the queues. When a big problem occurs, it is assessed through governmental intervention, so I do not see IRN as responsible for the big decisions; yes, we have improved the waiting conditions in our service facilities at Campus da Justiça. Still, I do not see much more than that.”;

“People are willing to wait 30 minutes in a queue; keeping the waiting time under that should be our main goal.”;

“From my point of view, the queues are perfectly solvable. The solution might be integrating technology, communication, and good design.”;

“There are not many people available for hiring.”;

“I like the idea of the self-service printing machine, not only because the citizen can do it himself but also because it eliminates the step of printing it at INCM.”;

“Our digital services are sophisticated and change how we operate, but they still have some limitations since some high-volume services cannot be done through them.”;

“Another alternative can be to reallocate human resources from the central services to reinforce the service delivery at the registry offices during the peak demand.”

M3

“The queues had always existed and will always exist.”;

“I think it can be controlled but not solved.”;

“Also, our focus should not be trying to solve the unsolvable.”;

“The key reason for the queues is the huge deficit of human resources. Many of our colleagues are aging and retiring; the others are bored, exhausted, and unmotivated since it is too much work for a few people. Moreover, it is not easy to hire people because that depends on governmental policies. The government believes that there are enough people and does not open public tenders as often. Also, public tenders are uneasy and take time. Finally, because the career is no longer attractive, the pool of candidates is insufficient for the job vacancies.”;

“The technological approach can be a great deal internally, but I do not imagine it succeeding at a service level since our population has many seniors. I tried those self-service machines at a supermarket and could not do it.”;

“Regarding the pandemic, we reacted instead of planning because there was not much time to make decisions, and it is a complex issue; things were always changing.”

M4

“As for the queues, I do not see it as a problem but rather something natural that always existed.”;

“I am quite optimistic; the queues can indeed be highly improved, but I think we are already on the right track; the present situation is merely an effect of an atypical event, the covid pandemic.”;

“What worries me the most is the damage to IRN's reputation, how we are viewed in the eyes of the citizens. More specifically, the occurrence of conflicts in the queues might attract journalists.”;

“Since we have a registry office nearby our headquarters and both are part of Campus da Justiça, which is one of the most mediatic places in Portugal, it is common for the media to come in times

of peak demand and spread the news, criticizing the long waiting hours, and showing the queues, projecting a gruesome image of IRN. The truth is that it is not always like that. In the end, people focus on the negative aspects, the long queues in the worst times, but are not grateful for all the measures we implemented to facilitate their lives. To me, the narrative passed in the news is unrealistic and unfair.”;

“I believe the current situation will pass, and things will be even better than before; we need to solve the volume of accumulated services during the lockdown.”;

“The problem we face right now is that the pandemic coincided with a year of a huge volume of renovation; we usually prepare for these types of years because the cycles of renewal every five and ten years are known, but the pandemic situation made everything more challenging.”;

“Implementing new technologies will augment our service capacity and make life easier for our citizens and staff.”

M5

“Regarding the queues, it always looked like something to control and improve; we have departments that analyze and predict the peaks of demand; that is very useful but is not enough to prevent it.”;

“We had a prototype of a self-service printing machine that was able to print the CC at the moment, but that self-service machine was financially unviable.”;

“In the last years, we have developed our service through the implementation of new technologies and constant updates, and we were successful in reducing the service time but also in offering alternative services to reduce the number of necessary visits to the registry offices, those have been our two major strategies.”;

“The pandemic has been a great opportunity to accelerate the digital transition of our services, mainly because our main strategy has been to reduce the number of visits to our registry offices.”;

“We work hard with the government to keep improving the service, but we are a huge institution, and sometimes the changes take longer to implement.”;

“We also look at our registry offices landscape and analyze service demand and capacity in different geographical areas. Although it takes time, we constantly work on it since demographic changes always occur. From there, we can decide to split, merge, close, or open new registry offices.”;

“I think the government should have informed us more than just one week in advance of the reopening date of the spontaneous service.”

ST1

“Part of my work with social media is to analyze the comments and publications related to the words: IRN; Cartão de Cidadão; to extract insights related to how the citizens view our institution. I also answer messages from people looking for clarification, giving us insights into what is not working so well.”;

“People contact us through Facebook as a last resource when they cannot reach the telephonic lines.”;

“The types of questions are usually the same, although sometimes depends on the trend, if a new service is available, or changes occur, also depending on the time of the year.”;

“Some people ask where their CC is located, usually because they have been waiting for weeks, or months, to get it. Other people ask for clarification on the proceedings; usually, they are confused and do not know how to do things or where to go. Also, some people reach out hoping for alternatives and tips.”;

“Regarding the publications, the main critics are about the queues and the waiting time to be attended, the impossibility of reaching our telephonic lines, and of having to wait more than a month for an appointment.”;

“From times-to-times people express their feelings and talk about conflicts that occurred.”

