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Customer Uncertainty:
a source of organizational inefficiency in the light of the Modularity Theory of the Firm.

A dissertation submitted to the doctoral school of
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ABSTRACT

Over the last century, customers have become increasingly uncertain about how to be satisfied because of the growing complexity of their own needs. On the one hand, most of standardized needs have been satisfied, on the other hand, worldwide demand for intrinsically complex needs (such as health care and long-term care) has increased especially because of population ageing. On the provider side, producing on the basis of a foreseen demand has become increasingly difficult and customer uncertainty has become a source of inefficiency for the organization. Nevertheless, in the theories of the firm so far developed, the customer is still a missing player, confined in the position of a 'rational agent'.

This research discusses whether and how organizational efficiency is impacted by customer's uncertainty in taking consumption decisions when the need to satisfy is complex. The central issue is to understand when it is efficient for the organization to involve the uncertain customer in the production process and, accordingly, which organizational form is the most effective in managing such involvement. Today, the lack of clarity on this theoretical issue has permitted, or even backed, in important sectors, an incautious adoption of mass-customization, that is the possibility for customers to choose exclusively among standardized options, without suitable consideration for both need complexity and the organizational form. My dissertation is organized in three chapters. In the first chapter I propose a theoretical framework on the basis of the Modularity Theory of the Firm (Langlois and Robertson 1995; Langlois 2002, 2006; Baldwin and Clark, 2003; 2006), which allows identification of the most effective organizational types to face customer's uncertainty. In the second chapter, I study what is the most efficient way to design and manage production processes in the presence of uncertain customer needs, implying the necessity to involve customers themselves in the production process. The focus here also is on the design and management of long term care (LTC) services. In the third chapter, by adopting theory building from case study methods (Eisenhardt, 1989, Yin 2003), I analyse five LTC organizations belonging to different categories of modularity and characterized by different governance forms in order to investigate the relationship between organizational and production efficiency.

Summarizing results, the thesis firstly theorizes that cooperative governance (internal organization of labour based on inclusion, participation and horizontal relations) is the most effective in minimizing dynamic transaction costs and the related unexpected production costs (damages, errors, waste of time, legal actions) thanks to developing capabilities related to how to satisfy customers' complex needs. Particularly, workers' accountability supports a learning by doing process that allows lifelong learning and the necessary flexibility to adequately meet customers' needs. Secondly, the study proposes a blueprinting approach to service design and management, which allows front office/back office separation to improve management efficiency. This structure is particularly suited at supporting decision-making processes in a flat organizational structure (such as the cooperative one), as it makes clear the workflows' processes and who is responsible for what. Thirdly, it empirically applies the theoretical results to situations of long-term care with customer uncertainty and shows how services should be designed in order to maintain a low level of unexpected production costs.

Key words: customer uncertainty, cooperative governance, modularity, long-term care services

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LIST OF ABBREVIATIONS

ADL	Activities of Daily Life
CU	Customer uncertainty
DTC	Dynamic Transaction Costs
EE	External Efficiency
IE	Internal Efficiency
ICT	Information and Communication Technology
LTC	Long Term Care
MTF	Modularity Theory of the Firm
NIE	New Institutional Economics
OECD	Organization for Economic Cooperation and Development
PC	Production costs
UPC	Unexpected Production Costs
UPC_1	Unexpected Production Costs of First type
UPC_2	Unexpected Production Costs of Second type
WHO	World Health Organization

INTRODUCTION

L'agitation et la chasse est proprement de notre gibier, nous ne sommes pas excusables de la conduire mal et impertinemment – de faillir à la prise, c'est autre chose. Car nous sommes nés à quêter la vérité, il appartient de la posséder à une plus grande puissance. […] Le monde n'est qu'une école d'inquisition[1]*.*

(Michel de Montaigne)

Une amélioration méthodique de l'organisation sociale suppose au préalable une étude approfondie du mode de production, pour chercher à savoir d'une part ce qu'on peut en attendre, dans l'avenir immédiat et lointain, du point de vue du rendement, d'autre part quelles formes d'organisation sociale et de culture sont compatibles avec lui, et enfin comment il peut être lui-même transformé[2]*.*

(Simone Weil)

The aim of this section is to introduce the readers to the essentialities of this thesis.

It firstly describes the role of the customer as an important environmental component that affects the organizational performance due to the increased complexity of the customer's needs, with also a focus on long term care services. In addition, this section explicates the research gap, aims, and purpose of the thesis. Finally, the positioning of the thesis is described and the structure of the thesis is presented.

1.1. THE BACKGROUND AND THE RESEARCH GAPS OF THE THESIS

The role of the customer has radically changed since the beginning of the 19th century. In the Western countries, long time has passed since the customer was satisfied with standardized and anonymous mass products and services. Consumption opportunities have expanded and customers' needs and desires have become so complex that customers have become 'uncertain' in making consumption decisions. On the provider side, the variety of products and services is largely increased in connection with increased competition and the opening up of the markets to the globalization phenomenon. Most of the standardized needs have been satisfied and producing on the basis of a foreseen demand has become increasingly difficult. Moreover, worldwide demand has been growing for intrinsically complex needs such as health care and long-term care because

[1] "*To hunt after truth is properly our business, and we are inexcusable if we carry on the chase impertinently and ill; to fail of seizing it is another thing, for we are born to inquire after truth: it belongs to a greater power to possess it. […] The world is but a school of inquisition."* (Michel de Montaigne, *The Essays* translated by C. Cotton)

[2] *"A methodical improvement in social organization presupposes a detailed study of the method of production, in order to try to find out on the one hand what we may expect from it, in the immediate or distant future, from the point of view of output, and on the other hand what forms of social and cultural organization are compatible with it, and, finally, how it may itself be transformed."* (Simone Weil, *Reflections concerning the causes of Liberty and Social Oppression*, translated by A. Wills and J. Petrie)

of population ageing; such needs - complex because they involve not well defined cognitive, social and psychological components - limit the customer's ability to understand how to be satisfied. In this context, the organizations' challenge is to involve the customers (in particular their idiosyncratic knowledge) in the production process while maintaining the costs under control. To this regard, a valuable instrument is modularity insofar as it is used not just to mass-customize products and services[3] but firstly to efficiently manage customer uncertainty. Thus, in this empirical and theoretical context, it is placed our research. The aim is to understand how the organization – at governance, service design and management levels – efficiently apply the modularity principle in the management of the relationship with the customer who is uncertain about how to satisfy his/her own complex needs[4].

1.1.1. CUSTOMER UNCERTAINTY (CU)

Customer uncertainty (CU) related to the satisfaction of complex needs, has received most of attention by service management scholars (Bowen and Jones, 1986; Larsson and Bowen, 1989; Pitt and Foreman, 1999), has been partially recognized by economists (Lancaster 1971; Stigler and Becker 1977), but has been only marginally considered in the organizational literature (Ulwick, 2002; Cui and Wu, 2016). Despite, it can be regarded as a specific kind of environmental uncertainty, its role for organizational (in)efficiency is still an open question. Consumers are source of uncertainty as they themselves are uncertain in taking consumption decisions. No longer regarded just as a 'rational agent' – the customer is not endowed with all the knowledge required to maximize his/her own utility (Lancaster 1971; Stigler and Becker 1977) and, hence, needs to acquire or develop capabilities to take consumption decisions (Langlois and Cosgel, 1996). Confronted with this type of environmental uncertainty, the organization needs to redefine its boundaries and its internal structure as the interaction with the customer can affect the organization's economic performance, especially when the client, because of need complexity, cannot easily acquire consumption capabilities on the market, but needs to be helped by the organization to develop them. Even though in the organizational literature uncertainty is

[3] Mass-customization is here regarded as a production strategy that allows to produce a customized product/service by mixing and matching standardized modules. Different matchings of similar modules generate customized products and services.

[4] Organization modularity concerns the design of the interactions among organizations' units and depends on the repartition of the ownership rights (decision rights, alienation rights, residual claims on income) in the same hands (leading to a modular market) or in different hands (leading to non-modular firms) (Langlois, 2002).

considered a fundamental source of transaction costs (Williamson, 1975), the one related to the customer is only marginally faced. Organizational scholars regard the client mainly as potential co-producer of innovation thanks to the knowledge transferred (Brusoni and Prencipe, 2001; Ulwick, 2002; Cui and Wu, 2016). By adopting an evolutionary perspective, the consumer is taken into account as potential support to the organization's survival and not also as source of production (in)efficiency and, through that, of organizational (in)efficiency. Because customers are frequently present and participate in the production of their own services, this type of uncertainty is a variable mainly studied in service marketing. In particular, several studies have analyzed the *organizational climate-customer satisfaction* link in organizational performance both in a theoretical and empirical way (Zeithaml, 2000; Schneider and White, 2004; Schneider et al. 2005), but only few scholars have studied how the organizational structure should change in presence of customer uncertainty for efficiency reasons (Bowen and Jones, 1986; Larsson and Bowen, 1989; Pitt and Foreman, 1999). Moreover, such studies neglect the role of organizational capabilities to face customer uncertainty as they adopt a static theoretical framework: non-standardized knowledge transfers within the organization and with the customer are not considered as a potential source of production and organizational efficiency.

1.1.2. ORGANIZATIONAL MODULARITY TO FACE CU

The Modularity Theory of the Firm (MTF, Langlois and Robertson 1995; Langlois 2002, 2006; Baldwin and Clark, 2003; 2006), based on the dynamic capability approach, provides a fundamental framework to understand how the economic organizations can support the customer when taking consumption decisions and, hence, efficiently manage customer uncertainty. According to the MTF, ownership rights are a fundamental source of modularity that efficiently manage uncertainty thanks to *information hiding* and the *encapsulation* of non-standardized knowledge transfers within non-modular organizations (Langlois, 2002). The *non-modular* firm and *loosely coupled* networks are more efficient than the *modular* market to manage non-standardized knowledge transfers and sustain the development of capabilities required to promote innovation activities. In a creative environment, non-standardized knowledge transfers may support innovations such as an outstanding fashion design, a new battery technology for a mobile phone, an original and cost-effective reorganization of a service (Osterloh and Frey, 2000). However, knowledge transfers with the customer and among employees matter also to develop a personalized product or service such as a dress or a treatment having at the same time medical,

psychological and social characters. However, the MTF does not specifically analyze customer uncertainty and, hence, the problem of developing capabilities to help the customer to take consumption decisions during the production process. Consequently, also the relationship between organization and production efficiency is not adequately investigated. Even if Langlois provides the theoretical background to analyze such relation by adopting a *functionalist* definition of organizational efficiency (Langlois 1984), it is unclear how the organization is *functionally* efficient to promote production efficiency. Moreover, the definition of production efficiency is based on the concept of allocative efficiency which does not allow to consider that some costs can occur 'unexpectedly' because of the lack of organizational capabilities. In fact, the assumption about given resources and static production function cannot be maintained when production cannot be completed without additional and emerging knowledge in the interaction between customer and producer. Consequently, the theory does not identify any indices of production efficiency to measure the role of different organizational structures on the efficiency of the production process. In fact, even the theoretical papers concerned with the potential efficiency of the system in presence of CU (Bowen and Jones, 1986; Larsson and Bowen, 1989; Pitt and Foreman, 1999), focus only on the static transaction costs and not on the unexpected production costs that different organizational structures may induce by more or less preventing knowledge transfers in the interaction with the customer. In a static framework, the problem of identifying new productivity measures does not emerge. Nonetheless, many service management studies identify, especially on an empirical ground, the existence of a causal relationship between customer perceived service quality (implicitly related to the type of knowledge transfer with the organization) and financial performance (Zeithaml, 2000; Rodney and Wright, 2004; Vogel et al. 2008; Liu et al. 2015) suggesting, hence, the use of financial measures, such as revenues, as potential candidates to quantitatively measure the relationship between the organizational structure and CU. Moreover, since scholars have identified the existence of a causal relationship between employee behavior, customer outcomes and organizational performance (Hacket 1989; Subramony and Holtom, 2012), other measures such as turnover and absenteeism could be eligible indices (Hacket 1989) to understand whether the internal organizational structure has a role in the management of knowledge transfers with the customer. To this regard, the support given by the system of incentives (expressed by the ownership rights) to the non-standardized knowledge transfers among providers to face CU is partly neglected in the MTF. But, as the behavioral literature on extrinsic and intrinsic motivations shows (Frey 1997; Osterloh, Frost and

Frey 2002) the organization has to provide incentives to intrinsic motivations since employees' contribution in tacit knowledge transfers (and, hence, also in the development of capabilities) cannot be measured (problem of asymmetric information). Similarly, in management studies an analysis of the link between the internal organizational structure, employee behavior and the efficient management of CU still lacks. The only exception is the work of Pitt and Foreman (1999), which posits the importance of internal marketing to face customer uncertainty by treating the employees as internal customers (Pitt and Foreman, 1999). However, such study, building upon the static framework offered by Bowen and Jones (1986), is unable to take into account the important role of the knowledge transfers among workers and with the customer for the satisfaction of the customer's complex needs. Finally, unexplored is the relationship between organizational modularity and product modularity in case of CU. While Sanchez and Mahoney (1996) focuses on the conditions under which product modularity enables organizational modularity; within the Modularity Theory, Langlois (2002) highlights that the relation is not deterministic and, in particular, that environmental dynamicity (economic change) intervenes in defining the modularity level of the production process and, hence, of the organization. However, in case of CU, such relation is mediated (and made complex) by the complexity and variety of the customers' need, which – being factor to be integrated in the production of services- may make different organizational forms more or less functional to reach production efficiency over time. The issue to investigate is not whether and to what extent modular products design modular organizations and vice versa, but to what extent need complexity allows to efficiently modularize product/services and the organization.

1.1.3. SERVICE DESIGN MODULARITY TO FACE CU

Service management and marketing literature will help us to investigate service design and management levels thanks to their focus on the role of the customer as input and as co-producer in the production processes (Bowen and Jones 1986; Larsson and Bowen 1989; Pitt and Foreman 1999; Ojasalo 2003). Even if customers can be involved in the production process of goods, in services the simultaneity of production and consumption necessarily involves at least the presence, if not the active involvement, of the customer at the moment of production. Such literature, hence, will provide us useful conceptual tools to gain insights into how the service system should be designed and managed in order to satisfy customers' complex needs. The main issue is investigating what is the balance between customization and standardization and, in

particular, what is the efficient modularization level in service design to satisfy unique customers' needs. As the customer introduces uncertainty in the production process both as input and as co-producer (Bowen and Jones, 1986; Ojasalo, 2003), it is evaluated as efficient to separate the activities between the front-office ones that involve the customer, from those that can be done in back-office (Larsson and Bowen, 1989). However, literature on service modularity seems to have not accepted such suggestion. At the service design level, the modularity principle – largely identifiable with the platform approach (Meyer and de Tore 2001; Meyer et al. 2007; Pekkarinen and Ulkuniemi 2008, Baldwin and Woodard, 2008) – identifies only standardized interfaces to manage the interaction with the customer. In continuity with product design in manufacturing settings, the service modularity principle has been developed in sectors such as logistics, banking, ICT, automotive, namely product-related services addressing clearly definable users' needs (Pekkarinen and Ulkuniemi 2008; Lin et al.2010, Zhou et al. 2010; Bask et al. 2010; Bask et al. 2011). In these sectors, the modularity principle is applied to manage complexity, but mainly to the purpose of offering mass-customized services, that is a variety of solutions in a cost-effective way. It does not consider that customer's knowledge transfers not always can be managed through standardized interfaces. In fact, standardized interfaces do not allow to distinguish the type of knowledge (standardized versus idiosyncratic) the customer needs to provide in order to be satisfied and, hence, is not able to reduce the unexpected production costs related to CU.

1.1.4. THE MODULARITY PRINCIPLE IN LONG TERM CARE SERVICE ORGANIZATIONS

The Modularity approach to service design has been applied not only in sectors such as logistics, banking, ICT, but also to satisfy customer's complex needs, such as health and long-term care (Meyer et al., 2007; de Blok et al. 2009, 2010a; Vahatalo, 2016). First, modularity has been applied in these sectors to improve care coordination in presence of service fragmentation (Meyer et al., 2007). The platform approach identifies a health care path (Meyer et al., 2007; Vahatalo, 2016) made by strictly sequential processes whose goal is the fluent implementation of each service process (output), more than the general health promotion (outcome). Second, the modularity principle has been adopted to provide a joined-up and holistic response to people with cross-cutting and multiple needs toward the perspective of increasing customer centeredness in a cost-effective way (de Blok et al. 2009, 2010a). The concept of 'patient centeredness' in LTC service design– highly supported by public policies and scholars – should be viewed as an implicit answer to the problem of customer uncertainty, to be taken into account when applying the modularity

principle (Bohmer, 2005). However, the main attempt to consider the 'human dimension of modular care provision' identifies personalization only as a mean to improve mass-customization (de Block, 2013) and not, conversely, modularity as an instrument to support personalization by promoting the development of organizational capabilities. In other words, the concept of patient centeredness still suffers from a problem of 'tokenism' (Beresford and Branfield, 2006), namely the organizations are built on the basis of the perspective of policy-makers and managers and not on the view and experience of service users (Glasby et al. 2015). In addition, most of studies of modularity in LTC sector concern home care services (de Block, 2010b; 2013; 2014), leaving unexplored modularity in residential care services, which usually are adopted when patient's social and health conditions worsen. Finally, beyond the literature on LTC modularity, the problem of the relationship between organization and production efficiency in presence of CU is not addressed in this sector. Specialist studies have focused on particular aspects, such as the relationship between the management and service quality (Anderson et al. 2003; Anderson et al. 2014), the importance of trust relationships and workers' intrinsic motivations for developing coordination capabilities among colleagues (for a systematic review, see Okello and Gilson, 2015) but not on the role of the governance on production efficiency.

1.2. THE AIM AND THE PURPOSE OF THE THESIS AND THE RESEARCH HYPOTHESES

The purpose of this thesis is to increase the understanding of the role of uncertain customers having complex needs on organizational performance. By creating a first bridge between organizational and service management literatures, in the light of the Modularity Theory of the Firm, I investigate whether and how the organizational structure at governance, service design and management level is able to manage customer uncertainty. In addition, the purpose is to analyze such issue within the organizations providing health and social services.

In particular, this thesis attempts to answer three research questions:

1) *How does economic organizations efficiently face customer uncertainty in presence of complex needs?*
2) *How does the service design and management functions contribute to efficiently manage customer uncertainty due to complex needs?*
3) *How LTC organizations – through governance, service design and management - promote external efficiency (low UPC) related to customer uncertainty in personal care service?*

The main research hypothesis is that in case of complex needs, customer uncertainty produces production inefficiency, whose level depends on the type of governance, service design and management adopted. Below, for each research hypothesis, the relative hypothesis is discussed.

Research question 1 – Building upon the MTF and to a lesser extent on the behavioral literature on motivation, the analysis explores the efficiency level of different organizational structures in presence of CU by looking at the different systems of standards and incentives offered. The first hypothesis is that non-modular and decentralized structures - thanks to their flexibility and ability to adequately motivate providers - promote coordination capabilities with customer and providers and, hence, an efficient management of customer uncertainty.

Research question 2 – Focusing on the service sector and in the light of the MTF, the thesis discusses the efficiency level of different applications of the modularity principle in service design and management when the customer intervenes in the production process both as input and as co-producer. Here, the hypothesis is that a blueprinting approach to service design and management sustains an efficient service modularization mainly by customizing front office activities and standardizing back office ones.

Research question 3 –The thesis firstly discusses in the light of the developed theoretical framework, the platform and blueprinting approach to service design and management in LTC services. Then, on an empirical ground, by using the theory-building from case study approach, it hypotheses the existence of a virtuous or a vicious cycle on production efficiency determined by the incentives and standards provided by the organizational structure.

1.3. THE POSITIONING OF THE THESIS

The thesis is positioned in the organizational literature, in particular the MTF, and service management studies on customer uncertainty, with the purpose of understanding whether and how the organizational structure supports an efficient management of CU.

With respect to the organizational literature, the thesis substitutes the static framework based on the Williamson's transaction cost analysis (Williamson 1985) in favor of the dynamic structure offered by the MTF, which is able to recognize a fundamental role to the organization in the

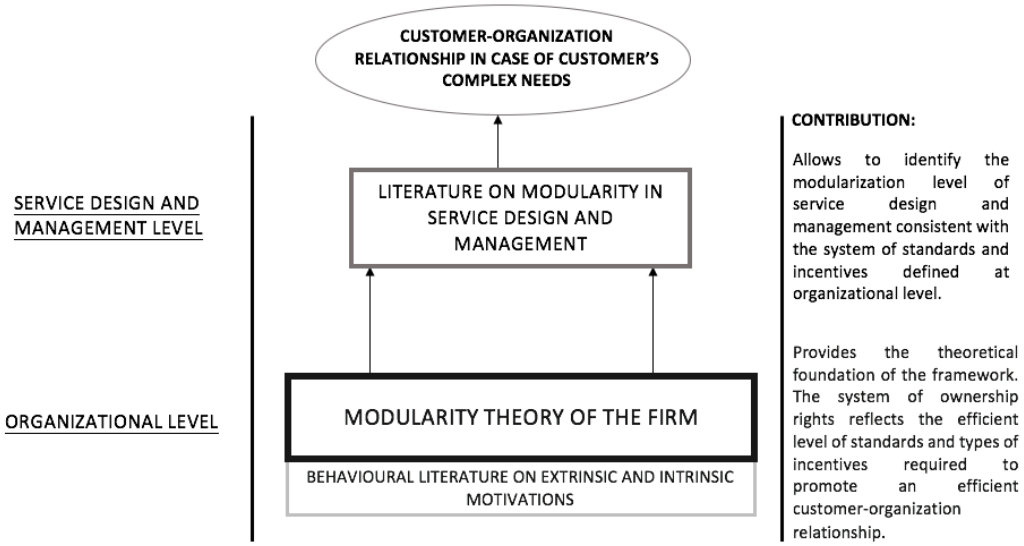
development of the capabilities required to manage customer uncertainty. To this purpose, this research tries to enlarge the perspective of the MTF towards the study of the relation with the customer when he/she is a source of uncertainty because of need complexity. However, in order to identify the organizational incentives required to support an efficient management of CU, this study requires enlarging the MTF perspective towards the behavioral analysis on extrinsic and intrinsic motivations.

In addition, the thesis highly contributes to the service management studies on modularity, by providing a theoretical framework that lends itself to be especially used in service design. Building upon the MTF, the modularity principle is not applied to provide mass-customized services as in case of the platform approach (Meyer and de Tore 2001; Meyer et al. 2007; Pekkarinen and Ulkuniemi 2008, Baldwin and Woodard, 2008), but in order to have a service design and management that is supported by the system of incentives and standards required at governance level to manage CU.

Finally, the thesis provides an example in the LTC sector to explicate the role of the organizational structure in production efficiency in presence of CU. After having shown that the platform approach usually applied for improving coordination in the care path (Meyer et al., 2007; de Blok et al. 2009, 2010a) displays some risks for service effectiveness (De Block et al., 2013; Vahatalo 2016), I propose a first application of the new approach developed on the basis of the enlarged MTF framework.

As the figure below shows, the analysis of the customer – front-office provider relationship is firstly based on the Modularity Theory of the Firm enlarged to the behavioral studies on organizational incentives to intrinsic motivations. The literatures on modularity applied at the three organizational levels (governance, service design and management) are jointly analyzed in order to understand how to promote an efficient management of customer uncertainty. In particular, the MTF framework supports and orient the analysis of modularity at service design and management level by defining the system of standards and incentives necessary to support an efficient customer – front-office provider relation.

Figure 1 – Reference literature adopted to develop the theoretical framework

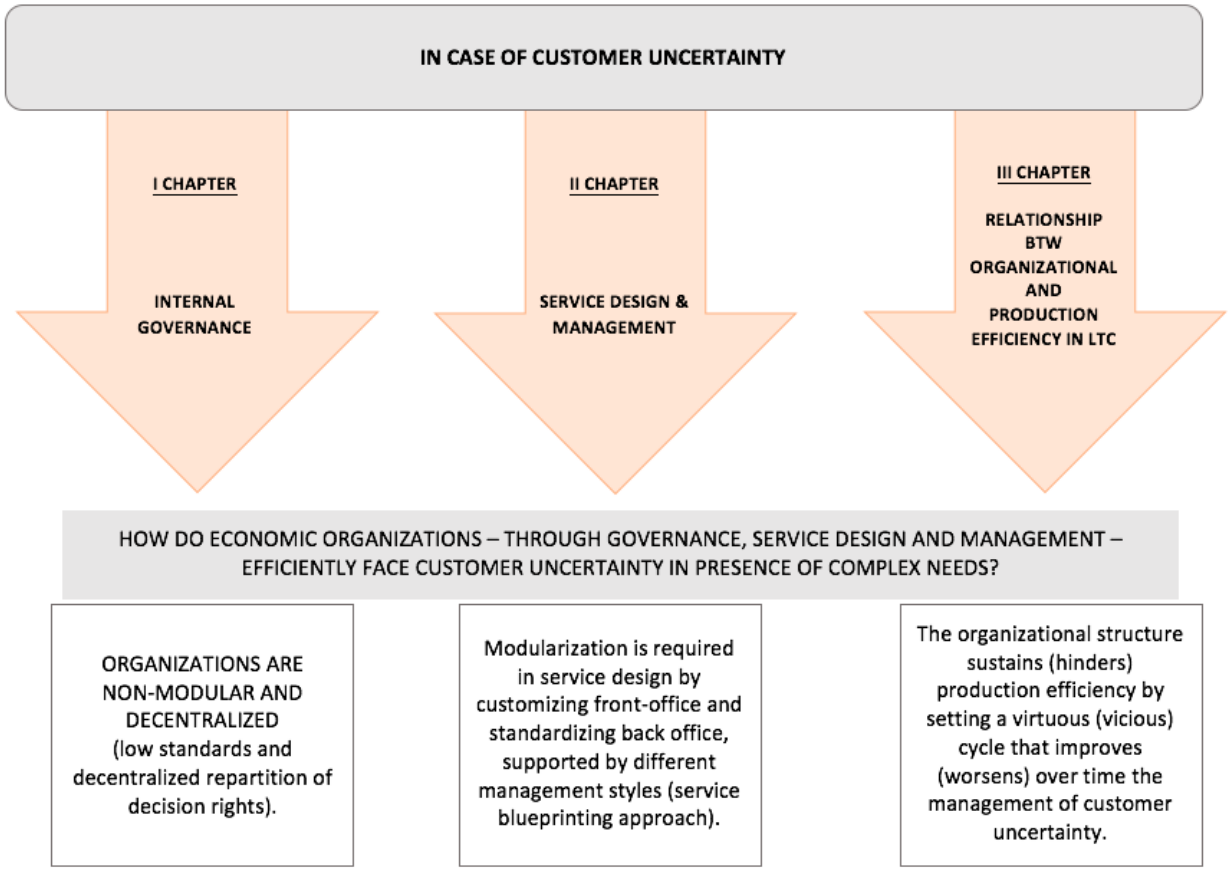


1.4. THE STRUCTURE OF THE THESIS

The thesis is structured in three chapters that constitute three original studies on the analysis of customer uncertainty.

As the figure below shows, the three chapters aim at answering the same research question from different perspectives. In particular, Chapter 1 analyses the role of customer uncertainty at organizational level in the light of the MTF and posits that non-modular and internally decentralized organizations are the most efficient in case of complex needs as they provide the adequate system of standards and incentives. Chapter 2 analyses the role of customer uncertainty at service design and management levels, also focusing on LTC services. It is argued that service activities should be modularized in standardized, mass-customized and customized services on the basis of a customer's need analysis and that the management should sustain front-office employees' intrinsic motivations. Chapter 3, studies –through a theory building case study analysis – the role of the organizational structure on production efficiency in residential LTC services. It hypothesizes that the organizational structure influences production efficiency, in particular the unexpected production costs related to customer uncertainty, by promoting a virtuous or a vicious cycle.

Figure 2 – Structure of the thesis



Chapter 1. The Undesired Costs of Not Involving 'Uncertain' Customers Starting from The Theory of The Firm

Despite the role of customer has radically changed over the last century, in the theories of the firm so far developed, the customer is still a missing player, confined in the position of a 'rational agent'. The efficiency of different organizational forms is still not evaluated on the basis of the way they coordinate with customers and, hence, sustain production efficiency. Other issues are very popular; the provision of incentives (Alchian and Demsetz, 1972), asset specificity problems (Williamson, 1985) capabilities acquired to face economic change (Langlois 2002). Such theories evaluate organizational efficiency by looking at the minimization of the sum of transaction costs and production costs, but not on the basis of the organizations' different ability to create production efficiency when customers ask to be involved in the production process. To what extent may be efficient for the organization to exclude customers from the organization's boundaries? Is the organizational form directly responsible for production efficiency? Are scale and production economies the only source of production efficiency? The lack of adequate studies on this argument has created wide confusion among researchers and encouraged firms – uncertain about the involvement or exclusion of the customer - to focus on a misleading 'third way': the *mass-customization* of products and services, which allows the customers to choose among largely standardized options. Indeed, the adoption of flexible technologies has allowed an increasing number of firms to involve the customer as 'co-creator' at reduced costs. However, not all needs can be easily standardized and not always modularization benefits are greater than the costs. Over the last decades, management studies have increasingly focused on the benefits of modularizing products and services without any consideration both for need complexity and the organizational form. The lack of clarity on this theoretical issue has permitted, if not even backed, in important sectors, an incautious adoption of modularity in services aimed at satisfying complex needs (education, health care, long term care). Thus, in this empirical and theoretical context, it is placed our research. The aim is to understand when and how it is efficient to involve the customers within the organizational boundaries. In particular, we argue that when needs are complex, the customer should be involved for increasing production efficiency and the organizational form is directly responsible for the customer's efficient involvement. The customer is a fundamental source of uncertainty for the organization. According to the neoclassical perspective, the consumer is an active maximiser of utility just like the producer (Lancaster 1971;

Stigler and Becker 1977) as he/she is endowed with all the knowledge required to take consumption decisions. However, as Langlois and Cosgel (1996) argue, in the light of the dynamic capability approach, consumption decisions require the acquisition or development of consumption capabilities (Langlois and Cosgel, 1996). In particular, in case of standardized production/services, the customer can easily acquire on the market the capabilities necessary to take consumption decisions (Langlois and Cosgel, 1996), but - when the product/service is produced to satisfy a complex need – here defined as a need involving not well defined cognitive, social and psychological components - I argue that the customer can hardly develop such capabilities autonomously: need complexity makes it difficult for the customer to understand how to be satisfied. In this case, the only way for the provider to decide which product/service to produce in order to satisfy the customer's need is to involve the customer in the *decision course* occurring during the production process of the product/service. However, with the customers' involvement, their uncertainty becomes a source of radical uncertainty for the organization that we call '*input uncertainty*' as it concerns the production process (in line with the definition of Bowen and Jones (1986)) and more specifically because it affects *production* efficiency. Since the production process can no longer be standardized (the customer's idiosyncratic knowledge is involved), also the economic activity coordinated through standardized market interfaces is inefficient. What is required is a re-design of the entire system based on production flexibility and ability to handle the consumer demands.

In the first part of the chapter, I am going to address the role of input uncertainty for the organization in the light of the *Modularity Theory of the Firm* (Langlois 2002, 2006; Baldwin and Clark, 2003; 2006), which – differently from the New Institutional Economics – and in line with the dynamic capability approach (Teece and Pisano, 1994; Langlois and Robertson 1995), recognizes to radical uncertainty and knowledge creation a central role in defining organizational boundaries; in fact, knowledge advancement requires a 'less explicit coordination' than that offered by the modular market (Langlois 2002). The role of 'input uncertainty' and of the related capabilities for the organization efficiency has not been addressed, with the exception of Bowen and Jones (1986) and Pitt and Foreman (1999). However, such studies are too vague and focused on the NIE perspective to recognize in need complexity (and related customer's uncertainty) the connecting link between the organization of production and the organization of the economic activity.

In the second part of the chapter, it will be shown that the organization is directly responsible of production efficiency to the extent that need complexity increases. Need complexity, in fact, can be the result of an organization's strategic choice (to address a niche market), but also the 'result' of technological progress, institutions and culture. While in the first case the product/service can be standardized and, hence, production efficiency is mainly the result of scale, specialization and scope economies; in the second situation, the organization can do very little to reach production efficiency by standardizing the product/service, as the customer has to be involved. The reason is that by not involving the customer, *unexpected production costs* may emerge in terms of damages, errors, waste of time etc. And the organizational form is directly responsible for their emergence; the unexpected production costs (UPC) decrease (increase) over time through the promotion (or discouragement) of the capabilities required producing a *shared structure of meaning* with the customer. For this reason, I aim to investigate the role of need complexity for organizational and production efficiency; I maintain that when the satisfaction of complex needs is pursued in the productive relation customer-provider, the most efficient organizational form is a *loosely coupled* system, such as network; instead, in case of *highly complex needs*, namely when the satisfaction of complex needs requires the involvement of more than one professionals in the production process, the most efficient organizational form is a non-modular and decentralized system such as a cooperative.

In the third part, in the light of behavioral studies on the role of extrinsic and intrinsic motivations for tacit knowledge transfers (Frey, 1997; Osterloh, Frost and Frey 2002), I argue that non-modular organizations are efficient not only because they *allow* knowledge integration to develop capabilities, but also to the extent that they *incentivize* individuals' effort to share knowledge. DTC, indeed, may partly emerge as lack of intrinsic motivations. In particular, the network of professionals incentivizes the development of capabilities to the extent that sustains a professional ethics based on cooperation among experts for the sharing of scientific results. However, in case of highly complex needs, the firm incentivizes knowledge integration insofar as it promotes the emergence of a bottom-up informal governance of the production process based on trust, cooperation and reciprocity.

1.1. The Modularity Theory of The Firm

1.1.1. The Building Blocks of the Modularity Theory

Organizational and social structures are complex 'designed' systems[5] characterized by different degrees of modularity. They are necessarily complex because, even if consciously designed, face over time unforeseen states of the world and unpredictable effects of human choices[6]. But their complexity can be managed if they evolve or are designed in a modular way, that is if they are partitioned into *near-decomposable* subsystems (Simon 1962); the parts are assigned to subsystems (modules) so as to minimize the interdependences between modules and to maximize the interdependence within them (Simon 1962; Langlois 2002). Idiosyncratic knowledge is stored and evolve within modules, while standardized knowledge enables coordination with the other modules of the systems. Thanks to these characteristics, modular systems exhibit important properties like greater adaptability and evolvability than systems without modular properties (Langlois 2002; Langlois 2006).

According to Baldwin and Clark (1997), a modular organization is obtained by partitioning information into *visible design rules* and *hidden design parameters* (Baldwin and Clark, 1997). *Visible design rules* (or visible information) consist of three parts:

• An *architecture* specifies what modules will be part of the system and what their functions will be.

• *Interfaces* describe in detail how the modules will interact, including how they fit together and communicate.

• *Standards* test a module's conformity to design rules and measure the module's performance relative to other modules (Baldwin and Clark 1997).

While *Visible design rules* need to be widely shared and communicated as they sustain the coordination among modules; *hidden design parameters* - according to Langlois (2002) - not only do not need, but also should not be communicated to the other parts of the system (Langlois 2002). The reason is the possibility offered by *encapsulation* to generate learning, new knowledge and, hence, radical change.

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[5] According to Simon (1962), a complex system is "*one made up of a large number of parts that interact in a non-simple way. In such systems, the whole is more than the sum of the parts, at least in the important pragmatic sense that, given the properties of the parts and the laws of their interaction, it is not a trivial matter to infer the properties of the whole*" (Simon, 1962).

[6] As Hayek argues, organization are '*the result of human action but not of human design*' (Hayek, 1967).

The Modularity Theory of the Firm (Langlois and Robertson, 1995; Teece and Pisano, 1994; Baldwin and Clark, 1997; Baldwin and Clark, 2003; Langlois, 2002; Langlois 2006) studies how modularity may help organizations to efficiently manage uncertainty, and more specifically generate, through innovative activities, radical change (Langlois 2002). According to Langlois, it is the radical change, indeed, that may be worth the costs of adopting a modular structure[7] (Langlois 2002); thanks to *information hiding*[8] and the *encapsulation* of non-standardized transfers within modules – modules enable learning and production of new knowledge, so that the cost of modularity may be more than compensated by the benefits over time of having reduced interdependences. In this perspective, the Modularity Theory finds its roots in the *dynamic capability approach* (Teece and Pisano, 1994; Langlois and Robertson 1995) in which productive knowledge is the result of learning and the acquisition of capabilities. These can be alternatively regarded as the '*routines*' (as theorized by Nelson and Winter, 1982), that is habitual patterns of skill-like behaviors, which are in large part made of *tacit* knowledge[9] (Polanyi, 1958). Economic capabilities (an effective repertoire of routines) are required in order to be able not only to produce, but also to transact. In fact, the development of production capabilities is sustained by coordination capabilities[10], which are differently sustained by different levels of organizational modularity. Within an evolutionary framework, the Modularity Theory of the Firm (from now on 'Modularity Theory') investigates how the modularity of the economic organizations changes to

[7] Benefits and costs of modularity have to be weighted. Concerning the costs of modularity, Baldwin and Clark contend that *"modular systems are much more difficult to design than comparable interconnected systems. The designers of modular systems must know a great deal about the inner workings of the overall product or process in order to develop the visible design rules necessary to make the modules function as a whole. They have to specify those rules in advance. And while designs at the modular level are proceeding independently, it may seem that all is going well; problems with incomplete or imperfect modularization tend to appear only when the modules come together and work poorly as an integrated whole"* (Baldwin and Clark, 1997).

[8] The concept of '*Information hiding'* developed by Parnas (1972) in the computer programming to minimize interdependences. With information hiding, every module "*is characterized by its knowledge of a design decision which it hides from all others. Its interface or definition was chosen to reveal as little as possible about its inner workings*" (Parnas, 1972).

[9] Tacit knowledge can be regarded as knowledge that cannot be fully articulated but must be acquired through observation and practice (Polanyi, 1958).

[10] Loasby (1998) talks about coordination capabilities as "*the knowledge of how to get certain things done*". He sustains that "*just as productive activities require direct capabilities, so transactions depend on indirect capabilities. Indirect capabilities are of two different kinds: we may be able to get things done for us either by gaining control of other capabilities or by obtaining access to them. […] The obvious application of the distinction within this paper is to the contrast between markets, which offer access, and firms, which allow hierarchical control; and the immediate conclusion is that control has substantial advantages, but is likely to be costlier than access. We can access more than we can control, and therefore should limit our attempts at control to those capabilities which are both crucial and manageable*". (Loasby, 1998)

efficiently face more or less dynamic contexts and, in particular, sustains the development of production capabilities.

The modularity concept is reinterpreted from a property right perspective (Langlois 2002) in a fashion that is consistent but, anyway, very different from that developed within the New Institutional Economics (NIE). What especially matters is the knowledge coordination property of the ownership rights rather than their ability to create incentives. The Modularity Theory recognizes in ownership rights the *real* source of modularity (Langlois 2002). In fact, property rights, by ensuring the exclusion of non-owners, create "protected spheres of authority", which in turn allow *information hiding* and the *encapsulation* of non-standardized transfers of knowledge, resources and energy. The existence of a principle of modularity in ownership rights allows identifying in the market a perfectly modular system. The market is the place where internal transfers become 'public' *transactions*, as they are *standardized*, *counted* and *compensated* (Baldwin and Clark, 2003). Standards sustain the emergence of market organization; they are social institutions (recurrent patterns of behavior[11]) that, by aligning the expectations of the parties, reduce the transaction costs of coordination (in this case they are called 'conventions') and by providing a benchmark against which quality and performance can be judged, they reduce transaction costs of monitoring (in this case, they are called 'norms'[12]) (Langlois and Savage, 1997). Thanks to the standards and the relative price as a coordination module[13] (Langlois 2006), the market minimizes uncertainty in the transactions and, hence, it allows an efficient coordination of economic activities. Standardized coordination creates what Langlois and Robertson (1995) call '*external economies of scope'*, which "*allow the makers of components to concentrate their capabilities narrowly and deeply and thus to improve their piece of the system independently of others*" (Langlois and Robertson 1995). However, in this organizational context, *knowledge* is highly *decentralized*[14], and in a changing economic environment (especially when knowledge is

[11] In line with Langlois (1986b) and North (1990), they are recurrent pattern of behavior that help to coordinate human activity.

[12] Conventions are self-enforcing standards, differently from the norms that require a complex enforcement system (monitoring).

[13] According to Langlois, modularity (or better near-decomposability) can be obtained in two ways: *'The first, for which there is no magic formula, is to figure out the best way to assign parts to modules. The second is ensure coordination among the (nearly) decomposed modules'* (Langlois 2006).

[14] It may be helpful the Langlois' citation of Hayek (1945): *'The whole acts as one market, not because any of its members survey the whole field, but because their limited individual fields of vision sufficiently overlap so that through many intermediaries the relevant information is communicated to all … The most significant fact about this system is the economy of knowledge with which it operates, or how little the individual participants need to know in order to be able to take the right action'* (Hayek 1945).

conducive to learning), it can produce high *dynamic transaction costs* (Langlois 2006). Such costs differ from the well-known transaction costs studied by the NIE. While these are fixed (and often sunk) costs of establishing and maintaining ownership rights[15], *dynamic transaction costs* (DTC) are *mundane*[16] transaction costs (Baldwin and Clark, 2003; Langlois 2006) that emerge "*as the costs of persuading, negotiating, coordinating, and teaching outside suppliers. Another way to look at these transaction costs is as the costs of not having the capabilities you need when you need them*" (Langlois and Robertson, 1995). In other words, DTC emerge because the organization prevents the integration of knowledge and, hence, the development of innovative activities. Since in the firm, the control of the necessary capabilities is more concentrated than in the market, the firm arises as a non-modular answer to the need of coordination[17], beyond that possible through the interface of the market (Langlois, 2002). In the modular markets, all the ownership rights reside in the same hands; instead, in the non-modular firms, ownership rights are partitioned; *alienation* rights, *decision* rights, and *residual claims to income* are attributed to different agents (Langlois, 2002)[18]. This is mainly explained by the need of internally facilitating tacit knowledge transfers and, hence, sustaining knowledge advancement and innovation. As Langlois (2002) argues:

> *They [firms] may do so in response to externalities arising from the likes of team production or asset specificity. More interestingly, firms may also arise in order*

[15] Such costs include legal, organizational and technological standards, the fixed costs arising from highly specific assets and the bonds and hostages sometimes used to offset those costs. Finally, it includes ordinary fixed capital like locks (Langlois 2006).

[16] *Mundane* transaction costs are *frictional* costs of trade that limit the extent of the market (Langlois 2006). The first type of *Mundane* transaction costs are transportation costs. However, the extent of the market is limited also by *coordination costs* due to spatial and temporal uncertainty produce and *dynamic transaction costs* due to the intrinsic non-standardized nature of activities that is attributed to innovation and economic change (Langlois 2006).

[17] In fact, as Langlois (2002) argues in line with Jensen and Meckling (1992), not only the market but also the firm is an efficient organization in so far as it allows knowledge to be in the hand of those who are able to make decisions. Two are the efficient mechanisms; "*One is by moving the knowledge to those with the decision rights; the other is by moving the decision rights to those with the knowledge*" (Jensen and Meckling 1992). In the market, it is the voluntary exchange that distributes ownership rights to those with the highest knowledge; conversely in the firm, who has the full decision rights (the owner) decides about the use of knowledge, by distributing inferior decision rights, hopefully, to those that are able to make the best use of their own knowledge.

[18] As Langlois and Cosgel (1993) sustain, in line with the Knight's perspective, business people can take decisions in presence of radical uncertainty on the basis of 'judgment'; '*with judgment we convert our lack of knowledge about the classification of outcomes into a form that can be used for action'* (Langlois and Cosgel, 1993). In this perspective, the firm arises as a form of 'cephalization'– rather than centralization - of the market organization with the assignment of certain individuals to leadership positions. In the firm, '*the owner directs the hired manager and control his or her function by using judgment of the manager's capabilities. Similarly, the manager has other employees whom he or she controls using judgment of them, and so on*' (Langlois and Cosgel, 1993). In this perspective, different degrees of decision rights are attributed on the basis of different individuals' knowledge that make individuals at different hierarchical levels to make the best use of their knowledge.

> *to generate externalities, that is, to facilitate the communication of rich information for purposes of qualitative coordination, innovation, and remodularization.* ***(Langlois, 2002)***

Among such rights, only the *alienation* right allows to reach a 'complete' modularity; in fact, it is the right to sell or to destroy the asset that gives the owners the final say (Langlois 2002). As Langlois (2002) contends,

> *'Granting an individual both control and alienability is clearly a more complete modularization than granting control alone, since the owner with alienability needs to engage in less explicit coordination with others to use the asset effectively under all circumstances'.*

The firm represents a case of 'hard modularization' that may facilitate modular innovation, namely innovation takes place through changes in the module without changing the way the module is related to the other parties (Langlois and Robertson 1992). In this context, publicly known standards help the development and coordination of internal routines (productive capabilities). However, when continuous learning takes place, standardized interfaces are necessarily in flux so that other relatively less non-modular organizational forms may represent a more efficient answer to coordination problems. As Langlois (2002) argues '*[…], unpredictable novelty may make any hard encapsulation undesirable, calling instead for "loosely coupled*[19]*" development teams'* (Langlois 2002). Transactions are to some extent encapsulated because the changing technology of production does not allow standardizing interfaces among different parties. Thus, instead of highly non-modular hierarchical firms, other hybrid organizational forms (ex. joint ventures and other collaborative arrangements) may arise characterized by ambiguous boundaries in which neither party owns complete (alienable) decisions. These non-modular organizational forms provide *qualitative coordination* of their complementary activities with the subsequent potential emergence of innovative activities (Langlois 2002). In this context, the development of *coordination capabilities*[20] - in support of qualitative coordination - becomes essential to coordinate complementary activities in their experimenting phases (Richardson 1972).

The central role of learning and new knowledge for the 'efficient' emergence of non-modular organizations sheds light on the innovative technology of production as the main determinant of

[19] A precise meaning of the vague term 'loosely coupled' may be 'modular but not fully decomposable' (Langlois 2002).

[20] Such argument, according to Langlois, is consistent with the idea of modularization developed by Richardson (1972)

the encapsulation of transactions[21] (Langlois 2002). Indeed, when learning is taking place, as seen above, standards cannot persist and remodularization may be inevitable. In this case, the possibility of sustaining over time both modular and systemic innovation[22] without being completely hindered by the fixed costs of remodularization, depends on the existence of a *just-embedded* system (Garud and Jain 1996). A system in which visible design rules (standards) are sufficiently fixed and unambiguous to sustain modular and architectural innovation but also adequately loose to encourage a systemic technological progress. However, building a *just-embedded* system is not at all an easy solution, because it largely depends on path dependency (Langlois 2002).

The Modularity theory – thanks to its building blocks - provides a theoretical explanation of the history of the organizational modularity over the last century on the basis of different levels of *mundane* transaction costs. With the alternation of highly dynamic periods and relatively more static ones - *mundane* transaction costs have shown to have a *secret life cycle* (Langlois 2006). In dynamic periods DTC are high and, hence, bring about vertical integration. However, in so far as the market expands and becomes increasingly predictable, DTC decrease and it becomes profitable sustaining the fixed set up costs of standardizing the production system to coordinate it through the modular market[23]. Consequently, when DTC are low, vertical disintegration occurs with a reduction of production costs due to the effect of standardization on the subdivision of labor[24]. In this way, Langlois (2006) explains in theoretical terms why division of labor has been accompanied by the vertical integration phenomenon described in the *Visible Hand* (1977) by

[21] In this regard, Langlois says that '*in all cases, the technology of production both causes and shapes the resulting nonmodular interconnections'* Langlois (2002).

[22] *Modular innovation* is the innovation that takes place through change in the modules; while, *architectural innovation* is that in which the parts remain the same but the architecture connecting them changes. It involves recombination, but not remodularization (that is a change in the visible design rules). *Systemic innovation* is the one that involves change in the visible design rules.

[23] It is helpful to take into account the distinction made by Langlois and Savage (1997) between standards with coordination function (already discussed) and those with an economies-of-scale function. While the first are social institutions favoring coordination, the second one, by reducing variety, allows an increase of the market on the basis of which economies of scale arise. Such standards are different but interrelated (Langlois and Savage, 1997). Coordinating standards, by reducing transaction costs, sustain also the setting of the standards required for economies of scale; by regularizing expectations, increase the predictability of the extent of the market, which enables the setting of economies-of-scale standards (Langlois and Savage, 1997).

[24] The relation between DTC and mechanization is more complicated. As the market expands still further, it may start to pay not to subdivide the tasks further (which would increase further the phenomenon of vertical disintegration) but to integrate tasks within a machine, with the effect of turning transaction back into transfers. However, mechanization can also turn transfers in transactions when, in presence of *coordination* costs, the output of production is predictable (ex. ATM machines).

Chandler and then by the vertical disintegration synthetized in the concept of the *Vanishing Hand* (Langlois 2003).

1.1.2. The central role of uncertainty

Noticeable is the distance of the Modularity theory from the mainstream transaction cost theory that goes under the name of the 'New Institutional Economics' (NIE) (Williamson 1975, Coase 1960, Demsetz 1967). Both literatures recognize to property rights a fundamental role for the emergence of firms, but, as sketched above, they mainly focus on different functions of such rights. While the NIE is mainly interested in the *incentive benefits* of ownership rights and considers the presence of highly specific assets as the main reason for the emergence of firms; the MTF focuses on the *division of knowledge benefits* that allow modularization and, thus, an efficient management of uncertainty (Langlois 2002). Indeed, what mainly separates the two literatures and brings to different answers about why firms emerge, is the different consideration for uncertainty. Whereas in the NIE, uncertainty creates inefficiency along with opportunism (Williamson 1985), in the MTF, *radical* uncertainty is the main source of organizations' inefficiency, as opportunism could not be possible without uncertainty (Langlois 1984). According to the author, radical uncertainty is the ultimate real responsible of the 'hold up' phenomenon in case of investment in specific assets, not opportunism (Langlois 1984). Self-seeking behaviour is just a parametric information problem; among all contingencies, there is a state of the world labelled 'opportunistic behaviour'. In this case, the real problem is the lack of structural information that makes it possible the adoption of that behaviour. Different, in fact, is uncertainty emerging as a lack of *structural* knowledge from that emerging from a lack of *parametric knowledge.* Imperfect *parametric* knowledge - characterizing neo-classical theory - is the lack of knowledge about which state of the world will occur but implies complete knowledge of the structure of the maximization problem. Conversely, imperfect *structural* knowledge produces *radical* uncertainty as it represents a lack of knowledge about all the possible states of the world and actions and about all the possible ways such states and actions relate to the agent's utility (Langlois 1984). In particular, in presence of *ex ante* competition[25], Langlois (1984) maintains that opportunism emerges in two cases; at the time of contract renewal and to the extent that one can renege on a contract with legal impunity. In both cases the problem is imperfect structural knowledge: in the first case

[25] Otherwise, the risk of opportunism does not emerge because of radical uncertainty, but because of ex-ante fewness of transaction alternatives (Demsetz, 1968).

because all contingencies are not foreseeable in detail and, hence, do not allow a long-term contract; in the second case, because specifications cannot be adequately detailed, and so the contract cannot protect against opportunism. In line with this perspective, the Modularity Theory highlights that what matters is not providing incentives by allocating the *claim on residual income* to one party, but promoting modularization by allocating *residual rights of control* to those that in an uncertain context are able to make a best use of the assets. Indeed, as Langlois (2002) argues, "*Even if no one is worried about the possibility of "hold-up" or the expropriation of rents, it still may be worthwhile to assign to only one of the parties the residual control rights over a package of assets if that party has comparative advantage in making the decisions*" (Langlois 2002).

Anyway, even if incentives are not considered as the main reason for the emergence of firms, they still have an important role. In line with Jensen and Meckling (1992), the author points out that the organization has to solve not only the right assignment problem (determining who should exercise a decision right), but also the control or the agency problem (how to ensure that self-interested decision agents exercise their rights in a way that contributes to the organizational objective) (Jensen and Meckling, 1992). According to Langlois (2002), the alienability right *'[…] solves both the problem of knowledge decentralization and the problem of incentives: the asset may be placed under the control of the person whose knowledge best equips him or her to use it, and alienability disciplines the owner's use of the asset by making its value (to which the owner has a residual claim) measurable on a market*' (Langlois 2002). In this perspective, both market and hierarchy provide adequate incentives. However, in the case of hierarchy, it is implicitly assumed that most of the decision rights can be exerted in a centralized way because the production process - highly standardized - is cheaply monitored. When, conversely, the economic activity is complex such as in professional services (Langlois and Savage, 1997), the production process cannot be standardized but requires *human judgment*. In this circumstance, Langlois and Savage maintain that the network structure results to be more efficient than hierarchy and market; thanks to not-too-strict standards, the network overcomes DTC and sustains innovation (solving the right assignment problems), while providing the incentives of market competition (solving the agency problem)[26] (Langlois and Savage, 1997).

[26] "*By concentrating decision rights at the top, the firm can in principle overcome both the narrowness of knowledge of the individual participants and the vestedness of decentralized decision rights. But such centralization of authority comes at the cost of misaligned incentives to the extent that it removes decision rights from the hands of those who must actually execute the routines of production. In a mature firm of the sort Alfred Chandler (1977) describes, such problems of agency are tolerable because operations are typically characterized by repeated, consistent replication of*

In conclusion, the Modularity Theory focuses on how structural uncertainty – emerging in innovative production technology – affects organization modularity and modularization. The modular market, thanks to standards, enables external economies of scope and modular innovations. However, with economic change, the market faces high DTC, so that transactions are encapsulated within non-modular organizations. Firms are not always the most efficient solution; when change is particularly high, it is more efficient to share decision rights with other parties in loosely coupled structures. Within such ambiguous boundaries a common advancement of knowledge and the innovation of complementary activities are sustained.

known routines. Such routines tend to be measurable at various stages of production, and so lend themselves relatively well to formal monitoring schemes, including documentation, accounting trails, and supervision of employees (Barzel 1982). Clearly, organizations of this sort are not obviously well adapted to the problems of professional production." (Langlois and Savage 1997)

1.2. The Co-Productive Role of the Customer and Customer Uncertainty

1.2.1. Customer Uncertainty as the Source of Radical Uncertainty

Recognizing the customer's uncertainty in consumption decisions is the first step to understand how the organization may find a source of inefficiency in the interactions with its customers. In this regard, the economic literature has increasingly recognized that the neo-classical customer (Lancaster 1971; Stigler and Becker 1977) is not endowed with all the knowledge required to maximize his/her own utility and that, hence, he/she is uncertain in taking consumption decisions (Langlois and Cosgel, 1996). However, how the customer's uncertainty may affect organizational efficiency is still an open question. Our attempt in this section is to identify the conditions under which the customer's uncertainty becomes a source of *radical* uncertainty for the organization and, hence, to provide a rationale for such analysis within the Modularity Theory of the Firm.

At the end of the last paragraph, we have shown that the complexity of the economic activity may play a central role in defining the relative efficiency of modular and non-modular organizations. Langlois and Savage (1997) show that professional services are complex and, hence, more efficiently organized in the network form than in the hierarchical form. However, what such study misses to explicate is the specific role of the customer's uncertainty in the 'varying concrete circumstances' the provider has to face (Langlois and Savage 1997) and its consequences on the relative efficiency of different organizational forms. In this regard, a few service marketing studies explicitly identify customer's uncertainty as a source of inefficiency for the organization, which affects its boundaries (Bowen and Jones 1986) and internal marketing decisions (Pitt and Foreman 1999). In particular, Bowen and Jones (1986) identify *input uncertainty* as a form of user's uncertainty that emerges because of the diversity and unpredictability of the demands and because of the on-site participation of the user (Bowen and Jones, 1986). When the services are highly intangible and complex (as in case of health care and long-term care services), input uncertainty is high and the most efficient way to reduce transaction costs[27] is to include the customer within the boundaries of the organization, in what they call a *relational hierarchy*. However, in such studies 'complexity' is a too vague term to understand why some economic activities should be differently organized to face customer's uncertainty. Of course, intangibility of

[27] In particular, the authors identify two source of transaction costs: performance ambiguity (due to the high intangibility of services and the low standardization of the production mode) and goal incongruence (source of opportunism). Both are involved in the "nature" of the service.

services makes it more difficult for the customer to take decisions, but also products may be complex enough to create uncertainty for the consumer. The issue, hence, is about the real source of service/product complexity, namely the complexity of the need to be satisfied, which can create different levels of customer's uncertainty. Moreover, the relation between customer's uncertainty and productive efficiency is largely omitted even if the client's inclusion in the firm boundaries reflects nothing but his/her own participation to the production process and, hence, to the generation of production costs. In the rest of the section we will address the first issue about the characteristics of service complexity that translate customer uncertainty in a source of radical uncertainty for the organization. The second issue – the relation between production and transaction costs, and customer uncertainty - will be studied in the next paragraph.

In general terms, organizations have to do with real customers, not with the ones theorized by the neoclassical approach; since real customers cannot build a well-defined system of preferences nor choose the product and services that maximize their own utility, they are to be regarded as *structurally* uncertain. Anyway, consumers usually take consumption decisions; in fact, the more the good/service is standardized, the more the customer is able to acquire on the market the information and, hence, the consumption capabilities required to take a buy-or-not decision (Langlois and Cosgel, 1996). In line with the concept of complexity developed in the first paragraph, we consider complex the products and services whose production process involves large interdependences due to the transfer of non-standardized knowledge. Despite the great role of standardized productions in our economic system, not every complex production can be standardized, because not all the customers' needs can be completely homogenized and, hence, satisfied in the same way. Examples are health care, education and the professional needs. For instance, health depends on many different factors (medical, psychological and social) so that the same symptoms could have been determined by different reasons and, thus, require different treatments. Similarly, educational needs change among persons so that not always the same educational strategy is able to reach the hoped results.

In general, their complexity is due to the fact of involving not well defined cognitive, social and psychological components; it is promoted by technological progress but also by the culture and important institutions like the legal system that in a *path dependence* perspective do not allow neither the provider to orientate the services toward any standardization nor the customer to acquire on the market any consumption capability. In this case, the consumer is not able to take

any consumption decision because he/she does not clearly know all the characteristics of such complex needs and how these should be managed in order to be satisfied. The provider, in turn, cannot clearly know which service to produce if not by involving the customer in the production process through which he/she may be satisfied. Such participation allows the customer to untangle the different facets of his/her own needs and for each facet to orient the provider in order to being *personally* satisfied. For instance, a personalized interaction with students allows the teacher to understand if students have any educational gaps or learning difficulties and, thus, to define a more effective personalized educational plan. However, *personalization* of the production process – namely the involvement of the customer in the production process - may occur also as an organization's strategical choice of personalizing needs. In this case, needs may be regarded as 'artificially complex' and the organizations - not only the service organizations but also the manufacture ones – have to decide to what extent introduce cognitive and emotional dimensions and, hence, involve the customers in the production process[28]. In this regard, an example is the customer's need for wedding dresses. Many sellers propose a selection of wedding dresses among which future spouses can choose. However, there are boutiques with fashion designers and tailors able to produce a personalized piece by involving the customer in the design and production phases. As it will be better shown in par.1.2.3., when needs are artificially complex, the organization can choose which is the most efficient modularization level. Independently of the source of need complexity, however, when the customer's personal and idiosyncratic knowledge is required in the production process, the firm faces - what in line with Bowen and Jones (1986) we call - 'input uncertainty', that is a *structural* form of uncertainty in the transaction with the customers due to the necessary providers' judgement in the production process[29]. Such uncertainty is due to service *structural unpredictability*, namely the customer's structural inability to formulate a choice because he/she misses adequate information and consumption capabilities. Only an increased availability of information - made possible by open access to the production process – would increase consumption consciousness. In this regard, ICT technologies may play an important role in facilitating the customer's involvement in the production process, allowing managing complexity through the transformation of well-defined and specific needs into standardized inputs of the production process. Customer's unpredictability

[28] From now on, anyway we talk about just service complexity and not product complexity. We justify such choice by recognizing that to the extent that the customer is involved in the production process, indeed the organization in that moment is providing a service. Moreover, when we talk about service complexity we refer to the specific case in which complexity is due to non-standardized knowledge transfers with customers.

[29] Capability introduced by Knight (1921) and reintroduced by Langlois and Cosgel (1993).

increases in so far as the satisfaction of the complex need requires that the professional judgment is exerted by more than one professional in the production process. In this case, the customer expresses a *highly complex need*, such as a long-term need. In fact, the customer's decision capability further decreases to the extent that the service has to be redefined over time across different states of the world. Satisfying their needs over time becomes increasingly difficult for just one provider's repertoire of routines, skills and mentality.

In conclusion, while standardization always reflects an organization's *ability* to standardize customers' complex needs, personalization may be the *necessary* result of the needs' inherent complexity (health care, long term care, education etc.). When the customer, because of need complexity, is not able to take a decision the only solution is to *personalize* the production process, that is to make the customer partaking in the process. This fact produces a radical form of uncertainty, *input uncertainty*, which, as it will be shown in the next section, is a source of *dynamic* transaction costs and, especially, of *uncertain production costs* for the organization.

1.2.2. Dynamic Transaction Costs (DTC) and Unexpected Production Costs (UPC)

We have seen that when the customer's needs are – inherently or artificially – complex, the production process is to be personalized, turning, hence, the customer's structural uncertainty into structural uncertainty for the organization (input uncertainty). I contend now that input uncertainty is a source of production (in)efficiency that is directly influenced by organizational modularity. Within the Modularity Theory, modular organizations are responsible for organizational efficiency (minimization of TC, DTC and PC) and define the way production efficiency is reached (in the market, within hierarchy or in other organizational forms midway these two extremes)[30]. Here I contend that when input uncertainty is high, the organizational form is directly responsible also for production efficiency; *dynamic transaction costs*, in fact, show their 'productive side' in the fashion of *unexpected production costs*. These are the costs of not having accumulated the capabilities required to personalize the production process with the customer.

Dynamic transaction costs are the main *mundane* transaction costs that emerge unexpectedly in presence of input uncertainty. In this context, they can be considered as *the costs of persuading, negotiating, coordinating with the final customer for satisfying his/her own complex need*. The other mundane transaction costs (transportation and coordination costs) are expected because always resulting from an organization's strategy to focus on specific market segments. In particular, transportation costs may emerge as the result of an organization's strategy to provide a personalized transportation service. Coordination costs, as well, arise mainly as an organization's personalization choice, since in many cases they could be cost-effectively solved by mechanization (ex. ATM machines). On the contrary, DTC may emerge *unexpectedly* and independently of the specific organization's strategy, as in case of inherently complex needs.

How do dynamic transaction costs show themselves in case of input uncertainty? In the Modularity Theory, uncertainty is about the economic change that - if not adequately addressed by the organization- prevents technological progress and organization survival. In that context, dynamic transaction costs arise as costs that the organization undergoes in acquiring production capabilities for not having adequate coordination capabilities. Conversely, *input* uncertainty arises

[30] For instance, in presence of economic change, efficient is a non-modular organization that – while providing adequate incentives - efficiently overcomes dynamic transaction costs and, hence, guarantees organization's survival over time (Langlois 2002; Langlois 2006). And consequently, the production process results organized within the non-modular organization.

as a *personalizing* change of the *current* production processes (through the required customer's involvement) that, if not adequately addressed by the *existing* coordination/production capabilities, determines *productive inefficiency*. In other words, analysing the effects and costs of input uncertainty means analysing the production process at any point in time, that is to 'stop the time machine' and look back at the accumulated capabilities[31], which are direct responsible for the efficiency of the current production process[32]. In this context, DTC , before showing themselves over time, show their '*productive side'* in the current production process, that is the production costs of not having accumulated so far the capabilities required to coordinate with customers. We call such costs *unexpected production costs.* For instance, in health care and LTC service sectors, patients may decide to start legal actions not because of negligent injuries but because of emotional distress or psychological injuries. Differently from the usual and 'foreseen' production costs, the *unexpected production costs* arise in the fashion of mistakes, damages, misunderstandings, legal actions etc., and more broadly of '*unpredictable'* resource losses related to the lack of coordination/production capabilities. Once the time machine has been restarted, DTC emerge again as the transaction costs of acquiring the production capabilities one needs over time (Langlois and Robertson 1995), and, this way, also as the costs of improving production efficiency (reduce UPC) over time.

In general, in the Modularity Theory, production and transaction costs are strictly related because both the technological progress and transactions are a matter of organizational capabilities[33] (Loasby 1998; Langlois 2002): coordination capabilities among parties are required to sustain the common development of production capabilities. In case of input uncertainty, however, transactions are especially a matter of capability because production efficiency (the level of the UPC) *directly* depends on the way the provider coordinates with the customer, that is on the coordination/production capabilities accumulated so far. Such coordination capabilities in fact are necessary to personalize the production process for they allow creating a *shared language system* with the customers in the production of services. In fact, as Langlois and Cosgel (1996) argue,

[31] As Loasby (1998) argues, capabilities *"[…] are in large measure a by-product of past activities, but what matters at any point of time is the range of future activities which they make possible*" Loasby (1998).

[32] In par.1.3. it will be shown that also motivation is responsible for the lack of capabilities and that the internal organization is responsible for the motivation as well.

[33] "[…] *the line between production costs and transaction costs is far more blurry than one finds it to be in the literature of organization. One cannot take production costs as given and then explain organizational form or the boundaries of the firm on the basis of the costs of transacting (however one defines those) alone. For one thing, transacting is also an activity that requires skill, and the costs one incurs in transacting are thus a matter of ones' capabilities*" (Langlois and Cosgel 1996).

> *[…] agents do not automatically share "common knowledge" of the structure of production and consumption, of the menu of choices available. The economic problem of production becomes a coordination problem: discovering — or, rather, helping to create — an interpersonally shared structure of transaction. Just as conversation cannot take place without shared structures of meaning, transacting cannot take place in an institutional vacuum. In both cases, the problem of coordination is one of sharing structure. Meaning, indeed, is always a matter of structure. A signal — a piece of information — is meaningful only in terms of some structure that can interpret it. (Langlois and Cosgel, 1996)*

Coordination capabilities not only sustain the development of production capabilities over time, but are directly adopted in the production process involving customers and, hence, directly affect production efficiency at t_0, t_1 etc. Consistently, organizational efficiency should be evaluated not only on the basis of the coordination and productive capabilities developed for technological progress, but – when input uncertainty is high – also on the coordination/production capabilities developed to promote production efficiency: coordination capabilities in fact are themselves production capabilities when the customer is directly involved in the production process.