ST2

“The reason why the CC has a validation date is due to the natural changes in the biometric data of the citizens. Also, those changes occur rapidly till 25, which is why the renovation of people under 25 must be done in our registry offices.”;

“The CC is renewed every five years till age 25, and then every ten years.”;

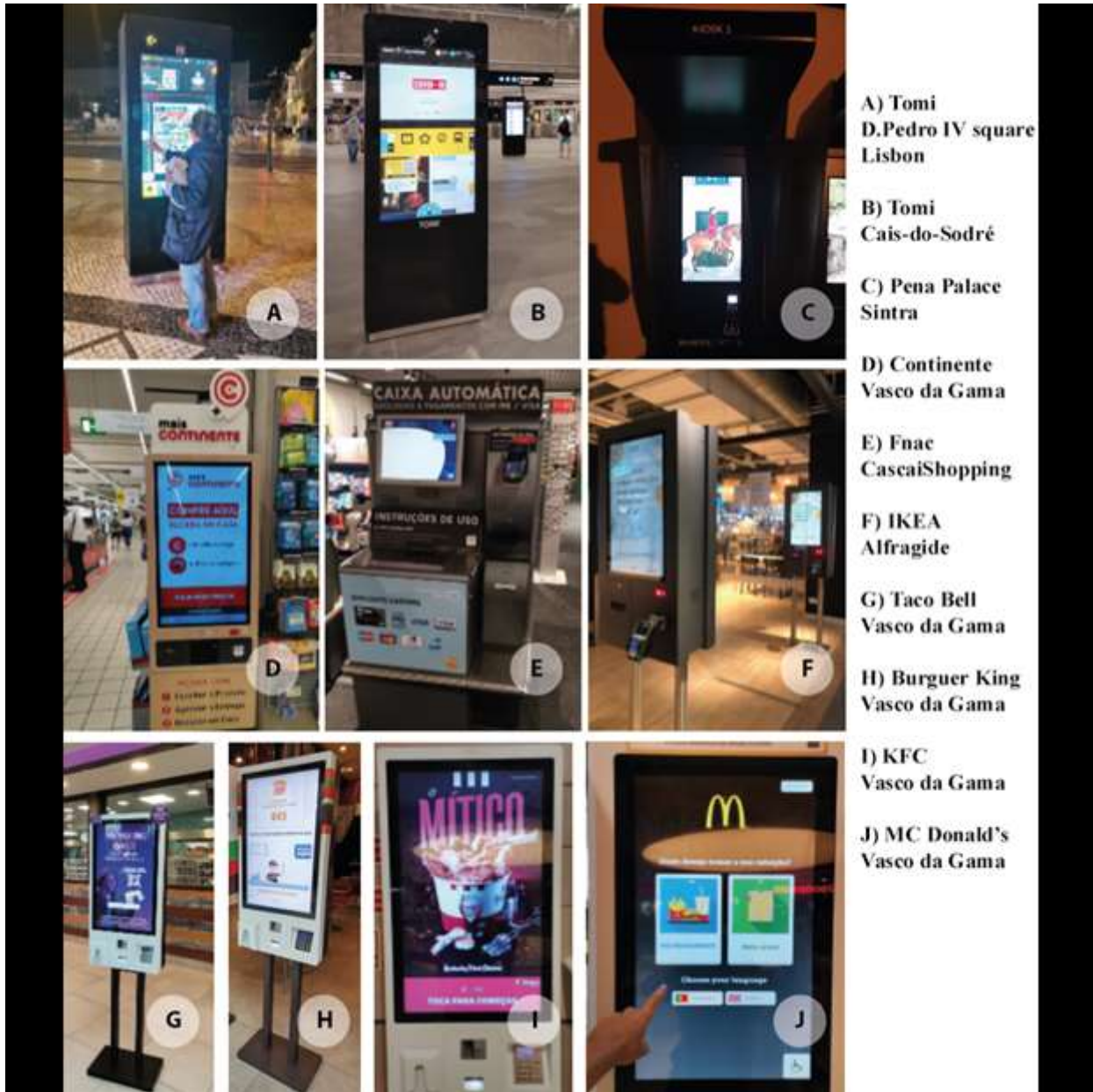
“It must follow the principles of authenticity and inviolability, meaning that it has to guarantee that the document is truly representative of the true individual as a citizen and that the process cannot be manipulated.”;

“The law number 7/2007 of 5 February article 20º Section II article 27 point 5, states that the collection of biometric data for the CC should be taken in the spaces designated by IRN... it is

possible to create an alternative place of service...first, it is important to change the current law in vigor in a way that coadunate with the alternative services you present. Second, it is important to obtain the opinion of the entities which previously pronounced about the system in place.”;

“Regarding the CC photo, since the process of the physical creation of the CC is the responsibility of the INCM, there are multiple check phases; therefore, anything that goes wrong can be signalized so that the emission is canceled and the citizen can be informed of the need to retake it, so I do not see any trouble with that.”

APPENDIX 11 – Ten examples of Self-Service Technologies in the Lisbon Metropolitan area Source: Self-elaboration



APPENDIX 12 – Photos of the queues on the Campus of Justice (DICCCJ)

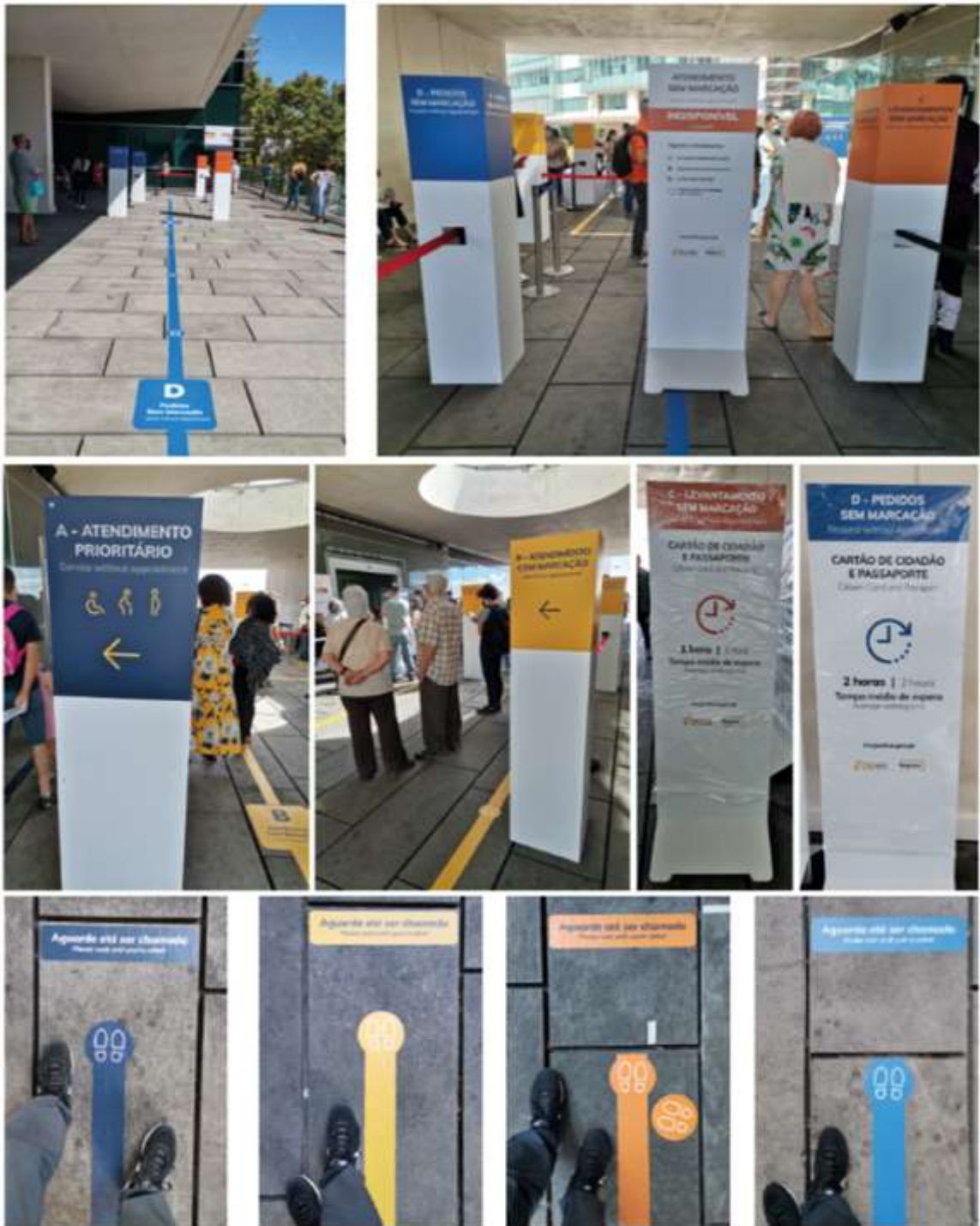


August 18, 2021 5:28pm



September 3, 2021 8:53am

APPENDIX 13 Design Signage equipment implemented for organizing the queues at Campus da Justiça, Lisbon