The only experience, skills and intuitions are not sufficient for the provider to 'judge' what to produce in case of professional services; he needs to involve the customer's idiosyncratic knowledge within the production process. The greater is the exchange of knowledge, the more the provider can know what the customer wants, in particular whether he/she needs a high or low personalized service. In this regard, I define a service as highly personalized when it involves a large use of customer's idiosyncratic knowledge in the production process, and lowly personalized when it is produced without such knowledge. For instance, in case of health care services, customer's knowledge obtained in the diagnostic phase allows the practitioner understanding whether the customer needs an ad hoc therapy or a more standardized one. In this context, the creation of a common structure of knowledge with the customer- thanks to coordination/production capabilities - is functional to the exertion of a conscious provider's judgment, which in turn directly affects the UPC level. In line with Langlois and Savage (1997) – considering professionals' knowledge transfers as a source of innovation, I maintain that overtime integration of additional practitioner's knowledge (through meetings, conversation, conventions, scientific papers etc.) maybe functional also to productive efficiency, but only indirectly in terms of the personalization of the production process.

There are cases in which the conscious professional judgement has to be exerted by more than one professionals within the production process. In this case, we talk about highly complex needs. Long term needs are an example of this type of needs; as they change through different states of the world, the provider may be unable to preserve over time a common structure of knowledge with the customer. Common structure is necessary to evaluate which level of personalization is required and, hence, reduce UPC. By using the same example above, after the therapy, the patient may keep on suffering the same symptoms as before. In order to make the best use of the customer's idiosyncratic knowledge in developing a new therapy, it may be required the integration of idiosyncratic knowledge of other professionals with similar or complementary specialties; a psychologist's intervention may show that the symptoms are now due to a psychological problem. More broadly, the intervention of other providers' knowledge in the production process allows to *directly* reduce UPC, thanks to different routines, mentality and specialization in the different states of the world.

Consistently with the Modularity Theory, I maintain that the new production routines and the new ways the provider applies existing routines can represent innovation (Langlois and Savage, 1997) that may increase production efficiency, by promoting a progressive reduction of the *repeated-but-still-unexpected production costs* across customers or with the same customer over time. In this sense, input uncertainty can be considered also as a specific source of innovation activity that emerges in the production process.

To sum up, when input uncertainty is high, organizational efficiency cannot be evaluated without considering its effects on production efficiency. Coordination and production capabilities result two sides of the same coin; coordination capabilities *directly* affect production efficiency by enabling the creation of a common knowledge structure with the customer, which is required to reduce UPC in the production process. UPC are not DTC, but are strictly related to them; the former represents the way in which DTC show themselves at t_1, t_2 etc. in the production process. The levels of UPC and DTC are highly correlated; the former reflect the productive side of the latter so that a low level of DTC means a potential increase in production efficiency over time; in fact, when DTC are low it means that new *personalization* capabilities can be efficiently acquired and, hence, that the UPC level tends to decrease.

1.2.3. Organizational and production efficiency

In case of input uncertainty, the relation between organizational and production efficiency results more intricate than in the general Modularity Theory. In this theory, the two types of efficiency just interact; productive efficiency is not influenced by the organization as it can be reached both in the market and through hierarchy; what matters is just minimizing the sum of DTC, TC and PC when DTC are high or low depending on the dynamic of the economic environment (Langlois 2002, 2006). On the contrary, when input uncertainty is high, organizational and productive efficiency not only interact, but the former is directly responsible for the latter, through the presence or lack of productive/coordination capabilities. In this context, focusing on allocative efficiency as source of productive efficiency is misleading as it would not allow to adequately judge neither the quality of the production process nor the related role of the economic organization. To this regard, in an evolutionary framework, Langlois (1984) provides a *functional* definition of organizational efficiency which - differently from the comparative one adopted by the New Institutional Theory - calls into question allocative efficiency in order to evaluate the different organizations' ability to sustain knowledge advancement. However, a consistent definition of production efficiency is required too that – instead of deriving from allocative efficiency – finds its roots in the organizational ability to generate knowledge. In this section, I show that in case of need complexity, as knowledge advancement may occur during the production process, firms hardly can minimize their costs. As UPC are high, organizational modularity affects production efficiency more than what allocative efficiency does. In particular, I argue that UPC level depends on the organizational culture which in turn is affected by the type of standards adopted in the production process and the internal allocation of decision rights. In fact, both organizational elements– by directly affecting workers' activity - determine the ability of the organization to satisfy the customers' complex needs. New indicators of production efficiency, hence, are required that allow identifying the role of these organizational elements on UPC and measuring UPC as a percentage of total costs over time.

The evolutionary study within the Modularity Theory aims at recognizing – despite path dependency reasons – the *function* offered by different modular organizations over time; in this perspective Langlois (2002; 2006) reinterpretation of Chandler's *Visible Hand* and the ensuing identification of a *Vanishing Hand* (Langlois 2003) is fundamental. The adoption of a different

efficiency standard to explain the emergence of firms in an evolutionary perspective is justified by the existence of structural knowledge imperfections (Langlois 1984), which cannot be taken into account by neoclassical allocative efficiency. According to Langlois (1984),

> *"the incompleteness of structural knowledge makes it impossible to assess the market in efficiency terms. To suggest that the economic system is an evolving or learning process in which new knowledge is constantly being created is to suggest that there does not exist a fixed allocation problem against which efficiency may be judged. Efficiency, at least insofar as it implies a comparison with some postulated global allocation problem, is simply the wrong standard. The economy is not inefficient because of imperfect structural knowledge; it is simply a-efficient. The reality is not wrong because it doesn't fit the model; the model is inapplicable because it doesn't fit the reality. Now, one may wish to argue that, for basic price-and-allocation theory in some of its forms, the difficulties of incomplete structural knowledge may be safely ignored, allowing one to go on talking meaningfully about efficiency in the usual way. But one cannot argue this with respect to the theory of internal organization — at least if one accepts my assertion that changing structural knowledge is at the heart of that theory."* (Langlois 1984)

Therefore, efficiency is evaluated as an *ex post* reconstruction of the organization's *function*, which in turn is identified on the basis of an axiomatically identified *goal/means framework* and is specified on the basis of the faced (dynamic versus static) environment (Langlois 1984). In this perspective, efficient is the organization that achieves a goal by minimizing the use of the means to reach that goal. And an organizational form (existing or not) is the most efficient among the existing organizational forms – if it is the ablest to economize on the means to reach the same goal (Langlois 1984). The issue, hence, is to identify among the existing (but also conceivable) organizational forms, the one that is most efficient in performing its *function*. As Langlois (1984) rightly observes, the importance of such type of efficiency is more limited than that elaborated within the NIE. In the comparative institutional framework of the NIE, explaining why an observed organizational form is the most efficient is equivalent to explaining why that organization is observed. Conversely, in an evolutionary framework explaining why an organization exists requires

also a path dependence investigation[34]. Hence, the most efficient organizational form is never the optimal organizational structure, but just the most conceivably efficient; as knowledge changes, other organizational forms may be invented that may better perform the function at hand. In this study, by omitting the *path dependency* reasons, I will focus on the *functionalist* explanation of organizational efficiency. Before analyzing production efficiency in case of complex needs and investigating to what extent organizations are functionally efficient, I will show under which conditions production efficiency cannot be considered as necessarily deriving from neoclassical allocative efficiency.

We have seen above that knowledge imperfections, in case of complex needs, produce along with DTC, also UPC in the production process. In this case, I argue – in line with the Leibenstein's concept of x-efficiency (Leibenstein 1966) - that allocative efficiency becomes relatively irrelevant for production efficiency. In fact, in the neoclassical theory, allocative efficiency produces a diligent management of given resources that determines the firms' production efficiency. The assumption is that organizations have *stable production functions* through which they produce maximum output, *given* a certain amount of input. Therefore, competition leads the organizations to reallocate resources in order to minimize their costs. However, the assumption about given resources and static production function cannot be maintained when production cannot be completed without additional and emerging knowledge in the interaction between customer and producer (in case of complex needs) and among producers (in case of complex and long-term needs). For instance, in health care services, patients provide information necessary to provide the right treatments. In other words, in an ideal perfect market competition, organizations aiming at satisfying complex needs, would never minimize their production costs, nor they would receive sufficient information to reduce UPC through the price which anonymous customers may be willing to pay. At the equilibrium point, on the one hand, marginal costs cannot reflect the existence of UPC, as these costs are due to missing input (knowledge) and technology (namely of not having acquired knowledge and capabilities required for satisfying complex needs). On the other hand, the price does not provide adequate information about the customer's needs; because of need complexity, the organizations have to involve the customer in the production process in order to obtain fundamental information and develop capabilities about how to satisfy

[34] According to Langlois (1984), the existence of a specific organizational form is not only due to its a priori superiority but also to its history, so that different organizational forms may be both inadequate to efficiently face existing environments. In this research, we are interested just in the functionalist part of the complete explanation.

him/her. In fact, the economic system is not endowed with all the knowledge required to satisfy complex needs. The lack of such knowledge determines unexpected production costs, that is errors and waste of resources.

This argument partially supports the Leibenstein's intuition about the existence of x-inefficiency[35] which goes unnoticed in equilibrium models. Stigler, in his critique to x-inefficiency, accuses Leibenstein for not having provided a theory of waste because X-inefficiency – as described by Leibenstein - could be easily attributed to specific inputs. And to this regard, he makes an example; if two similar farmers obtain different amount of corn, and hence produce at two different production frontiers, the less productive farmer should attribute his worse outcome to some factors, which hence should be reallocated (Stigler 1976). However, I argue that another story is producing goods and services that aim to satisfy complex needs. Here firms need to integrate customers' knowledge to be able to produce and, as different customers may be more or less able to express their needs, it may happen that the required knowledge is not available. For instance, in case of health needs, the patient may show symptoms that do not necessarily are to be attributed to the right illness. May be the illness is still to be discovered, or the patient may be unable or feel ashamed in providing additional elements that help a right diagnosis. In this case, UPC depend on the lack of the input (knowledge), not on its misallocation. Moreover, neoclassical theory has a great inconvenient, that of eliminating the problem of technological change due to knowledge advancement and, hence, the change in the production function itself. In case of complex needs production, such problem is fundamental as knowledge advancement obtained during the production process to some extent changes also the currently used technology through the development of new capabilities. During the production process with one specific client, the provider may progressively improve his/her ability to interact with all the customers in order to receive the right information. This means a progressive change of the technology of production, that is the production function. UPC are here the costs of not having acquired the capabilities required to satisfy the customer. The lack of correct knowledge to assess the patients' illness may be also due to the inability of the provider to interact with the patient. Again, such costs cannot be

[35] Leibenstein's (1966) conceives x-inefficiency as the degree of inefficiency which arises in the market because contracts for labour are incomplete, not all factors of production are marketed, the production function is not completely specified, interdependence and uncertainty lead competing firms to tacitly cooperate (Leibenstein 1966). In particular, Leibenstein identifies as sources of inefficiency the psychological pressure the different economic agents face and the burden of the habits, inertia and routines. However, he was accused of not having provided a formal theory of waste or empirical proof of the existence of x-inefficiency (Stigler 1976). Here, the identification of input uncertainty in case of need complexity may lead to a first attempt of providing a theory of waste.

explained as resulting from a misallocation of resources, but as the lack of the optimal amount of knowledge about how to satisfy complex needs.

Therefore, the theorization of UPC as expression of dynamic transaction costs in the production process, makes allocative efficiency a quite irrelevant standard for understanding the organizations' production efficiency in case of complex needs. In fact, the assumption of cost minimization does not allow to recognize UPC as additional to PC that emerge as resource waste, errors, clients' claims, and which in the end directly depend on the organizations' capacity to create new knowledge, foster coordination and, hence, productivity. According to a functionalist perspective, efficient is the organization that minimizes the use of resources to reduce customer uncertainty related to the satisfaction of complex needs. Now, we investigate to what extent organizations are functionally efficient in presence of this type of uncertainty.

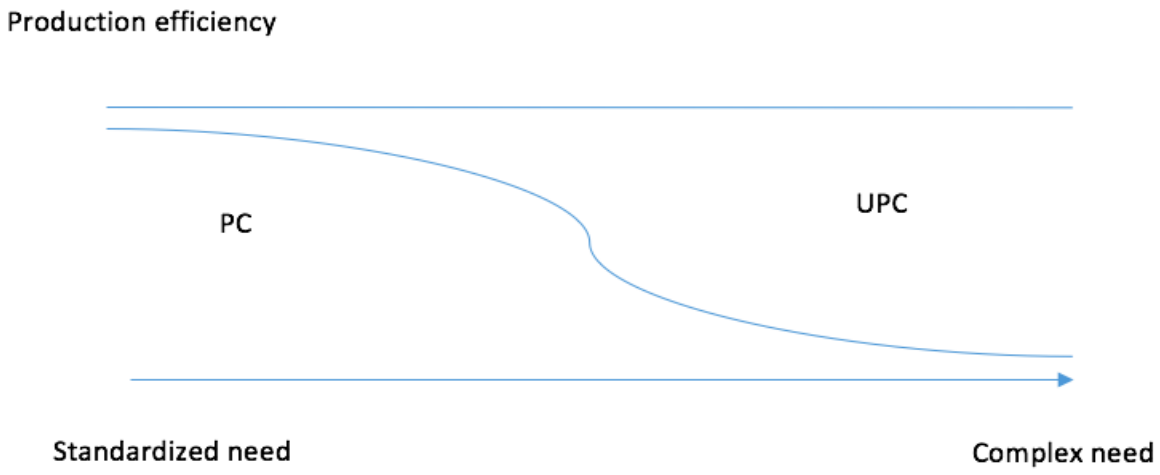
In the previous paragraph, we have seen that the organization is directly responsible for production efficiency by sustaining knowledge advancement in the production processes at t_1, t_2 etc. which involve both interactions customer-provider (in case of complex needs) and provider-provider (in case of complex and long-term needs). When needs can be standardized, input uncertainty and UPC are negligible and, hence, production efficiency largely depends on scale, specialization and scope economies that minimize PC. In this case, production efficiency can be considered as mainly depending on allocative efficiency; the use of strict standards and monetary incentives by the organization, sustains a standardized organization of the production process, which is consistent with the use of the modular market as main coordination mechanism in the promotion of allocative efficiency. On the contrary, when needs are complex, input uncertainty is high and production efficiency largely depends on the organization's ability to sustain efficient providers/workers' activity (involving knowledge advancement) and, hence, manage UPC. In fact, despite the important role that ICT technologies may play in facilitating the customer's involvement in the production process, satisfying complex needs implies the use of labor intensive technology on which depends the level of UPC. In the next sections, it will be shown that production efficiency (the level of UPC) depends on the organizational culture and in particular on the presence of democratic and open management. However, measuring the impact of organizational culture on productive efficiency is hard without objective measures. By referring to the Modularity Theory and behavioral theory, in the next sections, it will be shown that two, in

particular, are the organizational factors, related to organizational modularity, in charge of production inefficiency overtime; (1) the level of standards - constraining or enabling providers' knowledge advancement and the related production/coordination capabilities - and (2) the allocation of control rights, which may or may not incentivize the development of such capabilities. These organizational elements can be objectively measured by using working time (and related cost) as unit of measurement and, hence, by building different indicators of production efficiency that look both at the role of standards and workers' effort. In particular, concerning the role of standards, the costs of standards can be measured as the cost of time spent to satisfy standards and subtracted to a personalized interaction with the customer. When standards are strict, we expect large UPC. Concerning the allocation of decision rights that affect the incentive structure, the costs can be measured as hours of absence from work because of sickness or injuries. In case of a hierarchical governance, workers - not feeling empowered - are expected to become ill or injure themselves to a large extent and, therefore, UPC are expected to be high. Both indicators help the organizations to evaluate their role on reducing UPC over time and in comparison with other organizations.

At institutional level, the way standards are promoted is crucial to determine efficiency because – as we have seen - UPC and PC are driven by opposite levels of standardization. While UPC are reduced by existing coordination/production capabilities in the production process and, hence, require a few and general standards; the latter are reduced by hard standardization of the production process, which allows scale and specialization economies. Recognizing such opposition is extremely important to understand alternative possible paths of innovation in presence of intrinsically complex needs. The risk –in line with the prospect advanced by Industry 4.0 – is an indiscriminate application of standards at any organizational level to the purpose of reaching complete control of the production process and, thereby, reduce PC. In fact, when production process is aimed at satisfying intrinsically complex needs the perception of control is just illusory; the way input uncertainty reveals itself continuously changes and requires an answer that only human beings can efficiently give on the basis of their professional judgement and their flexibility. In this case, the cost of having invested in mechanization and automation is not repaid by savings due to increased control over the production process as UPC reasonably increase, even if maybe repaid by large reductions in labour costs and increased economies of scale, as it will be better shown in section 1.2.5.

In conclusion, the functionalist perspective of organizational efficiency not only helps to evaluate organizations in an evolutionary context, but also in a productive context. In fact, uncertainty and knowledge advancement may largely characterize production, making, hence, allocative efficiency a wrong standard for explaining productive efficiency. As UPC do not depend on resource misallocation, but on the lack of structural knowledge about how to satisfy customers' complex needs, the role of the organization for production efficiency becomes fundamental. In case of low input uncertainty, production efficiency depends on the level of PC that is minimized thanks to allocative efficiency. Instead, in case of high input uncertainty, production efficiency is sustained through the participative governance of the organization and in particular through 1) allocation of decision rights that incentivizes intrinsic work motivation and 2) the adoption of loose standards (not only in the production process but also in the broader economic activity) that support over time the development of coordination/production capabilities. The use of indicators based on working time allows measuring UPC as a percentage of total costs in case of low and high input uncertainty (see Figure 3).

Figure 3 – Source of production efficiency in case of standardized and complex needs



Source: Author's contribution.

1.2.4. Organizational modularity in presence of input uncertainty

In strategic management and industrial economics literatures the relation between product modularity and organizational modularity has been addressed by a number of studies (Sanchez and Mahoney 1996; Brusoni and Prencipe 2001; Sanchez 2000; Langlois 2002). While Sanchez and Mahoney (1996) focuses on the conditions under the basis of which product modularity enables organizational modularity; within the Modularity Theory, Langlois (2002) highlights that the relation is not deterministic and, in particular, that environmental dynamicity (economic change) intervenes in defining the modularity level of the production process and, hence, of the organization[36]. I intervene in such debate by recognizing a fundamental complication in the relation between modular product/service and modular organization. I argue that such relation is mediated (and made complex) by the complexity and variety of the customers' need, which – being factor to be integrated in the production of services, especially those to the person - make different organizational forms more or less functional to reach production efficiency over time. The issue is not whether and to what extent modular products design modular organizations and vice versa, but to what extent need complexity allows to efficiently modularize product/services and the organization. On the basis of the three types of need complexity identified above – *artificially* complex, *inherently* complex and *highly* inherently complex – I identify and 'predict' three different efficient levels of organization modularity.

1.2.4.1. Artificially complex needs and organizational modularity

According to Sanchez (1999), modular product architectures can be used to generate product variety and mass-customization, which in turn are able to target more finely grained customer preferences (Sanchez 1999). However, as sketched above, customers are uncertain (Langlois and Cosgel, 1996) and can acquire consumption capabilities only their needs can be standardized. Therefore, the possibility of generating mass customization products depends in the end on the type of need the organization is addressing. In this regard, I argue that when need complexity can

[36] For instance, the case of the automobile industry (Langlois and Robertson 1989) shows that periods of rapid remodularization of the production process often gives rise to the (highly nonmodular) forms of organization. The production techniques adopted for Model T were a remodularization of the manufacture of automobile parts. During the experimentation of the production process, interfaces were necessarily in flux. Hence, such experimentation required authority that the ownership rights on most of the stage of production allowed avoiding the DTC of bringing outside players into the process. The result was a highly centralized internal organization in presence of radical change. When change slowed, production was re-decentralized (Langlois 2002).

be managed by the organization, the application of a modular architecture to the product enables organizational modularity in the way Sanchez and Mahoney (1996) suggests:

> *We suggest that although organizations ostensibly design products, it can also be argued that products design organizations, because the coordination tasks implicit in specific product designs largely determine the feasible organization designs for developing and producing those products (Sanchez and Mahoney 1996)*

It is an organization's strategic choice that of maintaining need complexity and, hence, include the uncertain customer in the production process of the product/service. The organization decides to what extent involving the customers in the production process on the basis of a cost/benefit evaluation; the loss of profit opportunities - due to the loss of scale, specialization and scope economies - should be more than compensated by the savings for not having adopted standards and by profit opportunity for addressing a niche market. In fact, in so far as the production process is personalized, production efficiency increasingly depends on the reduction of UPC and the possibility to obtain such economies is limited. A 'compromise', in this regard, may be to modularize the product/service in order to involve the customer in just a few modules as in case of hobbyists[37] (Langlois and Cosgel, 1996). In this way, the customer's participation, for instance, to the design modules can be a source of different cost economies, by allowing a reduction of R&D costs, test market costs, promotion cost etc. Moreover, the modules, despite their internal complexity, are connected through standardized interfaces so that the non-standardized coordination with customer in a few production phases does not prevent the standardization of the overall production process. And in line with Sanchez and Mahoney (1996) a standardized production process enables the modular coordination of the production system.

The impact of product modularity on modular production process and organization are well synthetized by Sanchez and Mahoney (2012);

> *'If a firm adopts a modular architecture development process in which it (i) first focuses on defining and then standardizing (i.e., freezing) the interfaces between the functional components in a modular architecture, and then (ii) constrains the development of all components to conform to the standardized interface specifications for the modular architecture, then the tasks of developing*

[37] '*[…], hobbyists were terribly important in shaping the structure of the early microcomputer industry (Langlois 1992). These were largely final consumers — people who wanted their own computers for personal amusement. Not only did no consultancy services exist on the market, few of the necessary complementary capabilities existed on the market. So end-users integrated backward into the production of many components. And because these hobbyists did not possess the range of capabilities typical in large computer firms, each was forced to concentrate only on a small subset of complementary activities, which necessitated standardization and modularity in architecture to permit autonomous innovation.'* (Langlois and Cosgel 1996)

individual components become "loosely coupled" and can then be undertaken simultaneously by distributed development centers'(Sanchez and Mahoney 2012)

Depending on the cost/benefit evaluation the organization decides which type of market to address (niche or mass market) and, accordingly, how to modularize the production process and the organization. When the choice is for a mass customized market, complexity of the need and, hence, of the product/service is reduced and the production process is efficiently organized in a modular way. The organizational form of the economic activity may result highly modular as well, but, in line with Modularity Theory, it is not necessarily modular; this aspect could depend on the level of DTC in presence of economic change. On the contrary, when the choice is for a niche market, complexity of the need is high and we will discuss below such a case with reference to inherently complex needs.

1.2.4.2. Inherently complex needs and organizational modularity

The role of need complexity in mediating the relation between product and organizational modularity is well identifiable in the case of inherently complex needs. More than products, in this case we deal with services, which can be reasonably assimilated to production processes. On the one hand, even in case of products, to the extent that the customer is involved in the production process, indeed the organization in that moment is providing a service. Moreover, inherently complex needs are especially satisfied by professional services (such as health care and legal services). Such overlapping between service and production process allows to focus our attention on the relation between production process modularity and organization modularity. In case of inherently complex needs, the production process cannot be completely modular because the customer does not have the consumption capabilities to satisfy his/her own vague need and the provider has to include the customer in the production process if the will is to produce a service that answers the customer's needs. In this case, we have seen, production efficiency largely depends on the UPC level. And if the production process/service is *non-modular* (since the customer is included in the production process), then the organization of the production system cannot be modular as well. This is because not only productive efficiency (the level of UPC) depends on the way the provider coordinates with the customer, but also because the way the provider coordinates with the customer depends on the level of coordination/production capabilities accumulated so far by the provider. A modular production process would produce high UPC, and if supported by completely modular coordination with the customer would produce high

UPC also over time as the capabilities required are not developed. On the contrary, the creation of 'ambiguous' boundaries with the customer, that involve some sharing of decision rights, would reduce UPC and more broadly UPC over time. The production process, however, should not be completely non-modular; even if the application of production routines is not standardized (it requires professional judgement), the applied routines are standardized (Langlois and Savage 1997). By not imposing how the production process should be performed, such standards enable the development of coordination/production capabilities with the customer in the production process. Moreover, standards support not only loose coordination between the customer and the provider but also among providers themselves according to a process of *pigeonholing*[38]; on the one hand, the customer can identify the type of professional he/she needs, on the other hand, professionals can organize themselves in different specialties and subspecialties and, thus, know when they should interact with each other (Langlois and Savage, 1997). In line with Langlois and Savage (1997), I argue that in case of complex needs, the most efficient organizational form for professional services is a *loosely coupled structure*, the network, but the reason is also another and equally important. For Langlois and Savage (1997), the network is the most efficient because - while providing competition incentives like the market – it supports the advancement of knowledge like hierarchy (Langlois and Savage 1997). In presence of input uncertainty, however, another reason justifies the network structure as the most efficient modular organization: its support to production efficiency. Differently from the highly modular organization of the production process that can occur both in the market and in hierarchy, the network structure enables knowledge sharing with the customer in each production process at any point in time and more broadly the development of coordination/production capabilities required to create a common structure of knowledge with the consumer, which is functional to the reduction of UPC. Moreover, over time the network allows other providers to indirectly contribute to production efficiency thanks to the integration of idiosyncratic knowledge in other contexts (personal meetings, conventions, scientific papers etc.).

[38] identified by Mintzberg(1979) and cited by Langlois and Savage (1997): *'clients are sorted into categories according to which subset of standardized tools best fit their needs'.* (Langlois and Savage 1997)

1.2.4.3. Highly complex needs and organizational modularity

The efficient modularization level changes in case of *highly* complex needs (for instance long term needs satisfied by long-term care services and educational services). If the customer does not know today the characteristics of the needs to be satisfied, he/she even more does not know them when they change through different states of the world. In this case, the UPC level depends not only on the provider's capabilities to involve customers but also on the coordination capabilities developed with other providers in order to *directly* integrate their idiosyncratic knowledge in the production process. In this case, standards should enable a highly non-modular production process. In fact, the provider has to exert *professional judgment* by taking into account the customer's idiosyncratic knowledge and the knowledge emerged in the interaction with other similar and complementary professionals. Consistently the organization of the economic activity should be highly non-modular. On the one hand, the organization should sustain 'ambiguous' boundaries provider-customer because, by sharing some decision rights on the production process with the customer, the provider can exert a professional judgment that reduce UPC. On the other hand, the organization of providers should be non-modular to support through qualitative coordination (Langlois 2002) the exchanges of varied knowledge, human routines, skills and mentalities required to satisfy the customer. Differently from the case of complex needs, here the non-modular organization of providers is *directly* functional to the increase of productive efficiency over time because any advancement of knowledge is directed to shape the professional judgement in each production process.

However, since the production process is non-modular, the non-modular organization of the economic activity cannot be hierarchical. In fact, the centralization of information would limit internal knowledge transfers (Hayek, 1967). What instead is required is an internal structure *based on rules* that - even if not formally defined - always results from the interaction between the organization and the customer and in which knowledge transfers are more flexible and open than in the case knowledge has to pass through a center (Hayek, 1967). Accordingly, in such a structure, providers, differently from the network of professionals, *share the ownership* on production/coordination knowledge to perform their day to day operations with co-productive customers. They become *workers,* whose autonomous professional judgment is exerted by taking advantage of the common capabilities produced in the interactions with the other workers during the production process. And on the basis of widely accepted rules, they coordinate their efforts to

create qualitative coordination with customers. In general terms, we can assume that organizations face similar proportions of clients with uncertain needs if they provide services aimed at satisfying the same typology of needs. However, organizations with a good reputation about the capability to provide personalized solutions, could attract clients with higher level of uncertainty as these attribute a higher value to such organizations' capability. The same occurs concerning the objective complexity level of the need; organizations with a good reputation about the capability to obtain good results in case of complex needs, could attract this category of clients.

To sum up, need complexity has been identified as a fundamental reason for explaining the relation between modular product/service and modular organization. Need complexity defines to what extent the production process can be modularized and, hence, which organization modularity level is efficient. In fact, when needs are complex, the organization – through its standards and coordination capabilities - directly affects the level of non-modularity in the production process, by allowing more or less participation of the customer to it. In this case, organizational efficiency directly determines productive efficiency influencing the level of UPC. Input uncertainty does not always emerge; need complexity can be sometimes the result of an organization's strategic choice to address a niche market on the basis of a cost/benefit evaluation. However, when input uncertainty emerges because of inherent need complexity, standards have to enable coordination/production capabilities with the customer and the most efficient organization is a network organization that enables 'ambiguous boundaries' between provider and customers while supporting over time non-standardized coordination with other providers. In case of highly complex needs, standards – besides enabling coordination/production capabilities with the customer – have to support also the development of coordination capabilities among providers. In this case, the most efficient organization is a non-modular and decentralized structure in which also providers share some decision rights thanks to common ownership on the knowledge developed together over time (See Table 1).

Table 1 – The effect of modularity of production on the modularity of the organization depending on the type of need.

Need content	Standardized	Complex	Highly complex
Source of production efficiency	**Reduction of** PC	**Reduction of** PC **and** UPC_1	**Reduction of** PC**,** UPC_1**and** UPC_2
Production process	**Modular**	**Modularized – involvement of customer's non-standardized knowledge**	**Modularized – involvement of customer's and providers' non-standardized knowledge**
Relationship with customer	**Transaction**	**Ambiguous boundary**	**Ambiguous boundary**
Incentives	**Alienation rights**	**Alienation rights and Decentralized decision rights**	**Decentralized decision rights**
Standards	**strict**	**Enabling**	**Enabling**
Organizational form	**Highly modular (market)**	**Loosely coupled (network)**	**Non-modular and decentralized (participative governance)**

Source: Author's contribution

1.2.5. The Non-Vanishing Hand

As seen in section 1.1.1, Langlois (2006) explains the historical passage from vertical integration (described in the *Visible Hand* by Chandler) to vertical disintegration with the reduction of DTC over time, and synthetizes the concept with the expression *Vanishing Hand* (Langlois 2003). However, I argue that the growing importance of customer uncertainty for economic organizations partly complicates the analysis, as such type of uncertainty prevents the complete modularization of the economic system.

The role of the customer has radically changed since the beginning of the 19th century. In the Western countries, the customer is no longer satisfied with standardized and anonymous mass

products and services. Moreover, for cultural reasons, the customer feels involved in the production process of services when needs satisfy human rights such as health care, long term care, education. As needs become increasingly complex, production efficiency reasons prevent the adoption of modular production processes and, hence, of modular organizations. At organizational level, customer uncertainty involves that organizational efficiency depends on production efficiency (UPC – due to lack of capabilities in the production process - are the 'productive side' of DTC). Instead, at managerial level, it means that no productive efficiency consideration can be achieved without an adequate analysis of the organizational structure. With high customer uncertainty, UPC and DTC are large and modular organizations are inefficient against them. Thus, customer uncertainty determines the degree of freedom of economic agents to modularize the production process and the organizations' architecture toward the market structure. In other words, it slows down the *vanishing hand* process described by Langlois (2003), indeed supporting an opposite phenomenon which could be defined as *Non-Vanishing Hand*. In this scenario, elements of mechanization and automation that favor economies of scale and specialization, can be efficiently introduced but only if not directly used to manage input uncertainty. Otherwise, their presence would be not only ineffective, but even counterproductive as it could instigate unexpected and costly customers' reactions. When needs are complex, UPC make it highly difficult to reach scale and specialization economies. In this case, the solution may be to enter in deep contact with the customer and understand whether there are parts of the production process that the customer can learn to do autonomously or that can be standardized without the risk of increasing UPC.

However, input uncertainty can be also faced by adopting an alternative strategy, risk-pooling. Instead of facing directly customer's uncertainty, this is transmitted to insurance companies that collect customers' risks. In this way, the organization has the advantage to enlarge its dimensions and address a larger number of clients, with the possibility of introducing mechanization and automation in most of the production process and, hence, increasing economies of scale and specialization. Therefore, the responsibility about which path to follow to face input uncertainty, is on the institutional environment in which the economic organizations play. The crucial role of public institutions should be considered especially in case of customers' needs promoting fundamental human rights, as by adopting the risk-pooling strategy, customers' needs are not satisfied by the organization. What may happen is that while higher level institutions

(Constitutions) defend formally the existence of fundamental rights – lower level institutions (ordinary national and regional laws and regulations) define strict standards concerning how to perform the production process. In this way, in fact, the human right content of such needs is challenged as regulation may force organizations to introduce bureaucracy and standardization and exclude the customer from the production process. As UPC are likely to be high, the organizations implicitly adopt the risk-pooling strategy against input uncertainty. Today, high standardization of the organizational processes is wrongly justified by the need to increase control over production and is enhanced by the prospects of Industry 4.0. In the highly-standardized health care and long-term care sectors, hospitals and nursing homes make implicit use of risk-pooling strategy by paying insurance premiums against the risk of patient claims. Indeed, all these organizations need to ensure themselves but only those not investing in production capabilities (reducing UPC), are likely to make larger use of risk-pooling. Such strategy, however, is costly as may lead customers to start litigations even in the absence of workers' errors. It has been shown that in the US most malpractice claims indeed do not actually involve a negligent injury as two important studies implicitly show; the Harvard medical practice study (Brennan et al. 1991) and Utah/Colorado medical practice study (Studdert et al. 2000). Also, emotion distress and psychological injuries can cause claims (Stevenson and Studdert 2003) and, hence, increase the level of LTC insurance premiums. Therefore, by adopting a risk-pooling strategy, input uncertainty - along with producing UPC in the production process[39]– affects the organization's reputation and contributes to determine the level of the insurance premiums paid. And, insofar as customers, for cultural reasons, will increasingly expect to receive high-quality personalized services, insurance premiums may become progressively non-affordable.

In conclusion, from a functionalist perspective, we have no way of knowing *ex ante* which strategy – investing in capabilities or in risk-pooling – is the most efficient today for economic organizations. However, since such services may promote fundamental human rights, organizational efficiency cannot be the only source of economic concern. In fact, private UPC may become social costs; in so far as client's demand is not satisfied, the consequence could be a reduced level of population health, with consequent high social costs. This argument should be taken into account by policy-makers that usually are called to subsidize such organizations for equality reasons.

[39] including also the costs for customer claims in terms of time, administrative costs and attorneys' expenditure.

1.3. Non-Modularity and Intrinsic Motivations

1.3.1. DTC as Lack of Intrinsic Motivations

The Modularity Theory holds that the main reason for the emergence of non-modular organizations is the overcoming of DTC, which – by hindering a smooth coordination among agents – prevent tacit knowledge transfers and, hence, knowledge advancement. Whether such costs reflect also the low individual effort in transferring tacit knowledge is overlooked by this evolutionary theory. Yet, since the effort employed in tacit knowledge transfers cannot be monitored nor measured, free riding could occur. In this paragraph, after having introduced the behavioral studies on the role of extrinsic and intrinsic motivations for tacit knowledge transfers (Frey, 1997; Osterloh, Frost and Frey 2002), I show that DTC may partly emerge as lack of intrinsic motivations to work, which support knowledge sharing. Then, by enlarging the evolutionary perspective to a behavioral one, I discuss to what extent non-modular organization may efficiently reduce DTC by sustaining intrinsic motivations rather than extrinsic ones. I maintain that while the sharing of alienation rights supports weak extrinsic motivations to knowledge transfers, the internal distribution of decision rights promotes cooperation in knowledge, insofar as it meets workers' intrinsic motivations to work, in particular, the satisfaction of customers' needs. Then, in par. 1.3.3., I argue that the network's horizontal coordination and the bottom-up emergence of participative governance in firms are the most effective in reducing UPC respectively in case of complex and highly complex services.

Over the last few decades, behavioral economics has recognized in intrinsic motivations –along with the extrinsic ones – a fundamental engine of economic activity and, more specifically, of knowledge advancement. Extrinsic motivations occur when individuals can satisfy their needs indirectly through monetary compensation. Conversely, intrinsic motivations are addressed when the individual finds immediate satisfaction in undertaking an activity, in relation to the activity's flow, to a self-defined goal or to the obligations of personal and social norms for their own sake (Deci and Ryan, 1985; Frey, 1997). The first type of motivation supports competitive behaviors, the second one supports cooperation, trust, accountability (Tyler and Blader, 2000). As crowding effects characterize the relation between extrinsic and intrinsic motivations (Frey 1997), the organizations' role is to carefully define the set of incentives so as to avoid that intrinsic motivations – when required - are crowded-out by extrinsic ones. In particular, intrinsic

motivations are required when agency problems cannot be solved by monitoring. Inter alia, this occurs when agents are required to provide effort that enhances tacit knowledge transfers. When the individual is the only producer of knowledge advancement, he/she can be compensated according to his/her contribution to final output and, hence, the organization can adequately adopt monetary incentives. Instead, in case of tacit knowledge transfers, the person cannot be compensated on the basis of his/her particular effort as a 'social dilemma' arises (Osterloh, Frost and Frey, 2002); in fact, the contribution of tacit knowledge to a team cannot be measured (problem of asymmetric information) and the danger is the undersupply of such resources[40] by individuals who cannot be excluded from obtaining the benefits of the others' efforts (problem of free riding). In this case, the organization's role should be to manage extrinsic and intrinsic motivations in order to avoid that extrinsic motivations dampen the individuals' source of intrinsic motivations to work (Frey 1997) and, hence, that individuals free ride when their effort or output is not observable and measurable. More specifically, the organization's role should be to reduce the use of monitoring, sanctions, and bonuses, as these practices may reduce self-determination and shift the locus of control from inside to outside the person (Osterloh, Frost and Frey, 2002). Conversely, the organization promotes intrinsic motivations by involving individuals to the definition of common goals; by fostering the emergence of self-organization and by sustaining personal relationships that raise the intensity of intrinsic motivations to cooperate and, more broadly, team spirit (Osterloh, Frost and Frey, 2002).

Modularity Theory does not recognize the presence of a social dilemma in the high levels of DTC. Here opportunism – emerging because of structural uncertainty - is explicitly considered in the facets of hold-up risk and the risk of free riding in effort levels to produce knowledge advancement (Langlois 2002). No role it plays in determining low effort levels in the transfer of tacit knowledge and, hence, in the increase of DTC. However, in the light of the behavioral perspective above described, I argue that DTC partly reflect the existence of such social dilemma. Their emergence is due not only to the cognitive distance, among different agents, produced by decentralized markets, but also to the lack of trust and cooperation spirit necessary to sustain the individual effort toward the creation of a common ground for knowledge integration. So far, DTC

[40] In this perspective, organizational tacit knowledge is called a '*firm-specific pool resource'*, namely a good (1) whose access is restricted to members of the firm in question, and (2) firm members have open access. As a consequence, firm members may free ride on such resources of the firm. While in case of Ostrom's *common pool resources*, the risk is the overuse, in this case the risk is the undersupply.

have been considered high in the modular market because standards and decentralized ownership rights create 'physical barriers' to tacit knowledge transfers and, hence, increase the costs of persuading, negotiating and coordinating with other agents. However, such costs are reasonably high also because the modular market supports competition and mistrust, rather than trust and cooperation, and crowds out intrinsic motivations to work necessary to support tacit knowledge integration. For this reason, the level of DTC depends on the incentive structure provided by economic organizations. In this perspective, which is both *evolutionary* and *behavioral,* the behavioral social dilemma arises in an evolutionary economic environment in a so fundamental way that, in fact, the origins of innovation and economic change resides not just in the evolving interaction between modular and non-modular economic organization, but firstly in the way human beings shape their own environment in order to be incentivized by it to work. In particular, the non-modular organization *emerges because it is thought out* as a place adapt to support individuals' intrinsic motivations to work whose satisfaction requires prolific knowledge transfers among agents.

In conclusion, because of a social dilemma, intrinsic motivations to work- rather than extrinsic ones – are the most able to support efficient tacit knowledge transfers. DTC partly reflect the existence of such social dilemma and, hence, require organizations able to incentivize knowledge transfers. As the modular market produces extrinsically motivated coordination that crowds out the agents' intrinsic motivations to work (Frey, 1997; Osterloh and Frey, 2000; Osterloh, Frost and Frey 2002), the issue is to understand whether and to what extent non-modular organizations incentivize the reduction of DTC more efficiently than the modular market.

1.3.2. Non-modularity as support to the agents' intrinsic motivations

In the Modularity Theory, non-modular organizations – by repartitioning ownership rights in different hands – allow a 'less explicit' coordination than the modular market (Langlois 2002;2006). The centralization of ownership rights in few hands facilitates the integration of knowledge and, hence, lower DTC by reducing the physical and cognitive distance among agents who are no longer independent owners in a decentralized context. But it is not clear to what extent the centralization of alienation rights also incentivizes the decrease of DTC. According to Langlois (2002*),* alienation rights are the only useful incentives provided by non-modular organizations; such rights not only protect against the hold-up risk, but also provide adequate incentives to the owner by making the value of the asset (to which the owner has a residual claim) measurable on the market (Langlois 2002). Even if the agent was tempted to free ride, the owners' alienation right on the asset would incentivize the agent to contribute maximum effort anyway. Similarly, tacit knowledge transfers would be incentivized by the increased value of the asset on the market. In Langlois and Savage (1997), such point is made explicit; professionals are interested in sharing their tacit knowledge in the professional network because the increased knowledge would allow them to sell their services at a higher price. This argument is plain when the individual agent is the only responsible for the asset value or when individual effort is measurable and can be proportionally paid back. But it is unconvincing that the increased market value is sufficient to incentivize tacit knowledge transfers when neither individual effort nor output can be measured. In this case, sharing alienation rights on the final output provides weak incentives to cooperate to knowledge advancement. As Osterloh, Frost and Frey (2002) argue, in presence of a social dilemma "*[…] firm members have to choose whether they follow a competitive course of action that furthers their own interests at the expense of others, or contribute to a cooperative solution that furthers joint interests* (Osterloh, Frost and Frey 2002). In other words, in presence of a social dilemma, the profit interest backed by alienation rights is poor compared to other more contingent interests. The possibility to alienate the (portion of) assets is likely to be less incentivizing than the possibility to save energy at work in order to have fun at night. Individuals more likely decide on the basis of motivations that are related to their working activity and environment, including personal relationships, and that in fact may determine for the most part

the quality of their job and lives[41]. In this context, it is fundamental that the organization's ownership rights support intrinsic motivations to work that favor tacit knowledge transfers. In the light of such argument, the ownership rights can be distinguished in two classes – modular and non-modular - depending on their different ability to incentivize knowledge transfers and, hence, DTC decrease. Alienation rights (even when shared) can be considered as *modular* because they hardly incentivize the contingent individuals' will to transfer tacit knowledge to colleagues. Conversely, internally partitioned decision rights can be considered as *non-modular* ones insofar as such rights – by sustaining worker's self-determination through his/her own contribution to knowledge advancement – favor DTC reduction. In this regard, workers' empowerment may be constrained/enabled by standards, hetero-defined rules, procedures and owners' and managers' authority. While the hierarchical organization – based on highly constraining standards and strict internal procedures – represents an organizational solution that limits workers' active participation to knowledge growth; a decentralized organization – by sustaining the development of trust and cooperation – recognizes workers as the *de facto* owners of the possibility to transfer knowledge and empower them to contribute to knowledge advancement during their daily several activities. For this reason, the non-modular organization able to promote organizational efficiency through DTC reduction always adopts cooperative mechanisms to support knowledge sharing. This issue will be better addressed in the next paragraph where I analyze such problem with reference to complex and highly complex needs, namely in case the incentives to knowledge sharing affect also the efficiency of the production process (UPC).

In conclusion, enlarging the evolutionary perspective to a behavioral one allows better understanding of non-modular organizations and, in particular, of their internal partition of ownership rights. The modular market shows high DTC not only because of the cognitive distance due to knowledge decentralization, but also because of its incentive structure that favors mistrust and competition. Instead, within non-modular organizations, the possibility to support knowledge transfer and the related organizational efficiency is assigned to a horizontal partition of decision rights. While shared alienation rights hardly incentivize cooperation, an internally decentralized

[41] The crucial nexus is the one between ownership rights, intrinsic motivations, non-self-seeking behavior (trust and reciprocity), co-operation and knowledge generation. One basic question in this respect is: "Why intrinsic motivation should be linked to non-self-seeking behavior and co-operation?" Maybe be obvious, but we need to explain very well.

distribution of decision rights favors workers' empowerment by supporting his/her own participation to knowledge advancement and, thus, promotes the overcoming of DTC.

1.3.3. UPC and internal repartition of decision rights

The enlargement to a behavioral perspective is especially compelling to understand how to incentivize transfers of tacit knowledge when these are functional to the efficient production of complex and highly complex services. In fact, knowledge integration - by supporting the growth of coordination/production capabilities – influences not only the level of DTC but also of UPC, here considered as costs due to under provided effort and the related underdevelopment of capabilities in service personalization. Given the functional role of knowledge sharing to organization and productive efficiency, it is important to establish how the organization supports the incentives required to personalize services in case of complex and highly complex needs.

1.3.3.1. Professional Network structure

In professional network, individual effort is measurable thanks to the increased value of the service on the market, so that extrinsic motivations may be regarded as sufficient. However, a social dilemma arises when providers are called to share their knowledge and new practices within the network. In Langlois and Savage (1997), the network organization incentivizes professionals' tacit knowledge transfers thanks to alienation rights, and in particular to the increased market value that the service obtains due to knowledge transfers. However, such argument does not take into account that individuals may restrain such transfer because not only their knowledge may be a source of competitive advantage for themselves and for competitors, but also because their intrinsic motivations lead them to provide minimum effort, since they are only weakly related to market value. Therefore, I argue that what favors tacit knowledge transfers in the network is not much its similarity with the market (namely, the attribution of alienation rights to the individual professionals) but mainly its non-modular character, that is its support to providers who are intrinsically motivated to satisfy the customers' needs. The network structure in fact – by adopting a limited number of standards and by fostering professional values, reciprocal esteem and trust - produces a decentralized partition of decision making rights that supports individuals' intrinsic motivations to contribute to knowledge advancement in order to improve customer satisfaction over time. The adoption of few standards is consistent with the network goal to facilitate

knowledge sharing. Too strict standards, instead, would prevent professionals to share their knowledge, because of the fear to be sanctioned for not having followed shared procedures (Savage and Robertson 1997; Langlois and Savage, 1997). In addition, seminars, conventions, magazines support knowledge transfers that allow providers to indirectly allow the personalization of future services and, hence, increase the overall customers' satisfaction. This leads to the reduction of the UPC_1 over time (mistakes, damages, waste of resources, legal claims etc.).

In conclusion, the network structure supports tacit knowledge transfers among professionals thanks mainly to the low standards and decentralized repartition of decision rights, which support their intrinsic motivations to 'indirectly' satisfy customers through their contribution to knowledge progress.

1.3.3.2. The emergence of Participative Governance

In case of highly complex needs, the personalization of the service is the result of a work-team and, thus, the social dilemma emerges during the daily production process. Workers, while providing services, need to rely on the contribution of knowledge, experience and sensitivity of the other workers in order to deal with the customer's personalized needs. If they are intrinsically motivated to satisfy the customer, they know they have to cooperate with the other providers. However, the opportunities to free ride with impunity occur continuously because of unobservability and contract incompleteness. For the organization, this means, on the one hand, an insufficient development of cooperation capabilities among providers and a related high level of UPC_2 (waste of resources, many injury- and sick- leave hours, legal claims etc.) and, on the other hand, an inadequate growth of capabilities in the interaction with the customer that leads to high UPC_1. In this context, fundamental organization's goal is promoting the reduction of UPC, by knowing that when workers are satisfied for having satisfied the customer, UPC_2 are reduced, along with the UPC_1. Thus, central role of the organization is supporting cooperation, reciprocity and trust among providers and with the user, by investing in communication and observation of the customers' needs. In particular, the organization should promote workers' capabilities in customer's satisfaction through increased self-organization and self-control. The asymmetric information problem causing the social dilemma during the production process requires us to focus on the governance level that directly manages working relationships[42]. In fact, even in case of a cooperative organization that necessarily adopts participative praxis in strategic decision-making, the organization of daily production process could be hierarchical, namely characterized by an internal organization of labor based on vertical relations and strict respect of the way and

[42] In general terms, corporate governance allows to reduce coordination problems due to asymmetric information and diverging interests among different stakeholders, especially shareholders and managers. According to Alagoa (2015), "*corporate governance is the system of rules, practices and processes by which a company is directed and controlled. It essentially involves balancing the interests of the many stakeholders in a company, which include its shareholders, staff (including management), customers, suppliers, financiers, government and the community; and provide the framework for attaining the company's objectives*" (Alagoa , 2015). Compared to corporate governance, cooperative governance shows a specificity related to the type of ownership which is the potential misalignment between individual and cooperative objectives of members (Sacchetti and Tortia, 2014). Cooperative organization are controlled on an equal voting right basis by different typologies of patrons (e.g. producers, workers, consumers). In this context, the additional role of governance is to reduce coordination problems of members related to different interests at individual and collective level. Concerning worker cooperatives, the governance - thanks to democratic mechanisms - supports strategic decisions consistent with economic sustainability, employment stability and goals of mutual benefits (Sacchetti and Tortia, 2014). However, we have seen that because of a social dilemma, the problem of misalignment between individual and collective interests can occur also during the daily productive activity. Because of this, our focus is on the specific governance level of working relationships.

time of implementation of production rules and procedures (standards and internal routines) established by the organization. In this case, since decision rights are maintained in the hands of the management, workers are essentially executors of the rules and procedures, and their greatest source of motivation is necessarily the extrinsic motivation, which risks to crowd-out the intrinsic one. However, because of social dilemma, it is required a cooperative governance over the daily production process characterized by an internal organization of labor based on inclusion, participation and horizontal relations and in which standards are sufficiently loose and general (not detailed and bureaucratized, not administered in a rigid way etc…) to facilitate the bottom-up development of rules. Decision rights are shared among workers who are able to exert their own professional judgment and, thus, to nourish intrinsic motivations and sense of responsibility to support the organizations' goals (widely overlapping and coherent with employees' goals).

In the light of the evolutionary MTF perspective, this type of governance translates into a progressive participative governance, which is characterized by the sharing of decision rights on the organization and management of productive tasks that allows increasing self-organization and self-control of quality standards. In fact, supported by the creation of a common strategy based on cooperation, trust and reciprocal esteem among members, workers participate to the organization of the production process, and then exercise decision rights on the way and time of implementation of the production process. This is the way in which a multi-stakeholder governance emerges. The appropriate ways and times are progressively self-managed by the staff on the basis of self-defined rules that the group applies to itself and shares. In this way, the participative governance is effective in incentivizing knowledge transfers among workers and, consequently , in reducing both $UPC_1$and UPC_2.

1.4. Conclusions

In this chapter, the study of the Modularity Theory of the Firm has allowed to investigate how customer uncertainty in the production process affects organizational efficiency and imposes constraints to the organizational architecture. What emerges is that production efficiency depends on the organization's system of ownership rights and, in particular, the linked level of standards and type of incentives. In general, few standards and a decentralized repartition of decision rights enable and incentivize knowledge transfers among providers and with the customer, support the development of capabilities in the production process and allow to reduce the unexpected

production costs. Such costs are the 'productive side' of the dynamic transaction costs and emerge because of the lack of capabilities in the personalization of the product/service. Such capabilities concern the interaction with the customer (the lack of which leads to UPC_1), but can also concern the interaction among providers in case the personalization of the services involves knowledge sharing among providers (the lack of which leads to UPC_2). In case of complex needs, the boundaries with customers are ambiguous as some sharing of decision rights is required in order to favor the exchange of the customer's idiosyncratic knowledge. The most efficient organization among providers (according to a functionalist perspective) is a loosely coupled organization in which decentralized decision rights enable and sustain – mainly through intrinsic motivations - the general advancement of knowledge among professionals aimed at improve the personalization of services over time. In case of highly complex needs, requiring the knowledge contribution of more than one provider, the most efficient organization (according to a functionalist perspective) is highly non-modular and internally decentralized. Such characteristics allow the required flexibility in the management of knowledge and sustain providers' intrinsic motivations to transfer knowledge in the production process.

In the following chapter, I am going to analyze in depth the role of customer uncertainty for the efficiency of the production process and, hence, how such uncertainty creates constraints to an efficient design and management of the production process.

Chapter 2. Customization or Standardization? Service modularization as efficient 'compromise'

Satisfying customers occurs at some costs. The organization's goal is to keep such costs under control through an efficient design and management of the production system. In both manufacturing and service settings, production costs can be minimized thanks to the standardization of the production processes, but unclear are the constraints to an efficient design due to the involvement of the customer both as input resource and as co-producer (Bowen and Jones 1986; Larsson and Bowen 1989; Pitt and Foreman 1999). In particular, customization is usually seen as expression of 'luxury economy', the privilege of a non-price-sensitive élite (Sundbo, 2002), rather than expression of an efficient strategy against unexpected production costs due to customer uncertainty in the production process. The lack of clarity on customer's role in service design does not permit to fully recognize in modularization the efficient 'compromise' between customization and standardization. According to Sundbo (2002) among the opposite standardization and customization tendencies, modularization appears a valuable third way, able to guarantee cost effectiveness while promoting customization (Meyer and de Tore, 2001; Sundbo, 2002; Pekkarinen and Ulkuniemi 2008). But, as seen in the previous chapter, cost effectiveness does not depend only on the traditional production costs, but it is also a function of the UPC level or, in other words, of the level of capabilities developed for satisfying the customer. Modularization, thus, supports cost effectiveness mainly as decomposition principle that - by minimizing interdependence between modules and maximizing interdependence within - separates what can be standardized from what cannot be, especially idiosyncratic knowledge transfers (Balwin and Clark, 1997; Langlois 2002). In this way, it allowing on the one hand, the exploitation of scale economies and, on the other hand, the development of the capabilities required for an efficient management of the system. In the first chapter, we have adopted the modularity principle to identify the constraints that customer uncertainty imposes to an efficient organization's architecture; in this chapter, we analyze the conditions imposed at the level of production process design and management.

Service management and marketing literature will help us in this investigation thanks to their focus on the role of customer as input and as co-producer in the production processes (Bowen and Jones 1986; Larsson and Bowen 1989; Pitt and Foreman 1999; Ojasalo 2003). Even if customers can be involved in the production process of goods, in services the simultaneity of production and

consumption necessarily involves at least the presence, if not the active involvement, of the customer at the moment of production. Such literature, hence, will provide us useful conceptual tools to gain insights into how the service system should be designed and managed in order to satisfy customers' complex needs. The main issue is investigating what is the balance between customization and standardization and, in particular, what is the efficient modularization level in service design to satisfy unique customers' needs. Nowadays, two are the identified service design solutions; 1) mass-customized services resulting from the mixing and matching of standardized solutions and 2) tailored services obtained by customizing all the phases of the services. The first is characterized by high modularity level, the second one by minimum level. The 'compromise' modularization strategy, instead, is still in need of more extensive research. This chapter, therefore, addresses the following research question: *how does modular service design and management contribute to efficiently manage customer uncertainty due to complex needs?*

In the first section, I theoretically investigate how customer uncertainty due to complex needs affects productivity and, hence, imposes constraints to service design. After having shown that the customer introduces uncertainty in the production process as input resource and as co-producer (Bowen and Jones 1986; Larsson and Bowen 1989), in the light of the service productivity model (Ojasalo 1999; Gronroos and Ojasalo 2004; Gronroos and Ojasalo 2015) I argue that service productivity is a function of internal efficiency (manufacturing based efficiency) and external efficiency, here defined not as customer's quality experience (Gronroos 2000) but as the service quality promoted by the organization and, in particular, by its coordination/production capabilities. While external efficiency is pursued over time by reducing UPC (due to the lack of organizational/production capabilities); internal efficiency is obtained by minimizing PC. Moreover, UPC level along with PC level, may be considered as a fundamental indicator of the quality of service design and management. A low level of both measures indicates a high-quality service design and vice versa. Drawing on this conceptual framework, in the second section, I orient my evaluation about the *platform* application of the modularity principle (Meyer et al. 2007; Pekkarinen and Ulkuniemi 2008), which is generally adopted in service design. I argue that such approach produces two inefficient forms of service design in case of customer uncertainty due to complex needs. The first form - obtained by mixing and matching standardized modules (*mass-customization*) – is inefficient because it renounces to reduce UPC over time and hence to improve external efficiency; the second one – obtained by customizing all the input resources and service phases (*customization*) - renounces to minimize PC by not creating standardized back

office phases in which pursuing scale economies. In par.2.1.3., in line with Larsson and Bowen (1989) suggestion about the need of separating front-office activities from back-office ones in presence of CU, I propose, the *blueprinting approach* as alternative method, based on the blueprinting technique (Shostack 1982, 1984, 1987). This service design method, by separating between onstage environment and backstage one, clearly identifies the customer's role in service design (Bitner et al. 2007) and, hence, may constitute a valuable instrument to manage customer uncertainty. More than the platform approach, such technique lends itself to produce an efficient service design modularization: while in front-office UPC may be reduced through service customization, in back-office PC can be minimized through service standardization and consequent economies of scale and specialization. In this way modularization appears a good compromise in the search of a service productivity, which depends on two different sources, internal and external efficiency. In conclusion to the first part, I analyze the role of management in promoting an efficient service modularization. Consistently with the blueprinting service design, management style should be diversified so as to sustain the customization of the service phases involving high input uncertain and the standardization of supporting processes and services involving irrelevant input uncertainty. In case of front office services, internal marketing (Berry, 1980; Gronroos, 1981; Foreman and Money, 1995) is an efficient strategy as the employees, once made to feel responsible- are motivated to satisfy customers; conversely, in back office services, hierarchical manager style is still efficient.

In the second part, I apply the above-developed conceptual framework to the study of long-term care (LTC) services. Through need analysis, LTC need emerges as a complex need (Bohmer 2005; Antonovsky 1996; Tan K.-K. et al., 2014) that intrinsically requires customer participation to the service process both as input and as co-producer, leading hence to high customer uncertainty. The platform approach (Meyer et al., 2007; de Blok et al. 2009, 2010a) identifies a health care path made by strictly sequential processes whose goal is not health promotion (outcome) but the fluent implementation of each service process (output), which mainly involves the avoidance of risky factors. Indeed, the platform approach solution – by limiting the customer role in service process - renounces to manage customer uncertainty with the consequent increase of UPC. Conversely, the blueprinting approach promotes both external and internal efficiency by enabling different modularity levels depending on need analysis. In fact, because customer uncertainty is intrinsically related to the need to be satisfied, the provider should design and manage the service in order to allow the patient to find meaningful their roles, able to improve the quality of their life and to

support significant social interactions. The separation between front-office and back-office activities supports providers' effort toward patient's health promotion, while allowing to maintain PC under control. In conclusion, some managerial implications are exposed in order to sustain the exploitation of both external and internal efficiency sources.

2.1. Modularization of services

2.1.1. Need Complexity, Customer uncertainty and Service Modularization

There are several ways in which the modularity concept can be applied to service design, but what is the most efficient one in case of users' complex needs? It is difficult to answer this question without firstly investigating how customer uncertainty affects the efficiency of the production processes and, hence, imposes constraints to service design. In the service management literature, the role of the customer in service productivity is recognized in the concept of external efficiency, usually related to the customer's quality experience (Gronroos 2000; Gronroos and Ojasalo 2004). However, so defined, external efficiency only allows a posteriori evaluation and not an adequate control of productivity in service design. In order to address such issue, I draw on the studies on customer uncertainty in service processes (Bowen and Jones 1986; Larsson and Bowen 1989; Ojasalo 2003), the service productivity model (Ojasalo 1999; Gronroos and Ojasalo 2004; Gronroos and Ojasalo 2015), and the conceptual framework developed in the previous chapter. After having defined external efficiency as the service quality mainly promoted by the development of production capabilities – I posit that the *unexpected production costs* may be considered as an objective and direct measure of external efficiency and that their level constitutes, along with *production costs* (PC), valuable indicator of the quality of service design internally defined by the organization.

The service management literature shows that customer uncertainty, through the customer's involvement in the production process, largely affects service productivity (Larsson and Bowen, 1989; Ojasalo 2003). Generally speaking, the customer participates and introduces uncertainty in the service process both as input resource and as co-producer (Ojasalo 2003). Customer's inputs may include information, effort, physical possession (Larsson and Bowen 1989; Gronroos and Ojasalo 2004). When the customer's inputs are relatively unknown before the service is provided, the customer may introduce uncertainty in the production process and require the adaptation of

the service process. According to Larsson and Bowen (1989) input uncertainty is: *"[..] the organization's incomplete information about what, where, when, and how customer input is going to be processed to produce desired outcomes."* Input uncertainty, in particular, depends on two environmental variables, the level of *demand diversity* and of *customer's disposition to participate* to the service process (Larsson and Bowen 1989). The diversity of demand refers to the uniqueness of the customer's need to which the organization can respond by designing a more or less customized service. The customer disposition to participate refers to the customer's tendency to assume an active role in supplying labor or information inputs to the service production process (Larsson and Bowen 1989). In case of needs that can be standardized, input uncertainty is low (the customer's inputs consist just in his/her own presence and standardized information) and, hence, the user's co-producer role likely consists in following a strict script. On the contrary, in case of complex needs, input uncertainty is large. The need to be addressed not only is unique but also not clearly understood by the customer, who, hence, may be unable at the beginning to adequately express the knowledge required to be satisfied by the provider[43]. Thus, the customer adds uncertainty as input because he/she is unaware of his/her own input and, as co-producer, because he/she does not know any script to follow. In this case, only the reciprocal adaptation – through information exchange with the provider – can reduce this customer's difficulty and, hence, the uncertainty in the production process.

Because of customer's involvement, service productivity has been considered as a function not only of traditional *internal efficiency*, but also of *efficacy* or *external efficiency* (Gronroos and Ojasalo 2004). The first corresponds to the traditional manufacturing-based concept of production efficiency and, hence, is regarded as depending only on the production technology adopted. The latter reflects the customer perceived service quality, which is based on the customer's experience of two quality dimensions; the *functional* quality of the service process and the *technical* quality of the outcome (Gronroos 1983). For this reason, external efficiency depends on how the relation evolves with the company over time and, in particular, with front office employees (Gronroos and Ojasalo 2004). In particular, it depends on a *mutual learning experience* in which both parties –

[43] Because of need uniqueness, the customer-provider interaction is complex and the interdependence type dominating the customer-provider interaction is neither sequential nor pooled, but reciprocal (the output of each becomes the input for the others), even if other minor different interdependence types may exist as well (Larsson and Bowen 1989).

customer and employees - learn how to interact with each other (Gronroos and Ojasalo 2004; Gronroos and Ojasalo 2015). As Gronroos and Ojasalo (2004) argues:

> *"[…] service productivity quite frequently is dependent of how the relationship progresses. Relationships are learning experiences where both parties [...] get used to each other and learn how to interact with each other so that mistakes, service failures, quality problems, information problems and the like can be minimized. In other words, both the service provider and the customer gradually learn how to avoid mistakes and problems of various kinds that create unnecessary costs for both parties, and, in addition, have a negative impact on perceived service quality" (Gronroos and Ojasalo 2004).*

Despite the valuable intuition about the existence of two distinct sources of service productivity, the focus on customer's experience in defining external efficiency, does not allow to take into account the role of the organizational/production capabilities in '*avoiding mistakes and problems*' during the production process. Indeed, the efficiency level according to which the customer's and the provider's inputs are managed in the production process, largely depends on the organizational/production capabilities so far developed by the provider. In particular, important are the capabilities able to incentivize the customer to disclose the idiosyncratic knowledge required to satisfy him. In general terms, one could argue that the customer is incentivized to express him/herself and to cooperate in service production because then he/she will receive a higher service quality (Ojasalo 2003). However, at a closer glance, the customer's willingness depends on the providers' capabilities to engage the customer in the production processes by creating a shared language system. If not adequately incentivized during the interaction, the customer's inputs required are not provided and his/her co-producer role may finally result in a non-cooperative behavior. The direct consequence may be an unsatisfied customer. Thus, external efficiency should be defined not as customer's quality experience but as the service quality promoted by the organization and, in particular, by its coordination/production capabilities. Against customer uncertainty, the provider's capabilities should focus on the customization of the service processes in order to encourage the user's cooperative behavior and the disclosure of the user's inputs. Since the user does not know what he/she precisely needs, a customized/personalized interaction[44] allows mutual adjustment as coordination mechanism with the provider (Thompson 1967), which in turn reduces customer uncertainty about how to provide the service outcome. Such capabilities are important not only in the interaction with the customer but also in the back-office phases among providers. Especially in cases of highly complex needs,

[44] In this context, the concepts of personalization and customization are interchangeably used because they represent two sides of the same coin. While customization concerns the service content, personalization is about the way the service content is delivered (de Blok 2013). Here, the way providers interact with the customer indeed also changes the service content.

the effort made by providers in customization may depend also on the idiosyncratic knowledge emerged and transferred in the interactions among providers in charge of service customization. In this case, provider-provider interactions may be helpful for developing interaction strategies with the customer.

In this line of reasoning, the *unexpected production costs* (UPC) elaborated in the previous chapter, should be considered as a measure of external efficiency. In particular, UPC_1 - related to the productive relation between the customer and the providing organization - are the production costs due to the lack of providers' capabilities in managing uncertainty due to the customer's role as input and as co-producer. These may emerge in case of customer's non-cooperative behavior during the process (through waste of time and other resources) or, once the service has been delivered, by requiring a new service, disseminating negative reputation and starting legal action against the organization. UPC_2 – concerning the productive relation between the single provider (employee) and the organization - are the production costs due to the lack of providers' capabilities to coordinate knowledge, efforts, skills and strategies which are necessary to personalize their individual interactions with the customer.

Along with affecting the organization's revenues, UPC should be considered as indicators, together with PC, of the efficiency level reached by the organization in service design and management. In fact, the level of organization's capabilities required to manage customers' quality perception and, hence, UPC, strictly depends on the way service design and management is ideated. For instance, the amount of time devoted by front office employees to perform bureaucratic tasks (UPC_1)– being time subtracted to customization - is a direct measure of external efficiency and an indicator of the quality of service design and management. Providers' mistakes and waste of resources due to lack of work motivation are an example of UPC_2 that indirectly affect external efficiency. In fact, the lack of capabilities in customer-provider and provider-provider interactions can lead providers to lose work motivation that indirectly affect external efficiency. This is time subtracted both to 1) provider-provider interaction and, hence, to the development of new customization strategies and to 2) the interactions with the customer and, hence, to the identification of customized ways to satisfy him/her. In the light of the first chapter, I argue that UPC_1 and UPC_2 increase when the service design limits the development of capabilities, namely when 1) a large number of strict standards is used in service design and 2) the service is managed in a hierarchical way. However, these two conditions – ensuring service standardization - are necessary to control the PC level. Thus, an efficient service design and

management should promote at the same time both standardization and customization that respectively reduce PC and UPC in efficient ways. In other words, service design should be sufficiently modularized and sustained by management in order to take advantage of both productivity sources.

In conclusion, in presence of customer uncertainty, service productivity depends on two sources of efficiency; manufacturing-based production technology (internal efficiency) and organizational/production capabilities (external efficiency). External efficiency has been defined as a measure of service quality assessed in terms of UPC, which largely reflects the producer perspective. In the light of this line of reasoning, we investigate in the next sections whether the modularity principle applied according to the platform approach is efficient in sustaining service productivity in the case of highly complex needs.