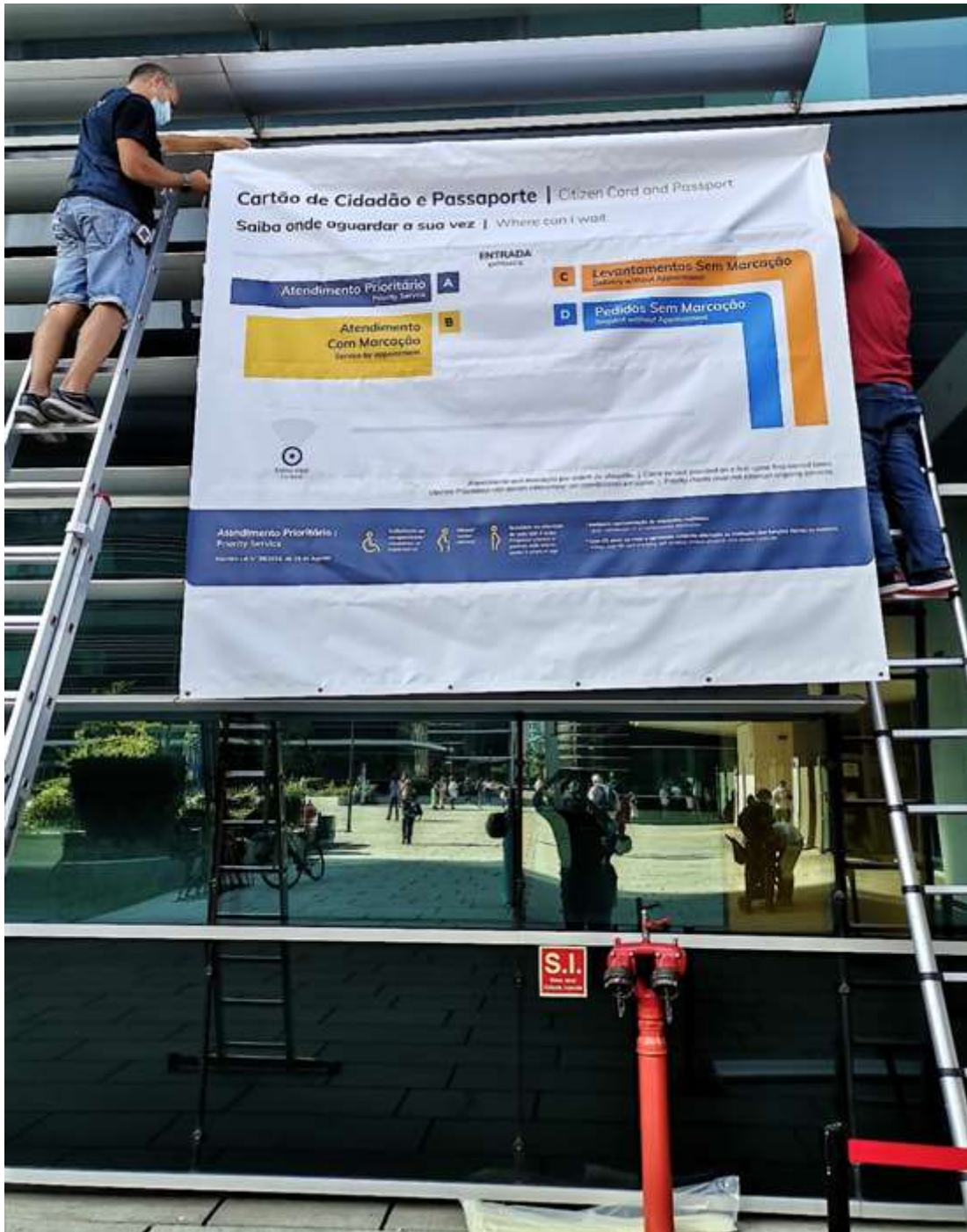


APPENDIX 14 One of the diagrams applied for organizing the queues at Campus da Justiça, Lisbon