2.1.2. Modularity without Modularization: the 'Platform' approach

In the service management literature, the modularity principle has been mainly applied to service design on the basis of the platform approach[45], previously elaborated in product design (Meyer and de Tore, 1999; Pekkarinen and Ulkuniemi 2008). In continuity with product design in manufacturing settings, the service modularity principle has been developed in sectors such as logistics, banking, ICT, automotive, namely product-related services addressing clearly definable users' needs (Pekkarinen and Ulkuniemi 2008; Lin et al.2010, Zhou et al. 2010; Bask et al. 2010; Bask et al. 2011). Despite the advantages in terms of flexibility, cost effectiveness and offering variety, I argue that the platform approach is inefficient to customize services addressing highly complex needs, such as personal services, as it does not allow to reduce UPC. On the basis of such method, customization can be obtained either by mixing and matching various standardized service modules (mass-customization) or by fine tuning any production phases (tailored service solutions). After having shown the service platform approach and the potential benefits identified in service design and management literature, I analyze the inefficiencies of the two customization strategies in case of need complexity.

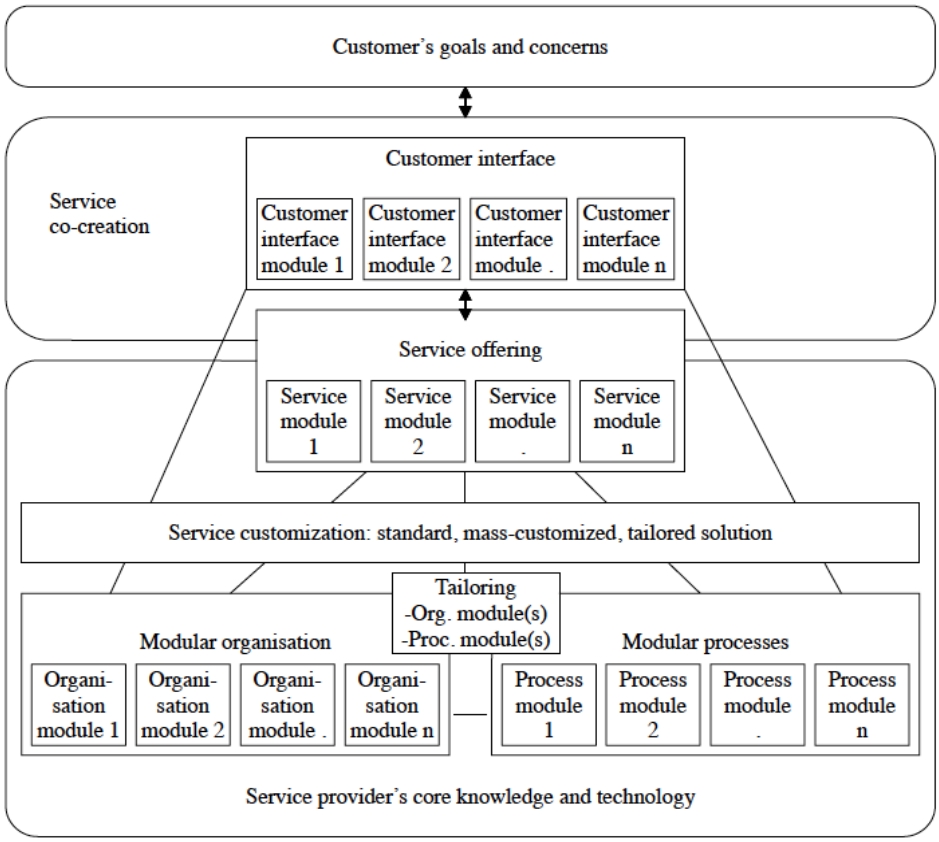
2.1.2.3. Service Platform

According to Meyer and de Tore (1999), the service platform identifies the specific set of service functionalities – delivered in human or computer form – that are used across multiple services, or the procedural connections that bridge and link specific sets of service functionality (Meyer and De Tore, 1999). Ulkuniemi and Pekkarinen (2008) develop a conceptual model of modular services which is made by three different dimensions; service modules, modular processes and modular organizations. Service modules are the smallest service units, consisting of service elements and processes that can be offered to a customer separately or as a part of a greater service offering. Modular service offering, which is obtained by combining one or several service modules, represents the element visible to the customer, whereas the other two dimensions are the means thanks to which the modular service is created and are, thus, intra-organizational (Ulkuniemi and Pekkarinen, 2008). Modular processes are composed by service modules as well. However, here service module indicates not the smallest service unit constituting one service functionality for the

[45] Anyway, modularity can be adopted for customization purposes not only on the basis of a platform, but also by changing dimensions of a service prototype that meets customer specification (Voss and Hsuan, 2009).

customer, but all the tasks necessary to obtain such functionality. While in the first case, the service module is made by the indivisible components expressing a service function, here the service module is constituted by all the indivisible steps to produce that service function. Such modules (tasks) – constituting the modular process - are designed independently but working as a whole to produce the service function. They are enabled by standardized interfaces, namely standardized way of working and documenting their sequential progress, that ensures the quality of modules (units) and improve their compatibility and flexibility. In turn, the modular production system is sustained by modular organization, that is loosely coupled networks (often obtained thanks to outsourcing) that operate a clear division of labor and allow organizational components to be flexibly recombined in a variety of configurations. The service provider selects the process and organizational modules in order to produce the requested service elements for the customer (Pekkarinen and Ulkuniemi, 2008).

Figure 4 - Modular service platform



Source: Pekkarinen and Ulkuniemi (2008)

Several are the identified benefits of the platform approach (Dorbecker and Bohmann, 2013). First, designing new services and redesigning existing ones is easier because each module of services, processes or organization can be improved or substituted in the platform separately from the other (Bask et al., 2010; 2011; Pekkarinen and Ulkuniemi, 2008). Service modularity allows reducing service complexity so that the system is easier to be managed. Moreover, by ensuring uniform service quality, modular processes enhance customer's reliability and increase customer trust in the employees (Rahikka et al. 2011). Finally, flexibility due to modularity of services allows differentiating the solutions and, hence, to broaden the number of offerings, which can create value for the customer (Pekkarinen and Ulkuniemi, 2008; Rahikka et al. 2011).

According to the service platform model, two are the potential customization strategies; the principal is mass-customization, the second and secondary is the identification of a tailored solution without the use of service modules and standardized interfaces. With the mass-customization strategy, modularity is an instrument to standardize services while meeting a heterogeneous demand. Customization is enabled by adding service modules to a standard package that meets the needs of the average customer in each segment. In fact, it is easier and more cost-effective to customize products to different market segments when some modules already exist. Intensive use of standard IT processes is made for managing customer segmentation and the customer interacts with the provider through a standardized interface. However, as the process modularity is not visible to the customer, he/she thinks to be treated uniquely. In this way, the main advantage of standardization, given by scale economies, is exploited.

The mass-customization advantages cannot be fully exploited in case of highly complex needs as market segmentation hardly can be produced when the customer him/herself is not fully aware of his/her own need or is aware of his personalized need. Indeed, the organization's inability to address need complexity through market segmentation reflects itself in the emergence of high UPC. Mass-customization strategy – while efficiently reducing PC thanks to intra-organizational standardized processes – is largely inefficient against UPC, with the consequence that external efficiency is not adequately pursued. In case of standardized interfaces, the role of the customer is limited and, thus, he/she is not able to express his/her own need. In this context service co-creation means basically to follow a strict script. At the beginning, the client is called to give some basic and standardized information such as price, time, production volume and quality of the products. In fact, only standardized information can be entered in IT systems or allow to activate

different combinations of standardized solutions. During the service processes, additional customer's information may lead to substitute some service modules (tasks) with others, but not to change the way the tasks are performed. Therefore, the risk of standardized human interfaces is that the customer is not incentivized to disclose the inputs required to produce a high-quality process and outcome, with the consequence that he/she may adopt non-cooperative behavior in the process or negatively react when the service is concluded. The client is not satisfied in his/her own need and this may lead to high UPC_1. Moreover, the adoption of standardized customer interfaces enables the design of strictly sequential and standardized production processes in which also provider-provider interfaces are standardized. The consequence may be high UPC_2 as such interfaces allow an efficient management of the information flow through the use of IT devices, rules and procedures (De Blok et al. 2014), but not the development of coordination/production capabilities required to sustain idiosyncratic knowledge exchange. Providers' intrinsic motivation are, hence, frustrated with consequent increase of UPC_2 and – through the decreased provider's ability to interact with the customer - of UPC_1.

The second strategy consists in the identification of a highly-tailored solution by developing a specific service module into the platform for which the customer interface is non-standardized. This tailoring module represents the organization and processes needed to produce services with unique features having non-standardized interfaces. In this case, instead of formal rules, IT devices and procedures, what is adopted is professional judgement, capabilities and tacit knowledge. From a service productivity perspective, such solution efficiently faces UPC but - by customizing even back office phases - it renounces to minimize PC. In general, designing tailored organizational and process modules to produce services with unique features is considered excessively costly. For instance, a logistic organization that considers standardization a key strategic priority to produce mass customized services, may evaluate as inefficient developing tailored customer projects (Pekkarinen and Ulkuniemi, 2008). For this reason, except in case of niche services, including luxury ones, the tailored strategy is regarded as a secondary option relative to mass customization. Especially in case of inherently complex needs, this is not a viable path as people are price sensitive but, nevertheless, want a customized service.

In conclusion, the platform approach implicitly affirms that service efficiency can be obtained only by minimizing PC through scale and specialization economies in standardized, sequential and unvaried intra-organizational processes. UPC reduction is not considered as a fundamental source

of productivity when the customers' needs are complex and not well defined. Consistently, two are the customization strategies identified; a mass-customized strategy and a highly tailored one. Neither of them is adequately efficient, while the first renounces to reduce UPC over time, the second one overlooks the efficiency sources that could come from standardizing phases not responsible for service customization. In the light of such line of reasoning, in the next paragraph, I elaborate an alternative application of the modularity principle, which is better able to exploit both sources of service productivity.

2.1.3. Modularization as 'Compromise': the 'blueprinting' approach

In the previous sections I have shown that in presence of complex needs, internal and external efficiency depends respectively on the reduction of PC and UPC (par.2.1.1.) and that the platform approach to service design – by proposing either a mass-customized strategy or a niche highly-tailored one - is not able to adequately exploit at the same time both productivity sources (par.2.1.2.). Here, my purpose is to identify an alternative modular strategy that - by designing the service package around the uncertain customer – is able to adequately reduce UPC along with PC, realizing an efficient 'compromise' strategy. As UPC reduction is pursued through customization while PC minimization is reached through standardization, I argue that a valuable strategy could be based on the blueprinting technique (Shostack, 1982, 1984, 1987), which separates between a front-office and back-office environment. This device, differently from the platform approach, allows to adequately managing customer uncertainty by accordingly adapting production processes in service design and management. Thus, after having shown the blueprinting technique, I propose the creation of a related approach to modularity that, centered on customer's need analysis, allows a loosely coupled organization of back office and front office services.

Blueprinting is a process control technique introduced by Shostack that allows to know how the service is structured in both analytical and holistic way (Shostack, 1982, 1984, 1987). By distinguishing between front office and back office actions, such technique allows to visibly identify the role of the customer in the service production and delivery system (Bitner et al. 2007). Chronologically the blueprinting is created firstly with the depiction of customer's actions, around which "*all other activities can be seen as supporting the value proposition offered to or co-created*

with the customer" (Bitner et al. 2007). Then, the front-office employees' actions are defined separated from the customer by the line of interaction. The line of visibility separates this part by the back-office employees' actions, which are invisible to the customer. Finally, the support processes are defined, which are all the activities carried out by not contact employees that are needed to allow service delivery. Such technique, along with being centered on customer's action, allows to evaluate, control and possibly modify the related level of service complexity and divergence (Shostack, 1987), aspects fundamental in defining the potential room for service personalization or mass-customization. Service's complexity can be defined "*by analyzing the number and intricacy of the steps required to perform it*" (Shostack 1987). Divergence level is identified "*by looking at the executional latitude or variability of those steps*" (Shostack 1987). A highly divergent service involves a large amount of judgement, discretion and situational adaptation. A service of low divergence is highly standardized with the steps that are executed in a strict and unvarying manner and in which the employees are not allowed to modify the service in any way. The level of service complexity and divergence depends on the specificity level of the need to be fulfilled. In the health care sector, the service of a general medical practitioner is highly complex and highly divergent. An x-ray service is low complex and low divergent (Shostack 1987).

The blueprinting technique lends itself to be adopted in the application of the modularity principle to service design, especially concerning the divergence aspect. By placing the customer's need at the center of the model and by contemplating the related level of service divergence, this design strategy allows to modularize services on the basis of the customer's need analysis, in a way that adequately reduce both UPC and PC. Indeed, it is the need and its more or less complex nature that - by transmitting uncertainty to the production process - imposes constraints to service design in terms of divergence level. Complex and personalized needs require highly divergent processes, made possible by a low modularity level, which enables judgement, discretion and situational adaptation in the interaction with the customer. Conversely, common and clearly specified need require low divergent processes, enhanced by a high modularity level that sustains standardization. Hence, need analysis is pursued to separate different need components and, accordingly, to develop a modularized service that clearly separate customized and standardized service functions. In particular, by taking into account the service divergence level (and, hence, the standardization/customization alternative), the blueprinting technique allows to identify three distinct types of customization, in which only the last one may be considered the result of modularization. The first model addresses specific and clearly defined customer's needs and is

characterized by the highest modularity degree in order to minimize PC. All the service processes are made in back office. The customer – belonging to a clearly defined market segment - follows a strict script as co-producer and provides standardized information that is then processed in back office. The second model renounces again to need analysis and addresses the customer's complex needs by developing a personalized solution. Modularity level is minimum as both front office and back office services are tailored on the specific customer's needs. In this case, only UPC are reduced over time, but PC reduction is not pursued. While these two models correspond to the two types of customization identified by the platform approach, namely mass-customization and tailored customization, it is the third model - by realizing a compromise between the first two – that operates a real modularization of the service (see Table 2).

In this case, the customer's need is highly complex, but through the need analysis it is also possible recognizing common and clearly identified need components and the related efficiency sources. Consistently, a modular service package is designed which, differently from the platform approach, is obtained not by a modular but a modularized service process depending on the type of need addressed. The complex part of the need is addressed by personalized service modules (outcome), whose production steps – necessarily highly divergent – require customer involvement in order to manage input uncertainty and sustain UPC reduction. Conversely, common and clearly identified needs involve low customer uncertainty so that the provider has plenty of room for deciding between the design of front-office mass customized services – addressed by modular service processes - and back-office standardized processes. Other considerations may orient the provider in one of the two directions, related to the customer's disposition or ability to participate to the service processes (Larsson and Bowen, 1989) and potential sources of economies. In this model, the blueprinting technique enables a type of modularization that takes into account the different efficiency sources when deciding among customization, mass-customization and standardization. The differentiation between front and back office services reflects respectively the differentiation in efficiency sources, UPC and PC (see Figure 5).

Table 2 - Customization models according to the blueprinting approach

Customization model	Characteristics of need	Main Efficiency source	Modularity level	Customer interface	Service process description
Modular *Mass customization*	Common and clearly defined	IE	high	standardized	Modular
Non-Modular *Tailored Customization*	Complex or personalized	EE	low	customized	Highly divergent
Modularized *Cost effective customization*	Highly complex Common and clearly defined	EE	low - front office	Customized	Front office – highly divergent
			high- front office	Mass-customized	Modular
		IE	high - back office	Standardized	Back office - Standardized and sequential

Source: Author's contribution

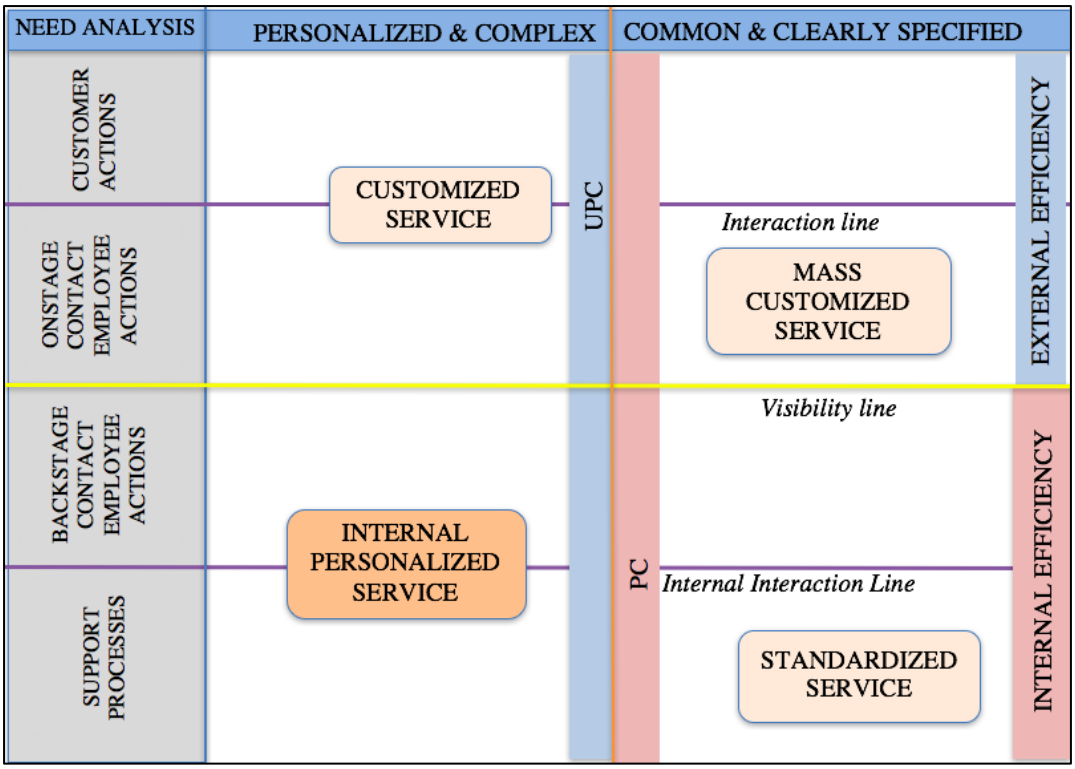
The line of visibility offers the provider a conceptual demarcation line to identify in front office activities the principal source of external efficiency and in back office ones the main source of internal efficiency. External efficiency is mainly reached thanks to personalized interface with customer and, to a lesser extent (when specific need components are clearly identified) thanks to mass customized services, which allow to promote also internal efficiency. The line of visibility, hence, becomes a potential instrument of modularization. In this model, front office services require customer's idiosyncratic knowledge as input of the production processes and their presence as co-producer. The level of modularity needs to be minimized to adequately face high input uncertainty due to complex need components and, therefore, reduce UPC. In fact, the standards adopted in customer-provider interfaces require to be loosely defined to enable service customization through knowledge transfers and providers' professional judgement. Similarly, provider-provider interactions should be characterized to a low degree by standardized interfaces and mainly by reciprocal interdependence that allow to sustain the exchange of knowledge, experience, strategies able to improve the individual provider's interaction with the customer. Production processes are not strictly sequential but highly complex, divergent and centered on the processing of the customer's input resources. Indeed, when the service function is addressing a

complex need, all its phases – even those invisible to the customer – have to be considered as done by 'internal customers', as all of them are oriented to manage customer's inputs and are able to partly modify the service content. This is especially important for front office employees, who are engaged in provider-provider interactions and whose effort in developing new customization strategies cannot be measured. Attention for relational aspects in service design is here fundamental, because social interactions are able to modify both the process and the outcome of the service. In fact, both the customer-provider and provider-provider interfaces should be sufficiently loose to sustain the personalization of the interactions with the customers. For instance, the user during the interaction could discover to prefer a provider's strategy for an activity and, hence, might require to some extent the modification of the rules (interfaces) on the basis of which producers are supposed to work together. The same could happen with provider-provider interactions that might partly change the two interfaces. In the interactions, the provider could develop a new customization strategy that might influence the two interfaces. Moreover, even if employees[46] have different professional specialties, the division of labor is intended to produce an integration of knowledge, skills and competences that enhances the overall satisfaction of the customer. Without good customer-provider and provider-provider interactions, the client may result unsatisfied and UPC may grow up.

Conversely, back-office services are services that require neither the customer's idiosyncratic knowledge as input nor the customer as co-producer, because they address a homogeneous need. Here the modularity level is maximized in order to minimize PC. Production processes are strictly sequential and providers perform functions by following stringent rules and procedures and by processing only standardized customer's information. Here the division of labor is intended to take advantage of both the providers' specialization - thanks to the repetitiveness of standardized operations – and, hence, of the economies of scale and specialization.

[46] The terms 'provider' and 'employee' are used alternatively because on the basis of the conceptual framework developed in the previous chapter, the organization under analysis in case of highly complex needs is a firm.

Figure 5 - Blueprinting service design in case of complex needs



Source: Author's contribution

In conclusion, the blueprinting approach can be seen as an efficient instrument to modularize services as, differently from the platform approach, allows to efficiently manage customer uncertainty by identifying a loosely couple organization of service processes able to contextually promote external and internal efficiency. Once made the customer's need analysis –blueprinting allows to separate highly complex and divergent services (front office) from standardized and sequential ones (back office). In back-office services, the level of modularity is maximized in order to minimize PC. In front-office services, it is minimized in order to allow human interactions to customize the service and, hence, reduce UPC. Given the fundamental role played by process divergence in case of services proving complex needs, the blueprinting approach should be preferred to the platform method as analytical tool for designing services especially in sectors like personal services or whenever the provider's strategy is to provide a really personalized service without completely losing the benefits of standardization.

2.1.4. Service modularization: the role of management

Modularization in service design is a necessary but not sufficient condition for promoting both external and internal efficiency. Front office and back office services require very different management styles to promote external and internal efficiency (Shostack 1987; Pitt and Foreman, 1999). In particular, in front-office activities, not only the customer but also the employee is source of input uncertainty. Worker's effort in the interaction with the uncertain customer and other providers is not observable, nor is it measurable (asymmetric information problem) so that it would be better considering the employee as an internal customer (Berry 1980). In line with Pitt and Foreman (1999) on the relation between input uncertainty and management, I argue that internal marketing (Berry 1980) is a necessary strategy to manage the activity of front-office employees in order to promote external efficiency, while a hierarchical control over the employees and coordination with subcontractors sustain internal efficiency in back office phases.

In the platform approach the main role of management is to identify market segments, to exert hierarchical control over the employees and coordinate with subcontractors (Pekkarinen and Ulkuniemi, 2008). In the blueprinting approach, instead, it is important that the manager is aware of the complexity level of the need to be satisfied and, once identified the source of input uncertainty, he/she is able to identify services to be personalized (front office services) and those to be standardized (back office services). Moreover, in order to efficiently manage the customer's input uncertainty, the manager should be able to manage the employees' input uncertainty. In the platform approach, as UPCs are not recognized as source of external efficiency, the employee is not viewed as an important source of uncertainty for the organization. But, as we have seen in the previous chapter, the employee's effort in tacit knowledge transfers is not observable nor measurable and, hence, may lead to free-riding behaviour (Frey, 1998; Osterloh, Frost and Frey, 2002). This may occur not only in the interaction with the customer, but also in the interaction with the other providers, so that the level of capabilities required in the final interaction with the customer is not developed. Thus, the management of employees' input uncertainty is functional to the management of customer uncertainty in the production process. In particular, the management plays a crucial role in sustaining the employees' intrinsic motivations to knowledge exchange necessary to develop the capabilities required to reduce $UPC_1$and UPC_2. In this regard,

interesting insights may come from internal marketing – coined by Berry (1980) - according to which the firm should be considered as an internal market (Foreman and Money, 1995) in which the employee should be treated as an internal customer in order to encourage his/her own participation to service processes (Gronroos 1981). The employees are allowed assuming some form of responsibility and participating to the management of the organization, in order to support their intrinsic motivations to satisfy the customer and, to this purpose, to share knowledge with colleagues and customers. As Pitt and Foreman (1999) argue, in case of high employee's input uncertainty, internal marketing is necessary to motivate them toward the organization's goal as *'it is a mechanism for assessing the attitudes, opinions, and feelings of employees, a tool for communicating with employees on aspects of strategy formulation and implementation, and a device for providing feedback to them on the progress reached by the firm and its members toward their mutual (congruent) goals*' (Pitt and Foreman, 1999).

On the contrary, in case of back office services, the employee is a negligible source of input uncertainty. Little is difficulty in monitoring and evaluating the quality and worth of the employees' job, as the job is standard as well as the information transfers with the customer and colleagues. Back office employees can be easily substituted by IT technologies, robots or the market. In this case, as explained by the Modularity Theory of the Firm, other conditions affect the efficient type of organization required and the related type of management. In case of changing and innovative environment a hierarchical organization can be justified with a strict control by manager over the workers' activity. Otherwise, the most efficient organization is the market in which incentives are given by the market price and the management role is to coordinate the work of suppliers.

In conclusion, consistently with the blueprinting service design, management style should be diversified so as to sustain customization of service phases involving high input uncertainty (including the employees' one) and standardization of supporting processes and services involving irrelevant input uncertainty. In case of front office services, internal marketing is an efficient strategy as the employees, once made to feel responsible- are motivated to satisfy customers; conversely, in back office services, hierarchical manager style is still efficient. In other words, the separated front office and back office service phases require very different management skills that

indeed may require different staff, different performance measures and maybe organizational forms. Especially in large organizations it may be convenient to identify two different managers.

2.2. Modularity and Long-Term Care (LTC) Services

2.2.1. LTC complex needs as source of patient's uncertainty

The conceptual framework so far developed for highly complex needs is here applied to the study of long term care services. Once analyzed in this section the complexity of long term care needs and the related user uncertainty, in par. 2.2.2. I study service design and management according to the platform approach. After having shown that this method – generally applied to LTC services - is inefficient against UPC, I propose the blueprinting approach as a more efficient method to service design.

The need for long term care is expressed by disabled and especially elderly individuals affected by chronic and worsening multiple co-morbidity[47] problems. Differently from health care need – concerning the medical measures required to fight specific diseases - LTC is about health and social dependency due to reduced mental and physical capacity, which does not allow to autonomously perform some basic activities such as bathing, dressing, getting in and out of bed or a chair, moving around and using the bathroom. These ones are often referred to as *activities of daily living* (ADL) (OECD, 2013). Such a dependency condition can be due to dementia (i.e. Alzheimer), other neuropsychiatric diseases, chronic diseases (heart diseases, stroke, cancer, chronic respiratory diseases and diabetes) and falls, whose risk increases with age.

Usually the uncertainty considered in relation to health care and LTC needs, is the one related to biological variability (Bohmer 2005) or, in other words, to the customer's body as input that necessarily is involved in case of health care and LTC services: similar pathological conditions can require different treatments as the patient may have different genetic predispositions and concomitant disorders. Moreover, because of comorbidity, uncertain may be the potential interaction among different therapies. Hence, providers do not know the customer's need until

[47]Comorbidity is defined as "*a concomitant but unrelated pathologic or disease process; usually used in epidemiology to indicate the coexistence of two or more disease processes*" (Farlex Partner Medical Dictionary 2012)

after care has begun and this type of uncertainty is reduced as the therapy progresses (Bohmer 2005). However, biological variability is not the only type of uncertainty involved by the need of health expressed by LTC need. According to the WHO vision, "*health is a state of optimal physical, mental and social well-being, and not merely the absence of disease and infirmity*" (WHO, 2005). In other words, the need of health is complex and, sometimes, highly complex as it concerns different dimensions of the human being (medical, psychological and social). If two individuals have the same disability, they might perceive different health needs. Moreover, their conditions might deteriorate, producing, hence, new needs. Thus, a well-defined cause-effect relation between LTC services and health promotion cannot be identified. For this reason, the involvement of the customer in the service, not only as input but also as co-producer, can allow to obtain idiosyncratic knowledge that allows to better customizing the service and, hence, promoting customer's health. To this regard, the salutogenic approach developed by Antonovsky (1996) and increasingly adopted in human sciences (Mittelmark et al. 2017) shows that motivating the active involvement of the customer may be itself a source of health. According to the salutogenic orientation, what explains health promotion is the presence of "generalized resistance resources" (GRRs), namely resources external or internal to persons that – by promoting the emergence of a 'sense of coherence' construct in individuals facilitate successful coping with inherent stressors of human existence[48]. In this perspective, LTC services promote health not only by reducing risk factors (such as falls, infections ulcers) and through pharmacologic therapy, but also and especially through the provision of 'salutary factors' (GRRs), which - according to a recent review of salutogenic studies on elderly people - can be identified in terms of increased sense of security, increased sense of independence, participation, familiarity, significant relationships with others (Tan K.-K. et al., 2014). Attention to social relations – and, hence, to the customer as co-producer – is an important means of health promotion especially today when the increase of LTC demand is due not only to the ageing of the population but also to changes occurred in the household structure: increasing number of childless household, mobility of children and a growing participation of women - so far the main informal LTC providers – to the labor market. This social

[48] As Antonovsky says, the weakness of the dominant paradigm is a pathogenic orientation that provides a dichotomous classification of persons into those who are 'naturally' healthy and those who have succumbed, temporarily, permanently or fatally to some disease. "If one is naturally healthy, then all one has to do to stay that way is reduce the risk factors as much as possible" (Antonovsky 1996). On the contrary, the salutogenic approach starts from the assumption that the human system is inherently flawed, and uses a continuum model, which sees each of us at a given point in time, somewhere along a healthy/dis-ease continuum. In this way, such approach is much more able to take into account the complexity of human being (Antonovsky 1996).

phenomenon shifted the responsibility for high quality social interactions onto the LTC providers, which, moreover, sustain the patient's health promotion also by establishing good relations with relatives. In the light of such studies, I can argue that because of the complexity of the LTC need, customer uncertainty is high, not only because of biological variability related to the customer's body, but also because health promotion requires as input the customer's idiosyncratic knowledge, efforts and his/her active role as co-producer of mental and social wellbeing. In particular, customer uncertainty due to the patient's role as co-producer may be high for several reasons. Firstly, as the LTC need is related to the user's progressive loss of autonomy, not always it is peacefully accepted by the individual, who hence may assume a fractious behaviour. Moreover, accepting someone else's help may mean giving strangers the access to intimate human life aspects (for instance in bathing, dressing services) so that these services, instead of being considered as helping, are experienced as humiliating, refused and able to reduce the patients' self-esteem and health. Finally, the user's inputs involved are the knowledge, mental and relational efforts and the physical presence of individuals often severed by neurological problems and that, hence, have difficulties in properly expressing themselves in language. Because of all these reasons, the patients' cooperative role cannot be taken for granted. Despite each of LTC needs (bathing, dressing, moving around etc.) appears clearly defined and easy to be addressed by separate service functions, one cannot assume that the patient - as co-producer - is always willing to provide his/her own fundamental inputs (body, knowledge, attention, effort) in the processes.

In conclusion, LTC needs intrinsically require that the customer participates actively to the service production process both as input and as co-producer, leading hence to high customer uncertainty. In the next sections, I analyze how customer uncertainty is managed in service design according to the platform approach. I show that, by limiting the customer role in the service process, the platform approach renounces to manage customer uncertainty with the consequent increase of UPC.

2.2.2. The platform approach to LTC service design

The platform approach has been extended to the design of LTC services as a cost-effective strategy to address the large and heterogeneous demand of ageing and frail population (Vahatalo, 2012). By delivering LTC service packages in the shape of social and health care path – over which the patient smoothly flows – such approach develops mass-customized solutions, which integrate both social and health care aspects and ensure the continuity of patient care (Meyer et al., 2007; de Blok et al. 2009, 2010a). Despite the importance of a 'patient-centered care' is generally acknowledged (de Blok et al. 2009, 2013), I argue that such approach – by limiting the customer's involvement in the service process to a mere *choice option* – renounces to adequately manage customer uncertainty and, hence, the related UPC.

The platform approach allows designing mass-customized LTC service packages by establishing- thanks to standardized interfaces- service modules, modular processes and organizations. Examples of LTC service modules are personal care, health care, safety, rehabilitation, entertainment, transport services etc. These are groupings of one or several components that provide variants and substitutes to the same functionality. For instance, in personal care, variants are bathing, getting dressed, eating, toileting etc. Substitutes are different meals on the basis of customer's diets. Standardized interfaces – sustained by a large use of IT - are protocols, rules, procedures, standard lines of communication that – by combining and connecting LTC components - allow to build and ensure the delivery of the overall service package (de Blok et al. 2010). Service modules are performed on the basis of modular service processes that are the building blocks of a mass-customized social and health care path. Finally, service modules and modular processes are sustained by a modular organization characterized by network of different professionals (caregivers, animators, physiotherapists, nurses), who can be easily substituted without jeopardizing the network functionality. In this regard, service packages offered by independent subcontractors and managed by one provider allows an efficient coordination (Vahatalo 2012).

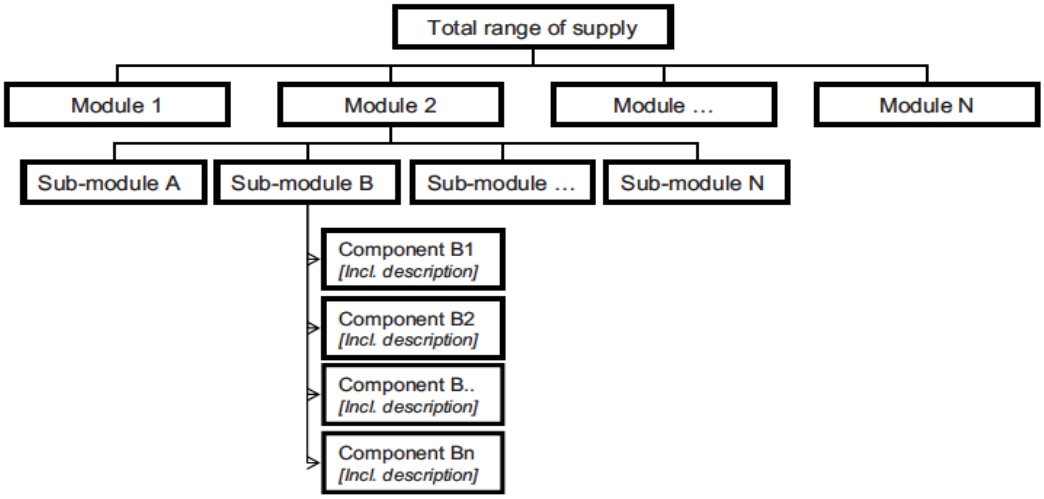
In LTC service design the platform approach displays its usual advantages and limits. The organization looks for broader segments of clients that can be reached more efficiently with options that match their specific needs (de Blok et al. 2009). Choice option is regarded as an optimal solution to provide patient centered care as it is considered able to treat each client as

unique and adapt the service package over time depending on changes in the health condition of the patient (de Blok 2009). Second, the provision of modular packages – by pre-defining components in transparent ways - eases the interaction between client and provider (de Blok 2010). Moreover, as the service package is usually originated from multiple providers, the application of modularity is likely to facilitate the coupled supply of care and service packages, facilitating the coordination of individual services, diminishing overlaps and preventing gaps in service provision (de Blok et al. 2009). Finally, the ability to standardize components should facilitate a cost-effective way of working, which answers the pressure for cost containment (de Blok et al. 2010a; de Blok et al. 2010b). These advantages can be reinterpreted in the light of service productivity. While the benefits in terms of internal efficiency are undeniable, external efficiency is only in part promoted. Mass customization may promote customer's satisfaction in the initial service phases when the customer is approached for the first time. Moreover, the UPC can be reduced thanks to the choice options and variation in case of clearly definable customers' needs (for instance need of helping in mobility, heightened toilet, meals etc.). However, these needs represent single instrumental aspects of the more important and complex patient's health need. This, in particular, is source of UPC that cannot be reduced by mass customized services but requires personalized interactions with the customer.

The platform approach plans out a very limited customer's role both in terms of input and, especially, as co-producer. Interfaces are standardized and involve as customer input, the customer's standardized information and his/her own physical presence, while as co-producer, the customer is just called to follow a well-defined script over the LTC pathway. In fact, at the moment of the access, information necessary to activate the service modules are specifically obtained through the selection of sub modules (washing, getting dressed etc.) and components (moment, time span, duration etc.) from a menu of modules (care) (see Figure 6) (De Blok et al. 2010a). The regular interaction with the customer during the service is intended to obtain additional information to substitute - in case of changing conditions - some modules with different ones. In particular, the LTC path is cyclical and can be divided into three phases; a-priori specification, on-the-job adaptation and on-going delivery of care packages (De Blok et al., 2010). In the first phase, a generic assessment of the client's needs takes place on the basis of which first general package is built. When care delivery starts, the on-the-job adaptation of the package occurs thanks to a more in-depth need assessment. Such phase is then followed by the on-going delivery

phase until some changes occur in the patients' health conditions, which require again the on-the-job adaptation phase and so on.

Figure 6 - Platform structure of LTC service



Source: de Blok et al. 2010a

Moreover, the platform approach limits room for collaboration among caregivers. Even in the case the single caregiver was willing to hear the patient's specific needs and desire of being more involved, the presence of standardized interfaces among providers, a strict schedule to follow and severe working procedures restrict the provider's ability to exert his/her own professional judgement and positively answer the user. Deficiency in coordination has been recognized as causing problems in the transition of patients over the path (Meyer et al. 2007) and more broadly in the provision of demand based services, as the responsibility with coordination rests with the customer (de Blok et al. 2010a). The providers, in fact, - by engaging in offering a seamlessly combination of service in one care - are called more to solve logistic coordination problems, than to cooperate with other providers in order to sustain the customer's health promotion. They have to integrate their care services, not to share information and strategies, that could allow to improve customization.

By limiting the customer's involvement in the service process and the collaboration opportunities among providers, the platform approach renounces to manage customer uncertainty coming from the complexity of health needs. In fact, the organization's capabilities required to efficiently manage customer uncertainty are not developed. Consequently, both UPC_1 and UPC_2 are likely to be high. By limiting the role of the patient – the provider shows to be interested more in the service output – namely the smooth customer's flow along the path - than in the service outcome,

which is the customer's health promotion. The lack of time, attention and efforts in social interactions creates or worsens the communication barriers with the customer. In fact, the customer does not find the service meaningful, able to improve the quality of his/her own life and to support significant social interactions. Hence, UPC_1 – concerning the transaction between the customer and the organization – may be high and largely affect the revenue. A high mortality rate, client's falls, pressure ulcers, infections, low satisfaction of patients and relatives can largely affect the provider's revenues through legal claims, bad reputation, waste of resources, especially of time in managing difficult relationships, etc. UPC_2 – concerning the transaction between the provider and the company - may be high as well. Front-office providers' intrinsic motivations are frustrated as they are not encouraged by the organization to interact with the patient and their family, to make efforts in the identification of new and more customized strategies or therapies. They do not receive training in order to improve their ability to satisfy the customer. Governance culture and rules are such that the providers' time and effort are engaged to perform the tasks they are supposed to perform by contract. Given the existence of standardized interfaces among colleagues, they are not incentivized to exchange experience, suggestions, strategies that could allow to improve the customer's experience of the overall service. Hence, sense of frustration, anxiety, pressure, tension can lead to front-office providers' burn-out. UPC_2 are, consequently, high due to the number of absences for illness and injuries.

In conclusion, what emerges is the creation of a health care path made by strictly sequential processes whose goal is not health promotion (outcome) but the fluent implementation of each service process (output), which mainly involves the avoidance of risky factors. Indeed, the platform approach solution – that creates broad segments in which client's needs are reached through choice option – is considered as the only choice from a service productivity perspective (de Blok et al. 2009). However, the recognition of UPC as mainly deriving from health complex needs - leads us to adopt a different approach to service. In this perspective, in the next section I adopt the blueprinting approach in order to define an effective involvement of the customer and providers in the production process and, this way, reduce UPC along with PC.

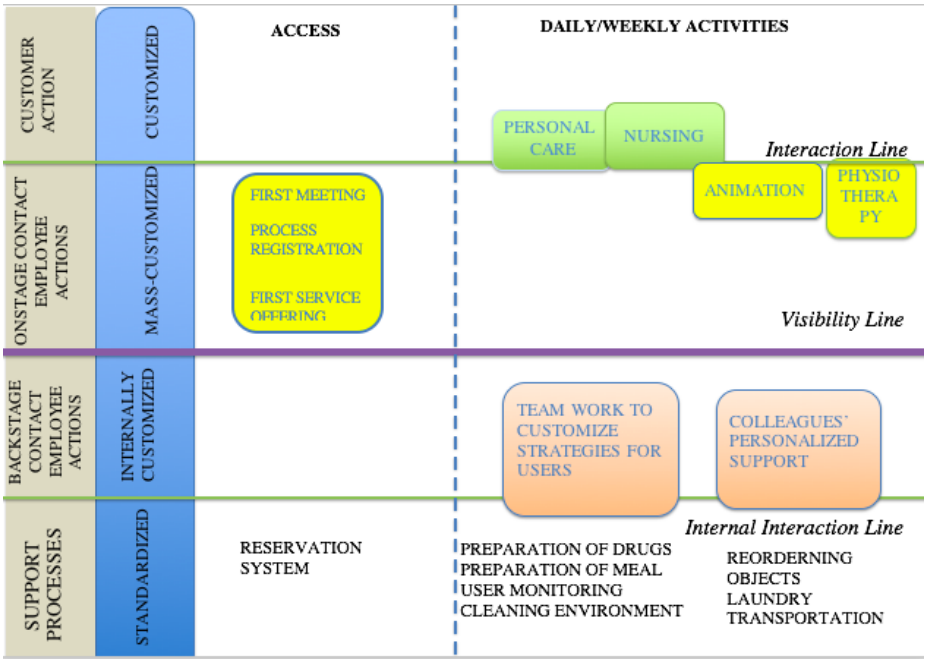
2.2.3. The Blueprinting Approach to Modularize LTC services

We have seen in par.2.1.3. that the blueprinting approach allows to modularize service design in a way able to promote both external and internal efficiency. Thanks to need analysis, it promotes customization of service phases involving high customer uncertainty (front-office) and standardization of services addressing clearly defined needs and not worthy of being mass-customized (back-office). In this section, the blueprinting approach is applied to LTC service design. While front office service phases are oriented to motivate the patient's active participation in order to promote the satisfaction of his/her highly complex need and, hence, reduce UPC; back office services are intended to standardize support processes and this way to minimize PC.

Differently from the platform approach that limits customer's involvement to a choice option (de Block 2010a) and that, hence, can address only specific customer's health needs, the blueprinting approach allows to motivate the user to actively participate as co-producer and, this way, satisfy his/her own health need, including also its social and psychological dimensions. As unknown is the way to promote the specific patient's health, non-standardized customer-provider interfaces enable personalized interaction, which - through reciprocal adaptation – efficiently faces customer uncertainty related to his/her own health promotion. In particular, personalized interactions are required in personal care, nursing, physiotherapy and animation, all activities targeted to patients' fundamental inputs, body and mind. For instance, thanks to customized interactions, the caregiver may find out that singing during client's bathing, favors the patient's cooperative interaction. The physiotherapist may try to motivate the recovering of the normal use of patient's arm through pet therapy. In this context, interfaces among providers should be sufficiently loose to allow the client to be pleased in little aspects of daily life (sleeping a bit more, feeling useful in some activities, taking care of an animal, receiving special attentions by some providers). The identification of personalized therapies may occur thanks to the knowledge exchange among providers with similar or different professional competences. Continuing the above example, other professionals may identify useful strategies to obtain the patient's cooperative behavior, for instance, through the use of symbolic language (music, art) or by helping to perform activities that are meaningful because related to his/her own life story (hobby, job, childhood). Hence, not only customer-provider but also provider-provider interactions are oriented to personalize the service and, hence, to reduce UPC.

In support to personalized services, mass-customized processes may address in less intensive ways well specified needs that are shared among different clients. For this reason, physiotherapy and animation may be partly performed through mass-customized services.

Figure 7 - Design of LTC services according to the blueprinting approach



Source: Author's contribution

As shown in Figure 7, the service process can be distinguished in two fundamental parts. The moment of access when a modular and quite general offering is proposed and the daily/weekly activities over which the offering is increasingly personalized. At the beginning, the customer is called to provide standardized information on the basis of which the LTC provider starts building a personalized service offering. During the daily/weekly service, personal care and nursing are fully personalized. Their modularity level is minimum as professionals - by drawing their routines from a standard and widely shared toolkit - can exert their professional judgments (Langlois and Savage, 1997). They are non-modular, except when need analysis allows identifying clearly defined need components. In this case, specific front-office services can be modularized: ex. in case of animation and physiotherapy (allowing this way to improve also internal efficiency). Physiotherapy and animation presents a greater modularity level in the sense that they are also in part mass-customized. For instance, in residential care during physiotherapy, the customer receives a high quality individual time with the professional during which a personalized therapy may be identified able to motivate the patient to maintain or recover his/her own physical abilities. However, in support to this activity, the client also participates to physiotherapy activities along with other people belonging to the same segment. All these activities are supported by back office

services in which the level of modularity is high as standards strictly define sequential processes. Need analysis allows to identify services and supporting processes that involve just standardized customer's knowledge as input and in which customer intervention may be efficiently avoided. Such activities usually consist in the registration system, meal preparation, drug preparation, user monitoring, cleaning environment, re-ordering objects, and transportation of goods. While innovation in front office activities is sustained by production capabilities and creativity in social interactions; in back office, standardization is likely to open the door to automation and the development of ICT robotic systems that allow to reduce labor costs and promote scale economies.

Differently from the platform approach, characterized by a cyclical LTC path, here the care path is progressively oriented to pursue and maintain service personalization over time. Customized service phases offer professionals the occasion to evaluate whether the mass customized services phases have to be maintained or substituted over time. Therefore, while the need assessment performed during the access phase is general as in case of the platform approach (de Block 2010a), all the front office daily/weekly activities are directed to (re)define a personalized therapy through to the extensive and intimate contact with the customer.

In conclusion, the blueprinting approach promotes both external and internal efficiency by enabling different modularity levels depending on need analysis. In fact, because input uncertainty is intrinsically related to the need to be satisfied, the provider should design and manage the service in order to allow the patient to find meaningful their roles, to be able to improve the quality of their life and to support significant social interactions. The separation between front-office and back-office activities supports providers' effort toward patient's health promotion, while allowing to maintain PC under control.

2.2.4. LTC service modularization: the managerial implications

Generally, the blueprinting approach requires that the management is sufficiently aware of the different dimensions of need complexity that lead to input uncertainty. In case of LTC need, both customer's and provider's input uncertainty is high and, hence, the management should be sufficiently able to manage front office and back office services in order to customize phases that are source of health promotion for the customer and standardize the remaining ones. Moreover, in order to adequately manage the customer's input, the management should be able to promote employees' intrinsic motivations to take care of patients. To this regard, specialized health care literature highlights the importance of management in sustaining customer's satisfaction through employees' satisfaction (Tzeng et al. 2002, Ott and Dijsk, 2005; Elarabi and Johari, 2014). An important problem is reducing 'rationing' (Shubert et al., 2008), to be considered as detrimental of provider's intrinsic motivations as it is the lack of sufficient time and resources the professionals perceive as needed by their patients (Shubert et al., 2008).

The role of management on the organizational performance has been investigated mainly by the specialized literature on aging. According to such studies, mainly focused on nursing homes as complex adaptive systems (Anderson et al., 2003), the relationships among workers are non-linear and the service outcomes cannot be directly controlled by managers using traditional hierarchical approaches. One important problem, to be considered as detrimental to staff's intrinsic motivation is rationing, which occurs when nurses lack sufficient time and resources to provide all the care they perceive is needed by their patients (Shubert et al., 2008). As shown by a recent literature review on rationing in nursing care (Papastavrou et al., 2014) factors influencing care rationing are to be found within the work environment, such as lack of time, lack of training, inadequate resources, unplanned increase in demand for patient care, communication barriers, habit, the role of teamwork (Papastavrou et al., 2014). By studying the relation between management practice and organizational performance, several studies show that specific managerial practices influence the capacity of nursing home staff to work together and, hence, at least partially reduce the causes of rationing. Management practices, such as building connections and developing existing strengths as resources for solving problems, are suggested to be more effective than traditional hierarchical approaches. In particular, they found out that management

by encouraging employees to incorporate diverse perspectives, will likely facilitate staff efforts to self-organize so as to meet the customer's demand (Anderson et al. 2014; Dellfield 2008).

In conclusion, the management plays a crucial role in identifying and promoting the different sources of productivity. Once identified the characteristics of input uncertainty related to LTC complex needs, managers should be able to reduce the rationing problem and sustain the front-office employees' intrinsic motivations to promote patients' health. In this way, external efficiency is sustained, while a hierarchical management style in back office services promotes internal efficiency.

2.3. Conclusions

In this chapter, it has been analyzed how customer uncertainty produces constraints to an efficient design and management of service processes. When the customer introduces uncertainty as input and as co-producer in the production process, service productivity depends also on a mutual learning experience between customer and front-office providers. For this reason, a more precise definition of production efficiency takes into account the difference between internal efficiency (manufactured based) and external efficiency, here defined as the service quality promoted by the organizations' production capabilities. UPC may be considered as a direct and objective measure of EE, and along with PC, indicate the overall efficiency of the service design. While IE is promoted by standardization, EE is obtained through customization. This fact implies that in order to promote both efficiency sources, service design should be sufficiently modularized. In this perspective, hence, platform approach to modularity – usually used in service design – is evaluated as inefficient. Its customization options (mass-customization and tailored customization) in fact do not allow to exploit both efficiency sources. As alternative, the blueprinting approach to service design is proposed. This approach allows for a real service modularization and permits to visibly identify the two sources of production efficiency. EE is the main source of efficiency in front-office services, where the customer is at the center with his/her own complex and less complex needs. IE is the principal source of efficiency in back office services, where customers' input is standardized. While EE is promoted by non-modular customer-provider and (in back office) provider-provider interactions, IE is reached thanks to highly modular services (also in front office in case the organization's employees, thanks to their capabilities, have evaluated the low complexity of their need and adopt mass customized service). According to this approach, two different management styles are required depending on the productivity source. On the one hand, the manager should sustain employees' intrinsic motivations necessary to develop the capabilities required to reduce UPC_1 and UPC_2. On the other hand, as in case of standardized back office services, employee is a negligible source of input uncertainty, authoritarian style is efficient to support employees' extrinsic motivations.

Then, this framework has been applied to the study of LTC service design and management. Here, customer uncertainty is due not only to biological variability (Bohmer, 2005) but also to the user's will (as co-producer) to provide his/her own fundamental inputs. While in the platform approach, the customer's role is limited and, hence, UPC are not addressed, in the blueprinting approach, the customer is at the center of the service and both efficiency sources, EE and IE, are sustained.

Chapter 3. The identification of the Unexpected Production Costs in an empirical setting

3.1. Research methods: Study design

In this chapter, I conduct four exploratory studies – by using the theory building method (Eisenhardt, 1989) - to analyze the relationship between organizational and production efficiency (in particular, external efficiency[49]) identified in the first and second chapter in the light of the Modularity Theory of the Firm. An interpretative model is here developed to analyze five Italian LTC organizations as emblematic cases of different approaches to the management of UPC (considered as index of external efficiency). This study is important because the mechanism through which the organizational structure (by varying the level of standards and the repartition of decision rights) affects external efficiency over time is still an open question. In particular, there are two main hypotheses. First, I hypothesize that the organizations investing in high levels of standards and low levels of coordination capabilities, experience a progressively lower level of external efficiency (vicious cycle). Conversely, the companies highly investing in capabilities experience a progressively higher level of external efficiency (virtuous cycle). In order to build the model, the five LTC companies have been organized in four categories that are analyzed in four case studies. The categories were chosen by taking into account the level of investment in standards (high and low) and in coordination capabilities (high and low). The first case study adopts *literal replication* logic (namely similar results are predicted) and involves two organizations belonging to the same category (high investment in standards and low investment in capabilities) that allows findings to be replicated (Yin, 2003). This case study provides a first support to the hypothesized sketched model. Then, the other three case studies, involving organizations belonging to the remaining categories are shown. These allow to enhance the generalizability of the model by employing *theoretical replication* logic, according to which contrasting results are expected for anticipatable reasons (Eisenhardt, 1989; Yin, 2003). The evidence, analyzed on the basis of the hypothesized model, generate considerations that are consistent with and legitimate the theoretical hypotheses developed in the previous chapters.

[49] defined as the service quality promoted by the organization's capabilities to provide customized services.

Within the theoretical framework of the Modularity Theory of the Firm, it was argued that in presence of customer uncertainty, the most efficient organization – according to a functionalist perspective - is the one that minimizes its instruments to promote production efficiency. This is the sum of the production costs (measure of internal efficiency) and of the *unexpected production cost* (index of external efficiency) [50]. While efficiency in production costs (PC) depends on allocative efficiency, the efficient management of the unexpected production costs (UPC) depends on the organizational structure. The organizations sustain external efficiency (low UPC), by defining the level of standards and influencing the development of organizational/production capabilities), which promote the progressive development of coordination capabilities. In particular, I argued that – participatory governance and the blueprinting approach to a personalized service design, combined with inclusive management, make a low use of strict standards and are able to sustain workers' intrinsic motivations to cooperate with each other in order to satisfy the client and, hence, reduce UPC. Consistently, in this chapter, my purpose is to empirically investigate these three organizational levels as potential sources of production efficiency in case of LTC services. As shown in par.2.2.1, LTC is a highly complex need emerging when elderly people lose autonomy due to worsening multiple co-morbidity problems. My focus on the organization of caregivers' work - basically consisting in patients' personal care – can explicate very well the companies' ability to face customer uncertainty. In fact, among LTC services, personal care is one of the most complex, as its provision requires caregivers' attention to patient's psychological and social aspects. In this empirical setting, my research question is declined as follows:

> RQ: *How LTC organizations – through governance, service design and management - promote external efficiency (low UPC_2) related to customer uncertainty in personal care service?*

In the light of the theoretical framework developed in the previous chapter, first, I hypothesize that governance is efficient if it is participatory as - by making a low use of strict standards and promoting a decentralized repartition of decision rights- caregivers are intrinsically motivated to

[50] As defined in the first chapter, the unexpected production costs (UPC) are the productive side of dynamic transaction costs (Langlois and Robertson, 1995): unpredictable resource losses (mistakes, damages due to the lack of coordination/production capabilities required for the personalization of the production process. UPC_1 emerge in the productive relation between the provider and the customer; UPC_2 emerge in the productive relation among providers when other professionals' non-standardized knowledge is required to personalize the production process.

develop coordination capabilities with customers and colleagues and to improve external efficiency. On the contrary, I expect low external efficiency in case of hierarchical governance, since workers are essentially executors of the rules and procedures, do not develop coordination capabilities and what matters is extrinsic motivation. Second, by adopting a blueprinting approach to service design, I theorize that a personalized type of personal assistance (which necessarily requires a low use of standards) adequately promotes external efficiency not only directly by allowing onstage caregivers' personalized actions, but also indirectly thanks to supporting processes (investment in professionals' training and in equipment, adoption of standards sufficiently loose to preserve personal interactions with patients and colleagues). Conversely, I expect that a mass-customized type of personal care is inefficient because its standardized interfaces with customers and colleagues prevent the development of coordination capabilities. Third, I hypothesize that external efficiency depends also on the management style; different are the combinations of governance and management that may be more or less conducive to external efficiency. Hierarchical governance may be alternatively characterized by authoritarian or tolerant management. While the manager with an authoritarian style refuses any debate with employees and relies on his/her own authority; the tolerant management involves employees at least in decisions that impact on their lives. Conversely, participative governance may show a more or less supportive management. In general, a supportive management that sustains team spirit is expected to promote external efficiency by sustaining providers' intrinsic motivations to develop coordination capabilities among colleagues.

Given the limited amount of information on such issues and the exploratory character of this study objective, I have adopted a qualitative case study design. According to Yin (2003), the case study is chosen as research method when, among other conditions, the contextual circumstances are highly pertinent to the phenomenon under study (Yin, 2003). In this research, the environmental settings due to the organizational structure are considered as central to explain the level of external efficiency. In addition, study embeddedness is here fundamental to analyze at the same time different organizational layers, their relation with the development of members' capabilities and UPC as a measure of external efficiency. Nursing homes lend themselves to be a valuable research object because, despite most OECD public institutions have imposed strict quality standards, they provide elderly various service quality experiences, due to the different

capabilities developed over time. Attention on UPC_2 as measure of external efficiency[51] is justified by two factors. First, as LTC is a labor-intensive service, labor time represents a fundamental source of service quality. Despite a minimum number of assistance hours is established by law to guarantee service quality, such quality is threatened by the level of sick leave hours (UPC_2), as continuity of care is not guaranteed[52]. Second, as LTC sector is subsidized by public institutions, LTC organizations' revenues cannot be considered as a measure of UPC_1 and, hence, of external efficiency[53]. Here, focus on caregivers' work is justified by the fact that among workers, they represent the largest part and, hence, are those that mainly contribute to UPC_2. Moreover, as seen above, such professionals provide the main and intimate type of daily assistance to the elderly, sustaining them during activities such as bathing, dressing, eating, walking etc. [54]The organization may essentially motivate caregivers' will to support the elderly. Thus, sick leave hours are here used as an objective measure (based on time) of UPC_2, namely production costs determined by the organizational structure and, in particular, their internal allocation of decision rights, which is supposed to affect caregivers' incentive structure. According to our discussed line of reasoning, hierarchical governance, standardized service design and authoritarian management – by favoring high level of workers' sick leave hours - may produce high costs for substitution, low service quality and low satisfaction of patients and their families.

In order to evaluate whether the model rightly interpret the way different organizational structures manage the level of UPC_2, I have identified four related categories of investment in standards and coordination capabilities (see Figure 8). As shown in Chapter 1 and 2, in case of hierarchical governance, authoritarian management and standardized service design, we expect a high investment in standards and low attention to coordination capabilities. In fact, when standards are high, low room is available for coordination capabilities. The development of capabilities needs to be enabled by a low level of standards before being promoted by

[51] As shown in the previous chapter, despite UPC_2relate to the organization of labor, they are due to the lack of coordination capabilities necessary to customize the service and, hence, to manage customer uncertainty.

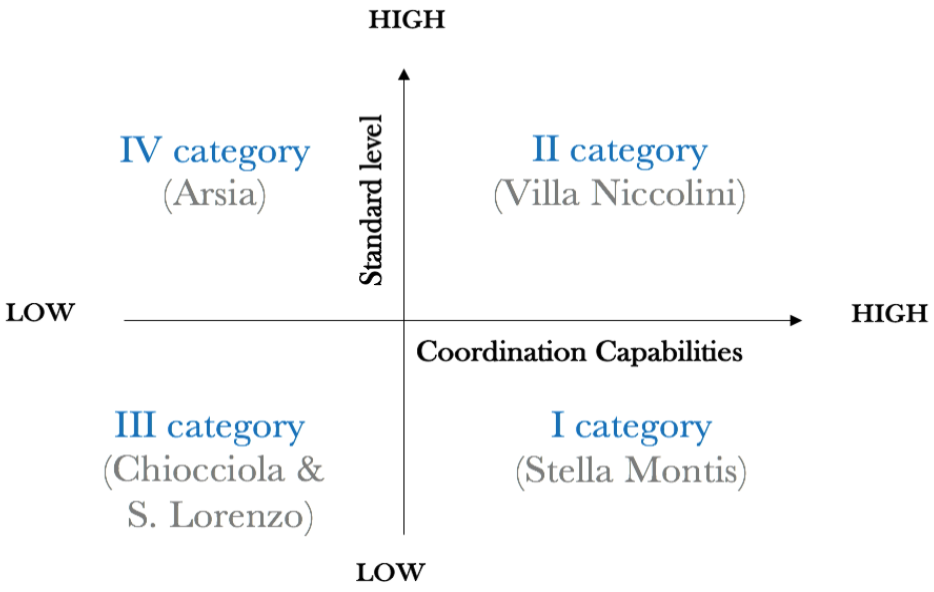
[52] Sick leave hours can be considered also as a measure of internal efficiency because they reveal costs for substitutions; high absence levels translate in the organization's need to pay overtime hours or to temporarily employ a substitute.

[53] However, other minor indicators can be used, such as number and expenditure for clients' legal claims, number of falls, infections ulcers etc.

[54] Despite a clear knowledge of service quality (and of external efficiency) requires the direct involvement of customers, given the theoretical focus of my study on the organizational and productive structure, I preferred to concentrate my empirical analysis only on the organization of front-office employees, namely caregivers, that allows to understand the internal mechanisms affecting productivity.

organizations' incentives to providers' intrinsic motivations. Conversely, an organization with participative governance, supportive management and customized service design is expected to have a low level of strict standards and high development of coordination capabilities. In case of the LTC sector, a minimum level of standards and procedures is imposed by the accreditation system. Hence, the categories have been identified on the basis of the different contribution by the accreditation procedures to the service quality in each organization. The first category includes benchmark organizations, as these – by not considering the accreditation standards as able to guarantee service quality - promote service customization by sustaining the development of coordination capabilities with the users and among providers. The second category includes companies that do not consider the accreditation standards as sufficient to guarantee service quality, but sustain the development of coordination capabilities only with users. The third category involves organizations that evaluate as adequate the publicly imposed level of standards and, hence, do not much invest further in coordination capabilities. Finally, the organizations in the fourth category includes organizations having made a very high investment in standards and, thus, a low investment in coordination capabilities. These organizations do not consider sufficient the level of standards imposed by the accreditation system and promote a greater standardization of the production processes.

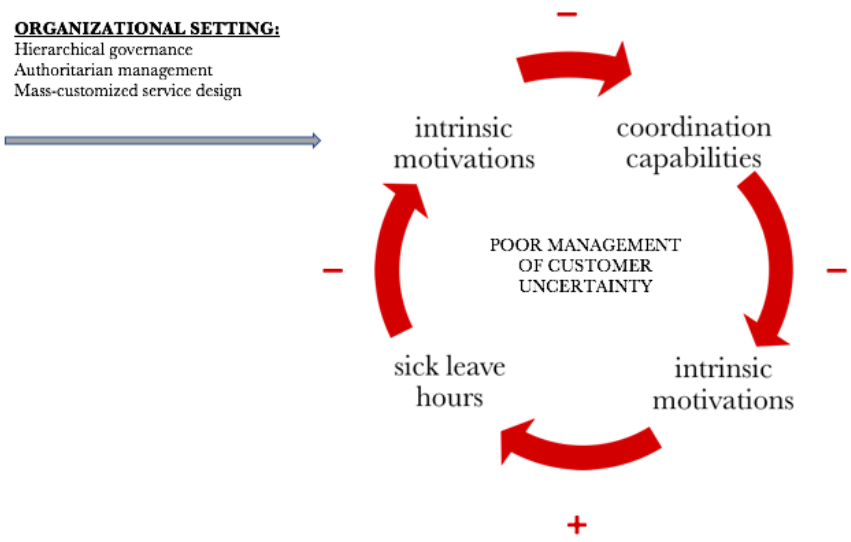
Figure 8 – The four categories of analysis



Source: Author's contribution

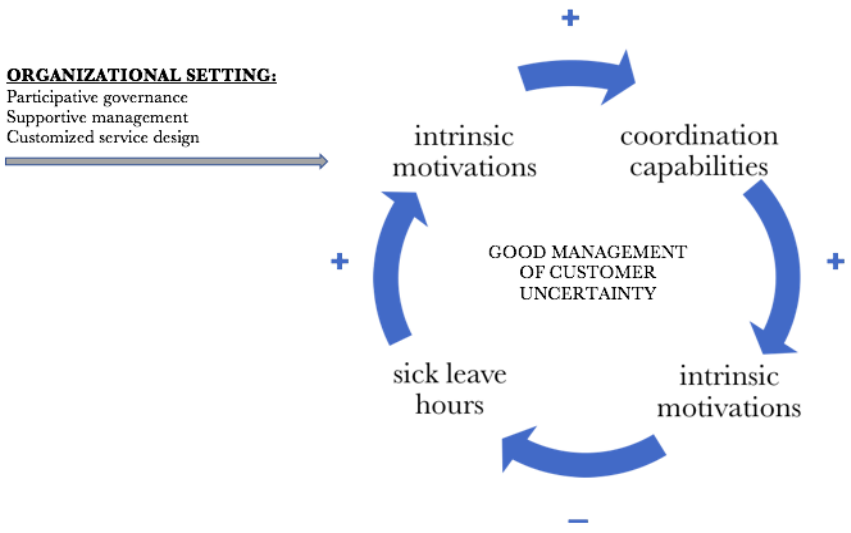
The three theoretical hypotheses about the concomitant role of governance, service design and management on external efficiency can be interpreted in the light of a cyclical vicious or virtuous model of interaction (see Figure 9). In particular, I argue that the organizations with a hierarchical governance, authoritarian management and standardized service design (namely belonging to the third and fourth categories) experience a vicious cycle that increasingly reduce external efficiency, while the organizations with participative governance, supportive management and customized service design (the other two categories) know a virtuous cycle that progressively increases external efficiency.

Figure 9 – Vicious Cycle Interpretative Model



Source: Author's contribution

Figure 10 – Virtuous Cycle Interpretative Model



Source: Author's contribution

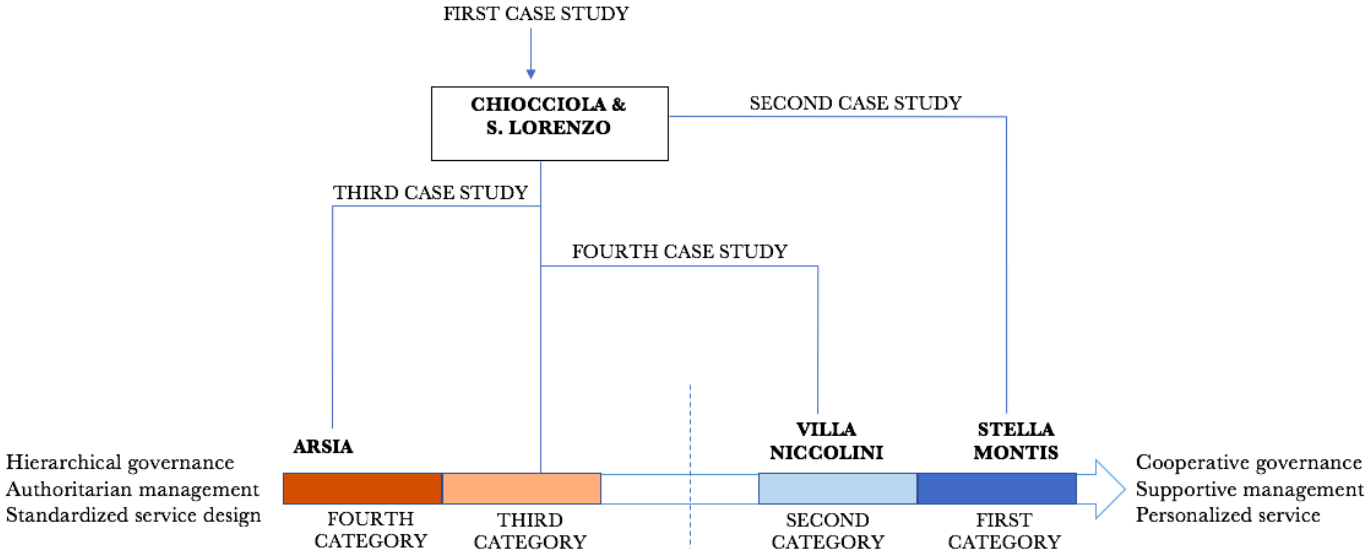
In the first case, we expect to find providers with a low level of intrinsic motivations. Caregivers' work – consisting in the execution of rules - can be monitored so that the organization provides incentives to extrinsic motivations, which are expected to crowd out intrinsic motivations. In turn, the low level of intrinsic motivations and the organization's attention toward the fulfillment of standards lead to a limited development of coordination capabilities to customize the service. The lack of coordination capabilities translates in low empowerment and burn-out problem for providers who, thus, make a larger use of sick leave hours. A high level of absences translates into lower service quality as continuity of care is hindered and customers' knowledge is not adequately used to customize their services. Because of it, the occasions for providers to coordinate among themselves in order to customize the service are reduced, along with the possibility to experience high satisfaction level in customization, which, in turn, hinder intrinsic motivations. As a consequence, the related development of coordination capabilities is again reduced and so on. The vicious cycle, according to a functionalist perspective, leads to a worsening in the management of customer uncertainty.