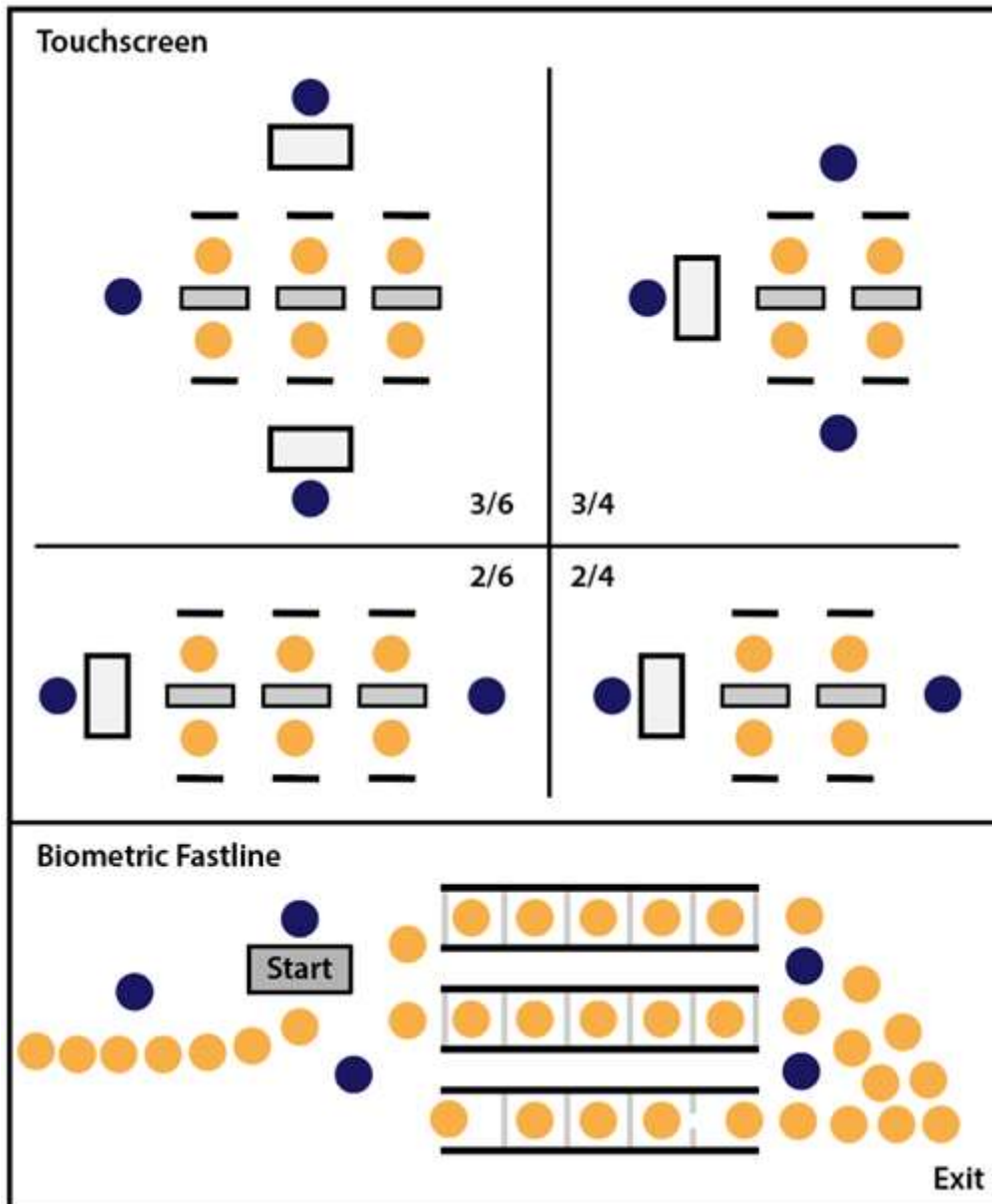
APPENDIX 15 The assembly of one of the diagrams in the Civil Registry Office of Campus da Justiça, Lisbon

Date: 27/08/2021



APPENDIX 16 Touchscreen and Biometric Fastline top view illustration Self-Elaboration

Notes: The Registry officials are represented in blue, and the Citizens in yellow. The worker-to-citizen ratio is also presented for the Touchscreen service. The Illustration is not in scale.



APPENDIX 17 – Potential impact of the proposed measures on the customer journey. Source: Self-elaborated, based on the customer journey and SSTs advantages from literature