Conversely, when governance is cooperative, management is supportive and service design is personalized, customer uncertainty is efficiently managed. In this case, we expect to find a high level of intrinsic motivations to work, as the organization recognizes its inability to monitor caregivers' effort in the exchange of non-standardized knowledge. Coordination capabilities are supported; providers, as owners of tacit knowledge, feel empowered and experience low burn-out

problems thanks to their coordination capabilities. Thus, they tend to make a lower use of sick leave hours, which, in turn, means a higher service quality and a greater use of customer's knowledge for customization purpose. Because of it, also the opportunity for providers to coordinate in order to customize the service increases along with their satisfaction level. Thus, the level of coordination capabilities increases and so on. The virtuous cycle improves over time the management of customer uncertainty.

This interpretative model is evaluated by analyzing five LTC organizations within four case studies (see Figure 11).

Figure 11 – Organization of the case study



Source: Author's contribution

After a brief introduction of the five organizations, I compare the different levels of UPC_2 of the organizations belonging to the four categories. Then, I analyse whether the different levels of UPC_2 can be explained by my interpretative model. First, I show that the differences among organizations are not large concerning the level of intrinsic motivations. In fact, the existence of a self-selection problem[55] partly complicates the analysis: in the light of the hypothesized model, since the level of sick level hours is related with percentage of answers, but not with intrinsic

[55] "Self-selection bias is the problem that very often results when survey respondents are allowed to decide entirely for themselves whether or not they want to participate in a survey. To the extent that respondents' propensity for participating in the study is correlated with the substantive topic the researchers are trying to study, there will be self-selection bias in the resulting data. In most instances, self-selection will lead to biased data, as the respondents who choose to participate will not well represent the entire target population" (Lavrakas, 2008)

motivations, respondents are supposed to be the most motivated within each organization, including the most hierarchical. In other words, respondents' motivation may be due also to the caregivers' personal background not only to organizational incentives, so that another motivation index is required that reflects only the organizations' incentives. This index is identified in the percentage of answer, as – despite its conciseness - concerns the overall population and is reasonably dependent on the incentives provided by the organizational structure. Then, I analyse this issue in the four case studies. The first case study analyzes two organizations belonging to the third category by adopting literal replication logic. According to Eisenhardt (1989), "*in replication logic, cases which confirm emergent relationships enhance confidence in the validity of the relationships*" (Eisenhardt, 1989). In this particular case, similar results provide information consistent with the presence of a vicious cycle. Then, the remaining three case studies have been built by comparing these organizations with each one of the organizations representing the other three categories in order to make the related types of cycle clearer. Finally, the regression analysis provides evidence that supports the hypothesis about the effect of the organizational structure on the caregivers' satisfaction level.

In order to investigate my research question, I use a mixed source of evidences; qualitative survey data, quantitative archival records and semi-structured interviews to managers. Triangulation of qualitative and quantitative data is used to analyze theoretical hypothesis according to a qualitative approach (Yin, 2003). According to Eisenhardt (1989), "*the triangulation made possible by multiple data collection methods provides stronger substantiation of constructs and hypotheses*" (Eisenhardt, 1989). The survey provides information about caregivers' subjective evaluation of different organizational aspects related to governance, service design and management on the one hand, and their levels of motivation and satisfaction on the other hand. Archival records offer quantitative data about potential UPC_2, namely the number of sick leave hours collected over five years and other general information about organizations. Interviews to managers provided information about the organization of labor, the type of investment in coordination capabilities and service design that allowed me to choose organizations and better interpret survey results.

In conclusion, the four case studies provide evidence which is consistent with the existence 1) of vicious cycles in the organizations belonging to the third and fourth categories and 2) of a virtuous

cycle in the companies representing the first and second categories. In the fourth category, we expect that the vicious cycle is accelerated by the large attention to standards. In the first category, we expect an acceleration of the virtuous cycle given by the great attention to capabilities. This interpretative model, inductively developed, contributes to define the content of the relationship between organizational and production efficiency developed in the first chapter in the light of the Modularity Theory of the Firm.

3.2. Recruitment

The case study research was conducted in the center-north of Italy. In order to draw solid conclusions on this novel subject, purposive sampling was used to identify organizations representative of the four categories above defined. Five organizations were selected so that literal replication mechanism could be adopted within the first case study and theoretical replication could be used in the comparison with the other three companies. While the first two organizations should predict similar results, the comparison with the other three companies should predict contrasting results for anticipatable reasons (Yin, 2003). To preserve uniformity within our sample and promote meaningful comparison among organizations, the following inclusion criteria for the study were adopted.

First, organizations have to offer their services to a client population mainly represented by frail elderly people. This means that all these organizations deal with similar issues concerning need assessment and satisfaction. Despite reputation effect may work and, thus, organizations may face different proportions of clients with uncertain needs organizations, one of the most used customers' selection criteria of the residential care center is the closeness to their own family and social context. However, since most of customers receive a public support in the organizations under study and public entry criteria may differ among Regions, the organizations under study may face clients with different level of complexity in health conditions. Second, all the organizations have to provide residential care services, namely they design and manage a service system that has to satisfy the same elderly needs. Third, the organizations have kept the same governance and management for at least over the last ten years. This is an important condition to evaluate whether governance, management and service design affect sick leave hours. Fourth, all the organizations are certified with the care related ISO9001[56], meaning that their products and

[56] Stella Montis has obtained a comparable certification to ISO9001 that is based on provincial standards.

processes are registered and implemented in an established manner. This should facilitate comparison. Moreover, in most OECD countries, minimum quality level in service provision is guaranteed by public institutions which impose nursing homes the satisfaction of a number of formal quality standards as a requisite for service delivery and public reimbursement. In particular, over the last eight-six years, service design has been largely shaped by the system of license and certification identified by the Framework Law 328/2000. Licensing refers to the formal verification by a public body concerning the fact that a specific provider meets the standards to operate in the market, whereas certification refers to the possibility for that provider to operate as a node of the national health system. Licensing and certification, provided by the Regions and Provinces, are considered as the main tools through which the quality of the service is guaranteed in the formal care. As Casanova (2012) highlights, "*in general, the certification reflects the necessity of evaluating the response to a need for care and its standardization, with the aim of overseeing and improving the quality of the response*" (Casanova 2012). Regional variations are inevitable but their common source in the above-mentioned Framework Law and intensive bureaucratic and legislative activities over the past decade by regional governments actually resulted in relatively similar regulations. The most important indicators used across regions are structural requisites (characteristics of the rooms and identification of service modules) and functional conditions. The last ones impose not only a minimum number of professionals' hours for user, but also the standardization of managers and professionals' procedures that have to be traced in order to build service quality indicators. Even if identified at regional level, the national system of licensing and certification allowed to choose organizations belonging to different regions without the risk for comparability and with the advantage of increased variability. In order to identify the organizations representative of the four categories, the companies were selected on the basis of informal networking and a structured interview to managers about the level of standards adopted in the organization of labor, the degree of autonomy for each role and task, and the type of investment made as support to caregivers' work (in equipment, training etc.). In the end, five organizations were identified; three cooperatives and two investor owned enterprises.

The organizations in which literal replication logic is applied, Chiocciola and S. Lorenzo, are multi-stakeholder social cooperatives of equal dimensions (60 bed spots), situated in the same town, Florence, and belonging to the same consortium of cooperatives, Consorzio Zenit. The consortium – dealing also with supporting cooperative's administration – is a dynamic reality that carries out and finances research activity in order to improve service quality. It promotes the homogeneity

of quality standards within its partners by requiring the fulfilment of licensing standards and by organizing professionals' training. However, the organizations have also been developing independently of each other. Located in different areas of Florence, they have been managed for more than ten years by the same coordinators who have developed their own specific style in the interaction with the employees and clients. Thus, on the one hand, the presence of the Consortium promotes uniformity among organizations, on the other hand, their separate evolution allows for some variability. In these organizations, managers' interviews show that caregivers have clearly defined tasks to daily perform and receive annual training activities required by accreditation. Given the central role of accreditation in the promotion of service quality, such organizations have not considered as necessary further investing in standards or sustaining providers' capabilities. As such, they are considered as representative of the third category (low investment in standards, low investments in capabilities).

Concerning the other three organizations, Arsia is a large IOE situated in Milan in which, according to management, caregivers have to strictly follow a protocol in which the time required by each task is contemplated. The organization, in fact, has invested in operation management strategy to reduce uncertainty of performance and, this way, reduce production costs. This organization is expression of the fourth category; very high investment in standards, low investments in capabilities. Villa Niccolini is a IOE with 82 bed spots, situated in Prato, in which caregivers have low degree of autonomy in the organization of labor but receive psychological support in the relationships with users and colleagues. This company has been included in the sample as representative of the second category (high investment in standards, high investments in capabilities). Finally, Stella Montis is a multi-stakeholder social cooperative with 60 bed spots, located in Fondo (TN), that promotes caregivers' participation to governance by systematically investing in training activities to support relationships with colleagues and patients and by supporting the creation of thematic working groups to face organizational problems or promote new working strategies. For this reason, it is considered a good representative of the first category: low investment in standards, high investments in capabilities.

3.3. Data Collection

3.3.1. Surveys and interviews

In order to evaluate the different types of governance, service design and management and their relation with UPC, I made face to face in-depth interviews to the managers and submitted the same survey to professionals of each organization (caregivers, physiotherapists, animators and nurses with the exception of cleaners), including also workers with a fixed term contract. For the reader to have a more precise idea of the kind of questions asked and the structure of the survey, a template of the survey is available in Appendix 1. The survey in general asked subjective questions about their working activity. It contains 75 questions divided in five sections, namely 'Personal information', 'Motivating factors', 'Governance', 'Satisfaction' and a fifth part 'Certification procedure' reserved to those having worked at least six years in the organization. The survey is largely based on the one adopted by Stella Montis every two years for evaluating workers' satisfaction. Because of the necessary modifications adopted for the purpose of our analysis, the survey was first tested in a nursing home not included in our sample, by asking a couple of caregivers to fill it out. Since changes were required, I tested it again with another couple of caregivers in another organization (again excluded from our sample). Finally, the survey was submitted by the manager of each organization on the basis of stringent procedures that I had exposed in person and then left written in a document (see Appendix 2). Following the procedures, the manager had to explain the caregivers the type of research and the importance of their contribution for improving working conditions. As the survey was anonymous, the managers had to provide each survey in one envelop and, once filled out, each caregiver had to seal the envelop and put it inside a box that, according to the procedures, had to be collocated in a common area. Because of five working shifts over the week, not all the caregivers could receive the survey on the same day. Thus, each organization was allowed 15 days to submit the survey, over which the survey was proposed to most of workers. Then I received the box back by managers. In general, data collection took place during a one-month period: from the 1st to the 31th of March 2016. 251 surveys were submitted, 184 different answers were collected and 181 were kept for the analysis. However, since focus centered on caregivers with a permanent contract, in order to preserve homogeneity between the sample and the population under analysis, I dropped all surveys that indicated a level of education higher than high school

(corresponding to all professionals with the exclusion of caregivers)[57] and those that indicated a fixed term contract (or left unanswered the question). The other answers being incomplete or irrelevant for different motives. Therefore, the sample (122 respondents) represents 64.25% of the total population studied.

3.3.2. Administrative data

Administrative data have been collected to build a potential measure of UPC_2 and obtain a general description of the organizations (dimensions, ownership structure) and their population (number of women, strangers, fixed term contract). To build an index of UPC_2 I used the annual sick leave hours[58] for each caregiver with a permanent contract over the period 2011-2015 and the relative annual worked hours (with the exclusion of overtime). In the context of LTC organizational structure, caregivers' hours of sick leave may represent important informative data as they reveal costs for substitution and service quality. In fact, on the one hand, high absence levels translate in the organization's need to pay overtime hours or to temporarily employ a substitute; on the other hand, caregivers' sporadic attendance prevents high service quality by preventing the continuity of care.

In order to have a comparable measure of caregivers' hours of sick leave within time series and across organizations, for any caregiver I have calculated the annual hours of sick leave (SL) over the expected working hours (EXP) during the period 2011-2015[59]. Calculation over five years increases data stability and facilitates comparison across the organizations. EXP data correspond to the expected working hours by contract and it has been calculated by adding worked hours (excluding overtime hours) and sick leave hours[60]. For the purpose of this study, such data have

[57] to be sure about it, I asked managers whether other professional had a degree and whether there were caregivers with a degree. In all cases, as expected, it was confirmed the absence of caregivers with a degree and the presence of only professionals with a degree.

[58] It is to be noted that the organizations cover the all sick leave costs for the first three days. From the 4th to the 20th day, the organization pays the 50% of the expected wage and from the 21st to 180th day pays the 33.34%, while the remaining part is paid by the Italian Social Insurance Institute, INPS.

[59] In order to use annual data over the mentioned period, first it was necessary to check that no change had been occurred in the population of permanent workers between January and March period. This information was given by managers.

[60] This calculation method has been preferred to the one that subtract hours of absence different from illness to the expected working time because the type and number of hours of absences that employee can do is established not by

been considered only for workers with a permanent contract. This is because in presence of a fixed term contract, the organization necessarily relies on workers' extrinsic motivations to promote production efficiency thanks to the threat of not renewing the contract. Since we are interested in analyzing the amount of sick leave as a measure of UPC and, hence, of the organization's ability to intrinsically motivate production efficiency, we have restricted our study to employees having a permanent contract.

Outliers have been excluded from the calculation of UPC over the five years. The exclusion criterion was the presence of a large number of sick leave hours for a certified health reason (attested physical limitations or serious illness) or for important personal problems (single mothers, recognized family problems, etc..), namely situations not affected by the organizational characteristics. To this purpose for each organization, I have sorted the five-year-distribution in increasing ordered data and highlighted workers' sick leave hours collocated above the ninetieth percentile. Then I have shown the file to managers of each organization and I asked them whether workers' absence had been certified. Moreover, I asked them whether there were other individuals with a frail health status placed below the ninetieth percentile. Caregivers identified by managers were considered as outliers since their sick leave hours could not be influenced by the type of organization. Having the list of caregivers for each year, it was possible to calculate turnover from one year to next and, hence, the mean as indicator of the stability of the organization.

the single contracts but by law and collective bargaining and, hence, it is scarcely proportionated to the number of worked hours expected by contract.

3.4. Data Results

This section analyses data collected to evaluate whether the evidences support the hypothesis about the role of the organizational structure as engine of a cycle promoting or deterring external efficiency. First, I provide a general description of all the organizations, which allows to evaluate their main differences and similarities. After having shown that the organizations belonging to different categories display different levels of sick leave hours, I ask whether such differences can be explained in the light of the hypothesized model on the basis of the different organizational characteristics. The analysis starts with the purpose to establish whether a relationship exists between the level of sick leave hours and the motivational/satisfaction level. To this regard, the different percentage of answer to the survey reveals the presence of a self-selection problem, which partly complicates the analysis. The study of the sample characteristics suggest that caregivers' motivation may depend also on personal factors, especially in the most hierarchical organizations. Thus, the percentage of answer is used as alternative index of intrinsic motivation because, despite its conciseness, concerns the overall population and largely reflects the organizational incentives. The four case studies are then presented, in which governance, management and service design are analyzed on the basis of caregivers' answers to the survey and interviews to the managers. In order to visualize organizational differences and explore the connection with the level of UPC, the blueprinting of the service design is built for each institution. In this context, instead of starting with the user's action (as usually happens), the chart is created on the basis of the caregivers' evaluation of the organization. The case studies allow to identify different types and levels of cooperation capabilities developed in each organizational type; in Arsia, Chiocciola and S. Lorenzo (the last two categories), cooperation capabilities emerge only in spontaneous ways, but in Villa Niccolini and Stella Montis they are sustained by their organizational structures. In particular, while in Villa Niccolini (second category) capabilities concern approach in communication in order to reduce the burn-out problem, in Stella Montis (first category), capabilities concern also the strategies to be adopted in order to increase caregivers' empowerment. Finally, the relationship between some fundamental organizational characteristics and satisfaction levels is studied thanks to regression analysis on the 122 respondents. The resulting evidences suggest that some important organizational characteristics (type of governance and level of training) affect the level of satisfaction across the organizations representing the four categories.

3.4.1. General description of the organizations

In this section, the description of the main organizational variables allows to identify the first differences and similarities among nursing homes across the different categories. As it will be documented, such data partly come from surveys, partly from the administrative office of each organization. This means that they refer to two partly different populations; the one of respondents and the one fully representative of caregivers.

Table 3 - Main organizational characteristics of the sampled nursing homes in 2015

	Bed spots	AWU (ULA)	ownership	province
Arsia	150	50.4	IOE	MI
Chiocciola	60	26.5	coop	FI
S. Lorenzo	60	27.7	coop	FI
Stella Montis	60	25.2	coop	TN
Villa Niccolini	82	34.6	IOE	PO

Source: administrative data

As Table 3 shows, organizations display various ownership structures and organizational dimensions. As indices of the last element, I have adopted the number of bed spots and the *average working unit*(AWU)[61]. This measure corresponds to the number of workers employed in absence of part-time contracts. Three of them (Chiocciola, S. Lorenzo and Stella Montis) are social cooperatives that are organized in order to assist 60 users[62]. Differences in the number of AWU is reasonably due not much to the differences in the effectively occupied bed spots, but in the legislative requisites and how bed spots are positioned in the building[63]. If we look at Figure 12, we can see that the number of members largely changes across organizations. In particular, the different percentage of members in Stella Montis and in the two organizations belonging to the consortium, could suggest a greater use of cooperation mechanism in S. Lorenzo and Chiocciola. The restriction of membership is itself directed to guarantee that members are effectively involved in the governance, not only in a formal, but also in a substantial way. The other workers

[61] This is calculated by dividing the total number of worked hours in a week by the number of expected full-time worked hours (38 hours per week).
[62] It may happen that the structure has vacant bed spots, however, it is in the interest of the organizations to find new users. In this circumstance, in Tuscany, professional hours required do not change and the organization has to cover the relative costs.
[63] While in S. Lorenzo bed spots are placed on three different floor, in Chiocciola they are placed on the same floor. Hence, in order to meet the requirement concerning the number of caregivers for bed spots, in case of S. Lorenzo meant to have more hours compared to minimum required.

may become members overtime, when they get better acquainted with the organization, or be simple employees, who are nonetheless an important stakeholder of the organization. Moreover, as stated in the first chapter, what firstly matters is the presence of cooperative governance at the level of working relationships during the productive activity (involving some sharing of decision rights in the production process) that generates a multi-stakeholder governance and to a lesser extent the presence of cooperation at corporate governance level (involving the sharing of strategic decisions and alienation rights). In line with this reasoning, our results show greater use of cooperation in Stella Montis than in Chiocciola and S.Lorenzo. Conversely, Arsia and Villa Niccolini are investor owned enterprises with very different dimensions both in terms of bed spots and AWU (see Table 3). Given the potential benefits deriving from economies of scale, the very large dimension of Arsia may partly explain its misleading tendency to minimize production costs through service standardization, supported by authoritarian management and hierarchical governance.

Figure 12 - Percentage of members within cooperatives

Source: survey (perc_answer: Chiocciola 79%, S. Lorenzo 67 %, Stella Montis 77%)

Additional and important information come from the analysis of gender, nationality and age of the working population.

Table 4 - Number of Italians and Foreigners in the sampled organizations

	Arsia	Chiocciola	S. Lorenzo	Stella Montis	Villa Niccolini
Italian	18 (28%)	16 (52%)	13 (38%)	29 (81%)	33 (77%)
Foreigners	46 (72%)	15 (48%)	21 (62%)	7 (19%)	10 (23%)

Source: administrative data

Table 5 – Gender differences across organizations

	Arsia	Chiocciola	S. Lorenzo	Stella Montis	Villa Niccolini
Female	44 (69%)	25 (81%)	26 (76%)	30 (94%)	39 (91%)
Male	20 (31%)	6 (19%)	8 (24%)	2 (6%)	4 (9%)

Source: administrative data

As Table 4 and Table 5 show, while female percentage is very high in all the organizations from a minimum of 69% in Arsia to 94% in Stella Montis, different is the case for citizenship. Arsia in this case is the nursing home with the greatest number of foreigners (72%), followed by S. Lorenzo and Chiocciola (62% and 48%), while Stella Montis and Villa Niccolini are the ones with the lowest percentage (19% and 23%)[64]. This is an important information that could allow to explain along with the turnover level, the ability of the organizations to create a participative governance. According to Hansmann (1996), homogeneity of membership lowers transaction costs. Consistently, we can expect that the organizations with high percentage of foreigners (along with a high turnover) are more heterogeneous and, hence, find more difficulties in sustaining a good communication level than the organizations in which people speak the same language, have similar cultural benchmarks and work in the same organization for a long time. To this regard, however, data on turnover[65] of permanent caregivers are quite low (see Table 6), suggesting that all the organizations had time to try to promote participative governance.

[64] Different percentage of strangers can be explained by the different extent and type of migration flux in different territories, along with the length of time of the phenomenon and presence of intermediary services to obtain Italian certifications required by law.

[65] Having the list of caregivers for each year, it was possible to calculate turnover from one year to next and, hence, the mean as indicator of the stability of the organization. Turnover was calculated as follows $\frac{\sum tot.entering_t + tot.\ exiting_t}{tot.caregivers_t}$, where $tot.caregivers_t = caregivers\ at\ the\ beginning\ of\ t + tot.entering_t - tot.exiting_t$

Table 6 – 2011- 2015 Turnover of permanent workers across organizations in percentage

Turnover (%)	2011(out)	2012	2013	2014	2015 (in)	MEAN
Arsia	7	14	8	17	6	10
Chiocciola	9	3	0	17	0	4
S. Lorenzo	9	6	10	10	7	7
Stella Montis	0	4	7	7	0	4
Villa Niccolini	2	19	13	15	10	14

Source: administrative data

Data on nationality are interesting too if considered along with the number of women (see Figure 13). In fact, we could expect that foreign women – who usually care for children or dependent relatives - cannot rely on a social network in case of emergency, so that they may use sick leave hours to look after them[66]. This reason may provide a rival explanation with respect to my hypothesis, as the level of sick leave hours may depend on this personal condition, not only on the organizational characteristics. This variable should be especially considered in case of Arsia, the organization belonging to the fourth category, namely the one with a high investment in standards and low investment in coordination capabilities, as foreigner women represent more than half of the workers (56%). However, as shown in table 7, sick leave hours data of foreigner workers are on average lower than in case of Italians. This result could be explained by the fact that they may feel insecure in their work and, thus, take less sick leave.

[66] Concerning child's illness, according to law (D. Lgs. 151/2001), up to 3 years old, the mother or father can be absent whenever it is required but without any retribution (they only continue to make contributions for eventual pension); after 3 years old to 8 years old, mother or father has only 5 days available; after 8 years old, specific days are not accorded. Parental leave is also recognized for serious family reasons for up to two years but it is unpaid (Law 53/2000)

Figure 13 - Percentage of foreigner women over the total population.

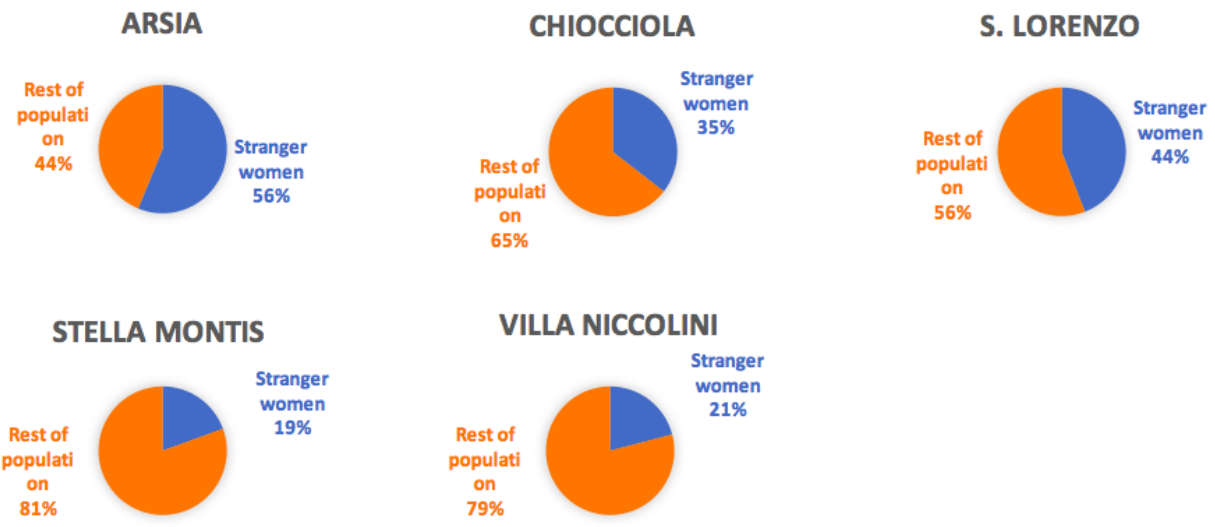


Table 7 - Average sick leave hours of foreigner/Italian workers over the period 2011-2015

Arsia		Chiocciola		S. Lorenzo		Villa Niccolini		Stella Montis	
Italian	Foreigner	Italian	Foreigner	Italian	Foreigner	Italian	Foreigner	Italian	Foreigner
10.6	9.1	5	3.2	5.3	4.7	2.7	2.1	1.8	1.8

Source: Author's calc. based on survey's data

Other important data to be considered concern the average workers' age (see Table 7). In Chiocciola and Villa Niccolini (with an average age greater than 47), the population is older than in Stella Montis, S. Lorenzo and Arsia, where the population is about 45 years old. This fact can influence the level of sick leave hours in the organizations, because with ageing, the working population is frailer.

Table 8 - Average workers' age at 03/2016

age	mean	sd	min	max
Arsia	44.63	8.27	28	56
Chiocciola	47.32	9.42	30	69
S. Lorenzo	45.11	8.9	30	64
Stella Montis	45.33	9.8	27	63
Villa Niccolini	47.2	10.9	22	62

Source: Author's calc. based on survey's data

Finally, valuable information comes from the number of annual temporary and permanent contracts. In general terms, we can see in Table 10 that all the organizations rely on permanent contracts. With the exception of Arsia (where values are uneven), over the five years all the organizations have maintained similar percentage of permanent contract hours over the total. Temporary contracts are usually used for substitution reasons. The singularity of Arsia, according to management, has been due to the ownership will to reduce, for cost reduction reasons, the number of assistance hours (very high) closer to the minimum legal requisites. This requires management to reduce over time the number of fixed term contracts, which incredibly dropped from 60336 hours in 2011 to 15915 hours in 2015 (see Table 8). Conversely, the number of permanent contract hours has an irregular trend from 2011 to 2015 (see Table 10). Therefore, in all the organizations, data on permanent contract hours inform about an important opportunity for their governance, namely establishing and nurturing relationships with the personnel on the basis not of extrinsic but of intrinsic motivations. Moreover, combined with data on turnover and on working time, they show that personnel are highly stable and, hence, that the organizations, at least over this five-years-period, had the opportunity to promote the desired working rules and an organizational climate suitable for their objectives.

Table 9 – Absolute and percentage number of annual fixed term contract hours

	2011	2012	2013	2014	2015	MEAN
ARSIA	60336	37064	11343	8270	15915	26586
	0,46	0,35	0,13	0,1	0,17	0,24
CHIOCCIOLA	9353	7993	7131	7834	6228	7707
	0,16	0,14	0,14	0,15	0,13	0,14
S. LORENZO	4888	3169	5509	8013	6595	5634
	0,1	0,07	0,12	0,16	0,13	0,12
STELLA MONTIS	9513	9345	8024	767	5128	6555
	0,23	0,22	0,19	0,02	0,12	0,16
VILLA NICCOLINI	3060,25	3852,75	3713	2998	6208,46	3966
	0,05	0,06	0,06	0,05	0,1	0,06

Source: administrative data

Table 10- Total number of annual caregivers' hours

	2011	2012	2013	2014	2015	MEAN
ARSIA	129531	104657	87974	77834	91861	98371
CHIOCCIOLA	59822	56066	51591	51711	48264	53491
S. LORENZO	50897	47480	46986	49738	50513	49123

STELLA MONTIS	41038	42723	42776	39947	45989	42495
VILLA NICCOLINI	63157,5	66488,76	65502,25	66257	63004,96	64882

Source: administrative data

Table 11– Absolute and percentage number of annual permanent contract hours

	2011	**2012**	**2013**	**2014**	**2015**	**MEAN**
ARSIA	69195	67593	76631	69564	75946	71786
	0,53	0,64	0,87	0,89	0,83	0,75
CHIOCCIOLA	50470	48073	44460	43877	42037	45783
	0,84	0,86	0,86	0,85	0,87	0,86
S. LORENZO	46010	44311	41477	41725	43918	43488
	0,9	0,93	0,88	0,84	0,87	0,88
STELLA MONTIS	31525	33379	34753	39179	40861	35939
	0,77	0,78	0,81	0,98	0,88	0,84
VILLA NICCOLINI	60097,25	62636,01	61789,25	63261	56796,5	60916
	0,95	0,94	0,94	0,95	0,9	0,94

Source: administrative data

In conclusion, such data provide a general description of the main contractual dimensions of the organizations. What emerges is that the companies – despite their different ownership and dimensions – have promoted stable relationships with their personnel, justifying hence an investigation on the role of governance, management and service design in shaping caregivers' behavior. Because of important differences in the number of foreigners, we can reasonably expect that in the more 'international' organizations, it has been more difficult to promote participative governance at least because of group heterogeneity. However, the low turnover and high percentage of permanent contracts suggests that this effect has been reduced or, at least, could have been reduced if wanted. Finally, the different percentage of foreign women has to be taken into account when evaluating the meaning of sick leave hours, because these could be due also to family problems.

3.4.2. Sick leave hours across organizations

Table 11 shows the evolution of sick leave hours across organizations over the period 2011-2015. As it can be seen, despite the number of absences varies across years, no increasing or decreasing

trend characterizes the period that, hence, is unlikely to be influenced by any exogenous phenomenon. As expected, the organizations expressing the four categories show differences in the level of absences for illness over the time span and, hence, also in the mean value. Arsia (first category) results as the nursing home with the highest amount of average sick leave hours (9.6%), as expected because of its organizational characteristics. Chiocciola and S. Lorenzo (second category) – despite their high number of members among caregivers – show a medium level of absences (respectively of 4.3% and 5.5%) and this could be explained by the low participatory organization of labor. Villa Niccolini (third category), despite its for-profit ownership structure, displays a level of absences much lower than the cooperatives Chiocciola and S. Lorenzo (2.7%). Finally, Stella Montis (fourth category) is the organization with the lowest level of sick leave hours.

Table 12 – Time series 2011-2015 of sick leave hours/ expected worktime

Illness hours/Exp. Worktime (%)	2011	2012	2013	2014	2015	MEAN
Arsia (I)	9.8	10.2	8.9	9.5	9.4	9.6
Chiocciola (II)	4.6	3.9	5.1	3.7	4.2	4.3
S. Lorenzo (II)	6.1	4.8	4.4	4.5	5.4	5.1
Villa Niccolini (III)	3.7	2.3	2.2	1.6	3.7	2.7
Stella Montis (IV)	1.7	2.3	1.7	1.7	1.5	1.8

Source: Author's calc. based on administrative data

The purpose of this research is to establish whether a relation can be identified between the different amount of absences and the organizational structures of the companies belonging to different categories. In particular, a relation that supports the hypothesis about the presence of a virtuous or vicious cycle. The different percentage of answer to the survey partly complicates the analysis of the cycles by creating a self-selection problem. After having analyzed the characteristics of the self-selected sample, the respondents' answers on their motivational level will be analyzed along with the type of relationship with the level of sick leave hours.

3.4.3. Self-selection problem and respondents' identity

In order to apply the interpretative model to the study of the five organizations, it is fundamental to take into account that the percentage of respondents across organizations largely varies and, hence, that a self-selection problem exists. The anonymous character of the survey does not allow

to clearly match each respondent with the corresponding level of sick leave hours. Before continuing our analysis, therefore, it is necessary to establish who exactly were respondents.

Table 12 displays the percentage of answer to surveys across organizations. The highest value is in case of Villa Niccolini (83%), followed by Chiocciola and Stella Montis (79% and 77%) and by S. Lorenzo and Arsia (67% and 42%). Some hints on their identity are, nevertheless, obtainable. First, we have evaluated whether the sample was adequately representative of population. To this purpose, I have used as control variable 'worktime'. As it can be seen in Table 13, population and sample means of worktime is similar, as well as the percentages of population and sample having worked at least 10 years. The sample of respondents can be considered as representative of the population, since no relevant distortion is detected.

Table 13 – Percentage of respondents among permanent workers

	Survey submitted	Survey filled out	percentage of answer
Arsia	52	22	0.42
Chiocciola	29	23	0.79
S. Lorenzo	30	20	0.67
Stella Montis	31	24	0.77
Villa Niccolini	40	33	0.83

Source: Author's calc. based on survey's data

Table 14 – Population and Sample Mean of worktime in each organization

	Population mean	**Sample mean**
Tot. Organizations	8.4	8.0

Source: Author's calc. based on administrative and survey's data

Table 15 – Percentage of population and respondents having worked at least 10 years

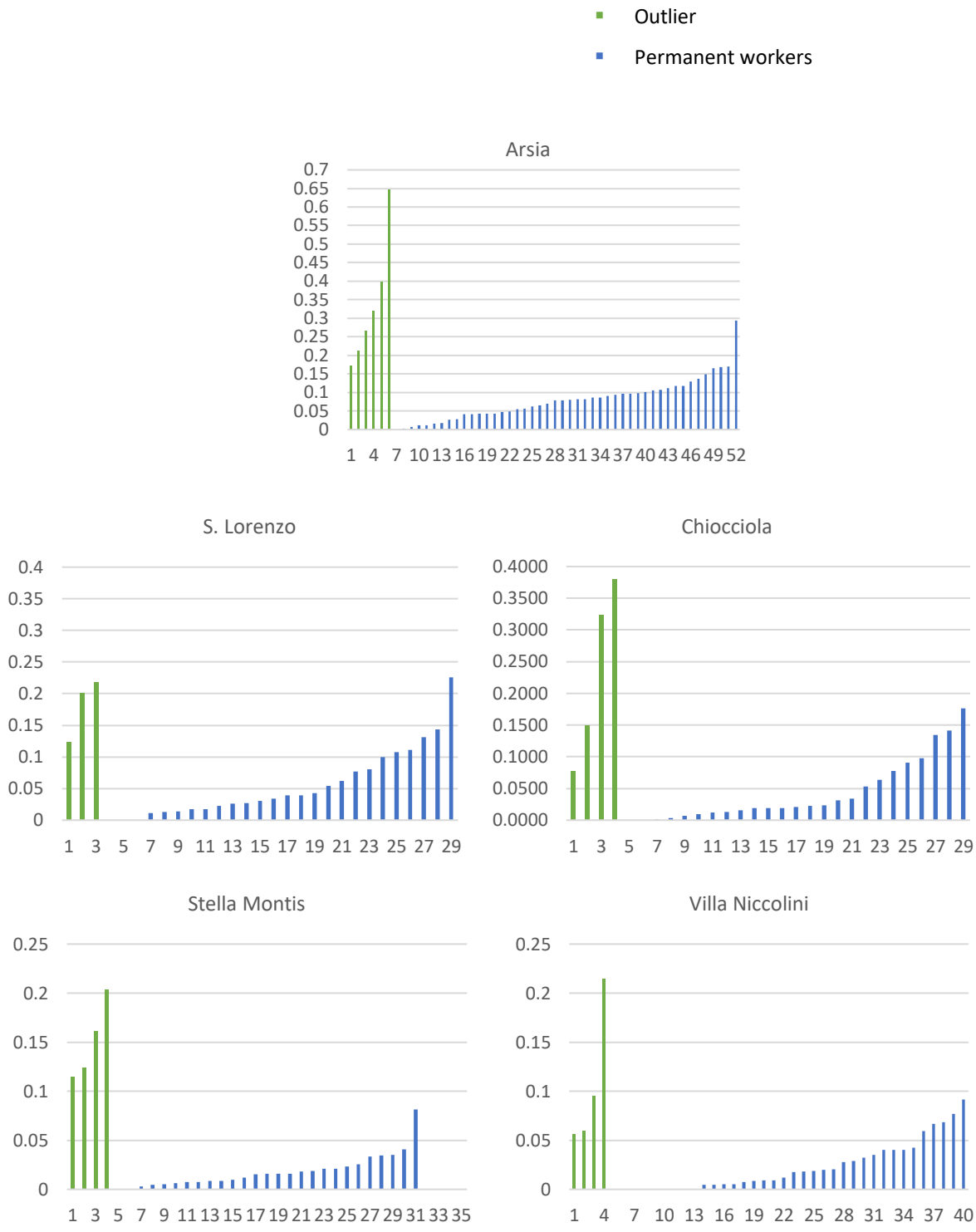
	% Population	**% Sample**
Tot. Organizations	54	55

Source: Author's calc. based on administrative and survey's data

Given that the sample of respondents is representative of the population, then we calculated the correlation between the means of sick leave hours and of answer percentage. The resulting value is negative and extremely high (-0.9412) and statistically significant (0.000 p-value). Such

correlation suggests that respondents are those having made the lowest level of absences within each organization. Another confirmation in favor of this interpretation comes from the analysis of the distribution of 2011-2015 sick leave hours of the permanent workers having received the survey. Figure 14 shows that the number of respondents could be included among the number of workers having made an absence level below 5% (with the exception of C. for two elements that are just above the 0.5 line). Given the good representativeness of the sample, this fact reinforces the hypothesis that respondents are those having made the lowest level of absence within their organizations, that are assumed to have stronger intrinsic motivations.

Figure 14 - 2011-2015 UPC level of permanent workers having received the survey



3.4.4. Motivation and Satisfaction Levels across Organizations

In the first chapter, intrinsic motivations have been regarded as a fundamental engine for the creation of new knowledge and the development of coordination capabilities. Consistently, satisfaction related to personal and team results should be considered as a fundamental objective for the organization in order to increase and maintain over time high intrinsic motivations among workers. As it will be shown, most of respondents declare to be highly motivated about most of aspects in all the organizations. Such information, however, needs to be analyzed by taking into account the self-selection problem. In particular, the negative relation between the average motivational factors and sick leave hours suggests that respondents (workers with low absence levels) find motivational sources also in their personal background, especially in the most hierarchical organization, where we expect a negative influence by the institution. This interpretation is consistent with the hypothesized model. Because of the self-selection problem, the variable 'percentage of answer to the survey', can be considered as an index of the level of intrinsic motivation to work, which concerns the entire population and is reasonably affected by the organizational structures.

The 34 questions on motivation and satisfaction can be collected in four different aspects:

- Relationship with the users (intrinsic motivation);
- Relationship with colleagues and manager (intrinsic motivation);
- Learning and ability to contribute to organizational goals (intrinsic motivation);
- Remuneration and conciliation work-private life (extrinsic motivation).

The survey was structured so that a clear comparison could be drawn among motivating factors and the relative levels of satisfaction: issues identified as source of motivations are then asked to be evaluated in terms of satisfaction. In order to avoid confusion among the elements of motivation and satisfaction, the survey visibly separates questions on motivation and satisfaction, placing the first at the beginning of the survey and the second at the end. Besides, among the instructions for managers it was required to highlight the differences between motivating and satisfaction aspects, suggesting strategies of explanation.

Relationship with the user

In general, data show that caregivers attribute high value to the relationship with the user. On a scale between 1 (not important) and 7 (very important), mean value for motivation is usually

greater than 6 and also the level of satisfaction is high (greater than 5) (see Table 15). Coefficients of variation[67] (CV) are low concerning answers on motivation but they are higher in the evaluation of satisfaction, suggesting that in each institution, greater divergence of views concerns their satisfaction level.

Table 16 – Motivation and satisfaction level in the relationship with users

Legend:
Mot_1/Sat_1 - *helping elderly to improve their quality of life*
Mot_3/Sat_3- *Being able to influence the organization of your work so as to better meet the needs of the guests*
Mot_6/Sat_6- *Having a good relationship with patients*
Mot_7/Sat_7- *Participating to social and animation activities with patients*
Mot_16/Sat_18- *Entering in synthon with users and his/her own needs*

		Arsia	Chiocciola	S. Lorenzo	Stella Montis	Villa Niccolini
Mot_1	mean	6.67	6.91	6.32	6.25	6.73
	CV	0.11	0.04	0.15	0.14	0.08
Sat_1	mean	5.55	5.74	5.45	5.79	5.18
	CV	0.35	0.28	0.17	0.15	0.32
Mot_3	mean	6.34	6.39	6.02	6.04	6.43
	CV	0.14	0.1	0.14	0.13	0.12
Sat_3	mean	5.31	5.54	5.05	5.44	5.21
	CV	0.24	0.23	0.23	0.16	0.36
Mot_6	mean	6.72	6.91	6.5	6.61	6.73
	CV	0.08	0.04	0.11	0.09	0.08
Sat_6	mean	5.95	6.68	6.1	6.08	5.96
	CV	0.27	0.08	0.17	0.13	0.21
Mot_7	mean	6.13	6.26	5.75	5.83	5.97
	CV	0.14	0.14	0.21	0.16	0.19
Sat_7	mean	5.26	5.47	5.53	5.71	5.36
	CV	0.32	0.3	0.24	0.17	0.34
Mot_16	mean	6.35	6.81	6.65	6.65	6.76
	CV	0.22	0.06	0.1	0.07	0.08
Sat_18	mean	5.85	6.3	6.1	5.75	6
	CV	0.18	0.13	0.14	0.14	0.21

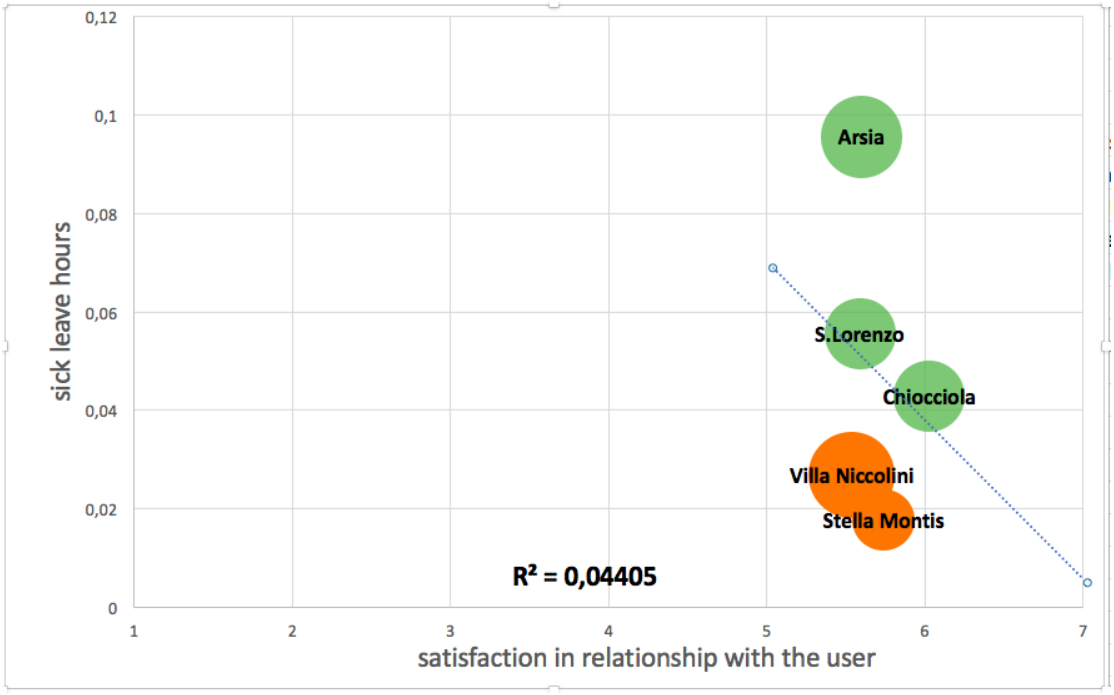
Source: Author's calc. based on survey's data

In general, we can see that the level of satisfaction is only a bit lower than the level of motivation concerning the all aspects and that the level of intrinsic motivation is very high across

[67] Coefficient of variation is a standardized measure of dispersion defined as the ratio of the standard deviation σ to the absolute value of the mean $|\mu|$.

organizations. If we build two indices of motivation and satisfaction -obtained as sum of the variables concerning the relationship with users, we obtain a high correlation coefficient (0.46). The lack of great differences can be at least partly explained by the different percentage of answers in the organizations, with the lowest level in Arsia (42%), hierarchical organization that represents the fourth category. Moreover, in the light of our model, the absence of any relation – at organizational level – between sick leave hours and satisfaction indices (see Figure 16) can be explained with the fact that caregivers have different motivational sources from the organization. Especially for motivational factors related to the relationship with users, this is reasonably expected. In fact, the level of motivation may largely depend on vocation and past experiences. Finally, to some extent, this result may be also due to the low analytical power of the survey instrument to deeply understand individuals' motivations, instrument that however is fundamental when the population to investigate is large as in this case.

Figure 15 – Relationship between satisfaction and sick leave hours



Internal working relationships

Experiencing positive relationships with the colleagues and the manager is considered as a highly important motivating factor, as the mean values in Table 16 show.

Table 17 - Motivation and satisfaction level in the relationship with colleagues and management

Legend:

Mot_8/Sat_8 – Experiencing a supportive and collaborative climate with colleagues
Mot_9/Sat_9 - Participating to activities for socializing with colleagues (dinners, tours, parties etc.)
Mot_13/Sat_ 14- Trusting colleagues
Mot_14/Sat_ 15- Trusting manager

		Arsia	Chiocciola	S. Lorenzo	Stella Montis	Villa Niccolini
Mot_8	mean	6.13	6.45	6	6.46	6.45
	CV	0.16	0.15	0.2	0.11	0.1
Sat_8	mean	4.33	5.17	4.84	5.08	5.03
	CV	0.39	0.24	0.27	0.23	0.27
Mot_9	mean	4.53	5.18	4.6	5.26	5.06
	CV	0.48	0.29	0.33	0.23	0.34
Sat_9	mean	3.44	3.91	4	4.83	4.27
	CV	0.58	0.49	0.39	0.31	0.43
Mot_13	mean	5.24	6.5	5.75	6.26	6.24
	CV	0.1	0.1	0.26	0.17	0.22
Sat_14	mean	4.14	4.39	4.7	5.04	4.54
	CV	0.44	0.31	0.31	0.22	0.4
Mot_14	mean	5.81	6.67	6.1	6.56	6.54
	CV	0.29	0.09	0.25	0.09	0.1
Sat_15	mean	4.29	5.65	5.5	5.75	5.18
	CV	0.51	0.18	0.23	0.17	0.40

Source: Author's calc. based on survey's data

Concerning the relationships with the manager, caregivers were called to evaluate to what extent it is important having the possibility to trust the manager. As Figure 16 shows, most of workers in all the organizations regard the possibility to trust manager as a central motivating factor to work; value 6 and 7 were chosen by 96% of caregivers in Stella Montis, 91% in Chiocciola and 88% in Villa Niccolini, while in S. Lorenzo and Arsia it was chosen by 75% and 71% of the sample. However, different is the value given to the linked satisfaction level. In Stella Montis, in Chiocciola and in Villa Niccolini around 60% of respondents chose level 6-7, in S. Lorenzo 50% of the sample and, finally, in Arsia – with a bimodal distribution on value 1 and 6 – only 43 % of caregivers chose that

value. The different levels can be interpreted on the one hand as a reflex of the effective role of the manager in their daily activities and on the other hand as a reflex of the quality of the relationship with this person, which, especially in hierarchical organizations, is central to preserve caregivers' effective behavior. Concerning the relationships with colleagues, data on satisfaction quite differ with respect to the evaluation on management. Through a comparison of Figure 18 and 19 concerning the levels of motivation and satisfaction, we can note that modes in satisfaction distributions are shifted from values 6 or 7 to level 5, with the exception of Arsia in which mode is still on 6 but values are very dispersed as coefficient of variation shows (0.51). These data confirm a general difficulty to establish good interpersonal connections with colleagues when they are called to collaborate and support each other. However, interesting is the distribution of answer to the issue "Participating to activities for socializing with colleagues" as source of motivation (see Figure 20). In Stella Montis, where the organization supports participative governance and cooperation among colleagues, most of respondents considers socialization activities with colleagues an important motivating factor. This data informs about the instrumental role of playful activities toward the creation of a cohesive team.

Figure 16 - Distribution of 'Trusting manager' as motivating factor

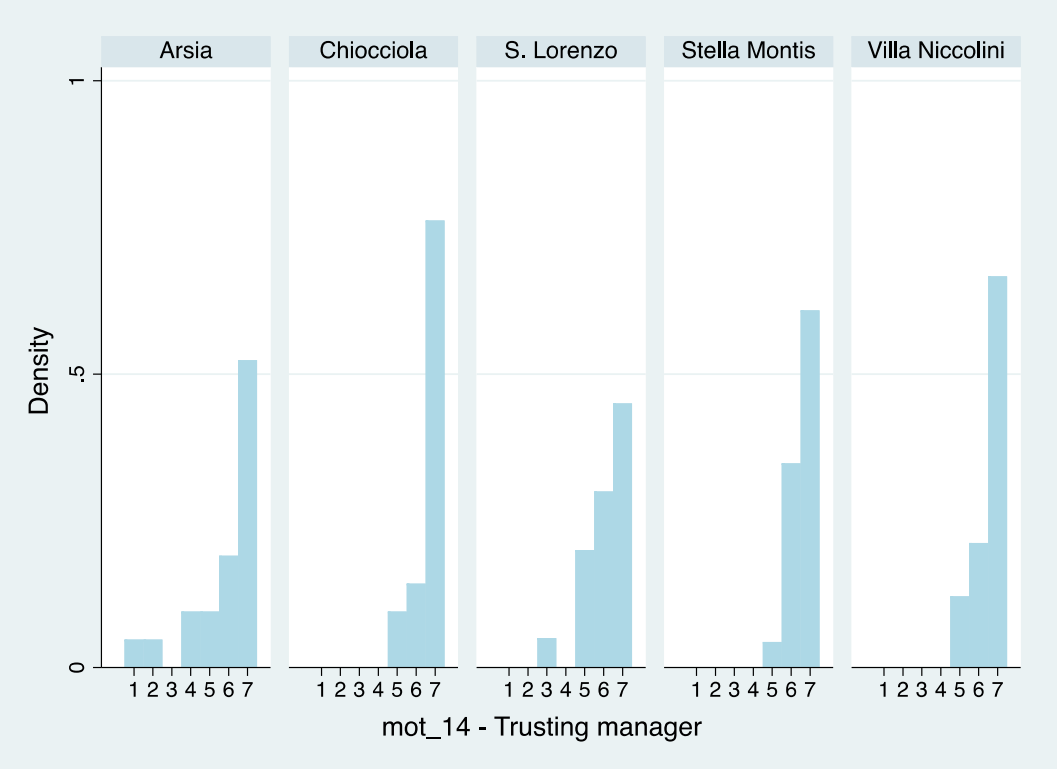


Figure 17 - Distribution of 'Trusting manager' satisfaction level

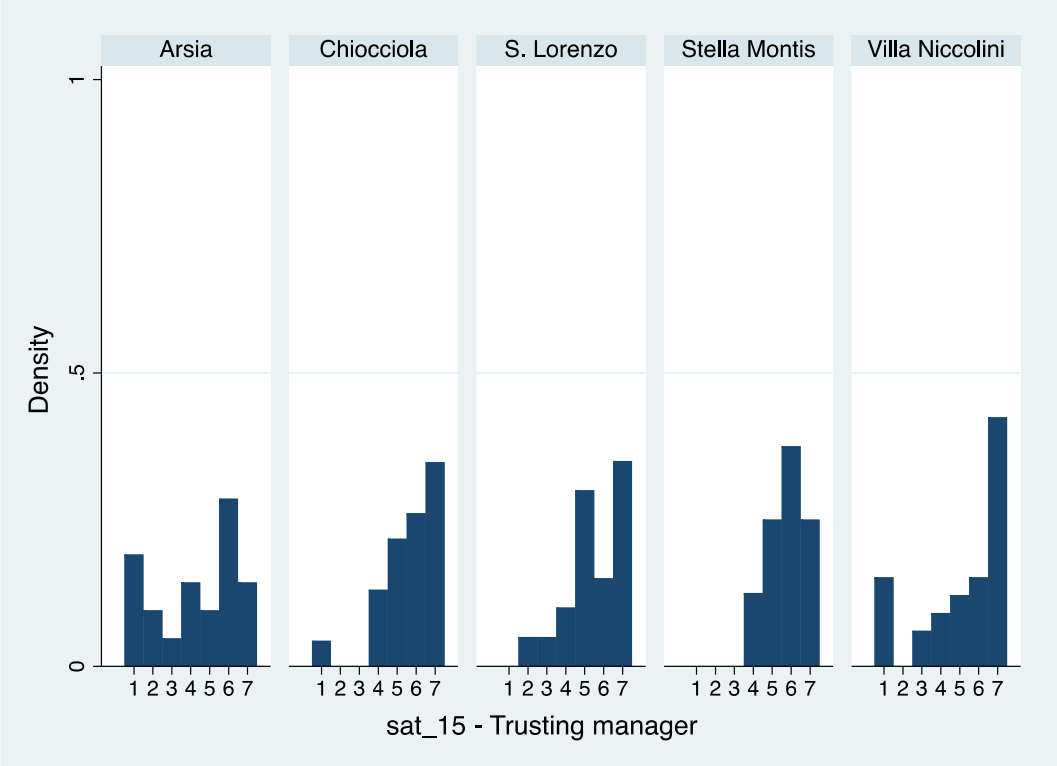


Figure 18 – Distribution of 'Trusting colleagues' as motivating factor

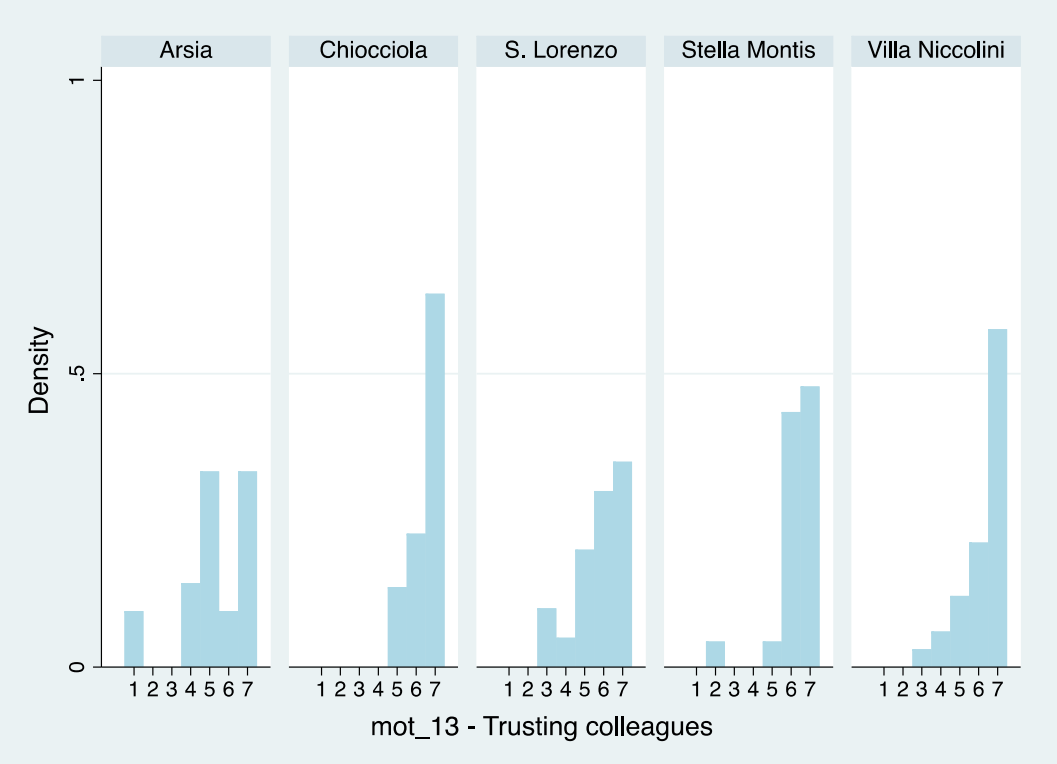


Figure 19 - Distribution of 'Trusting colleagues' satisfaction level

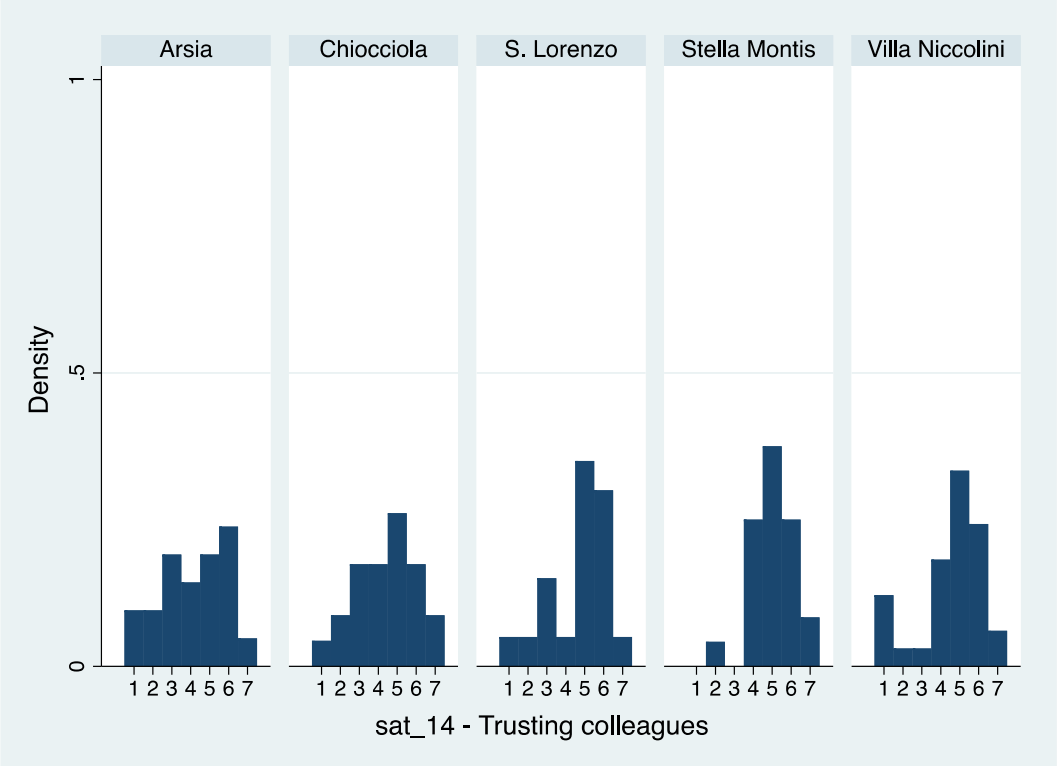
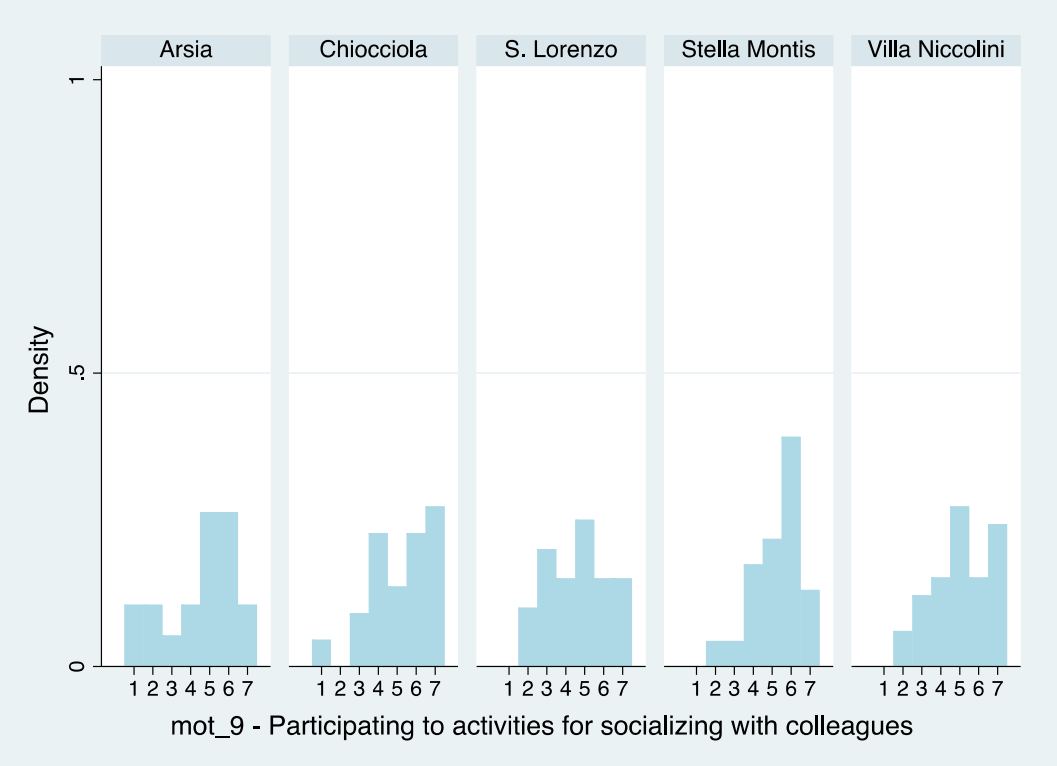


Figure 20 - Distribution of 'activities with colleagues' motivation level



Two motivating and satisfaction factors whose level not only necessarily depend on the organizational characteristics, but also essentially affects the organizations' ability to promote coordination capabilities, are the following: 1) the existence of fair and equal relationships and 2) recognition and appreciation of personal efforts. As Table 17 shows, both variables are on average considered very important (most of the means are greater than 6). Being treated in equal and transparent manner is generally considered as fundamental motivating factor especially in Chiocciola and Villa Niccolini, where the 91% attributed to it a very high level. Instead, with respect to satisfaction, caregivers on average are quite disappointed and their opinion largely differs between each other, as large coefficient of variation (greater than 0.30 in almost all cases) shows up (Table 17). The only exception is Stella Montis where the satisfaction level is higher than in Chiocciola and Villa Niccolini and where the coefficient of variation remains quite low with values concentrated around the mean. As expected, the lowest value about the fairness of treatment has been given by caregivers in Arsia, while in Villa Niccolini and S. Lorenzo respondents admit that their personal effort is not adequately recognized.

Table 18 – Quality of the relationships internally to the organization

Legend:

Mot_5/Sat_5 - recognition and appreciation of personal effort
Mot_15/Sat_16 - fair and equitable treatment

		Arsia	Chiocciola	S. Lorenzo	Stella Montis	Villa Niccolini
Mot_5	mean	6.2	6.52	6.2	6.52	6.6
	CV	0.27	0.32	0.16	0.08	0.10
Sat_5	mean	4.61	4.47	4.15	5.21	4.06
	CV	0.38	0.48	0.44	0.18	0.50
Mot_15	mean	5.9	6.68	6.47	6.58	6.66
	CV	0.3	0.09	0.15	0.09	0.09
Sat_16	mean	4.55	4.91	5.4	5.29	4.61
	CV	0.42	0.34	0.23	0.19	0.45

Source: Author's calc. based on survey's data

Figure 21 –Quality of internal relationships as motivating factor

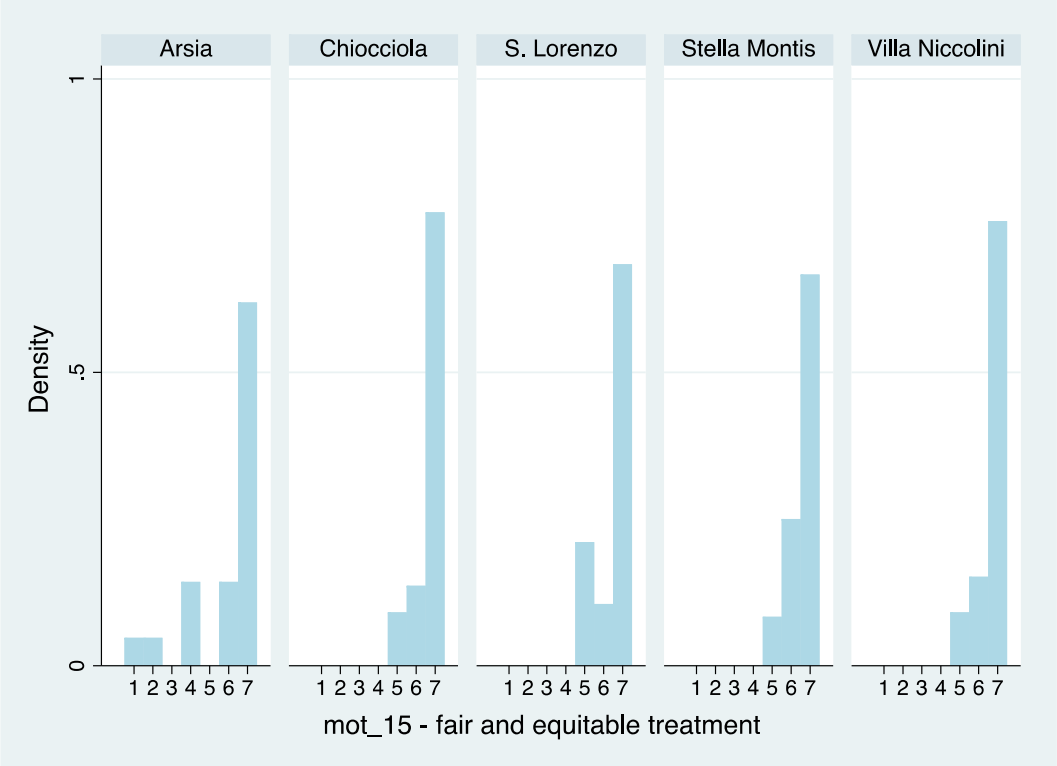
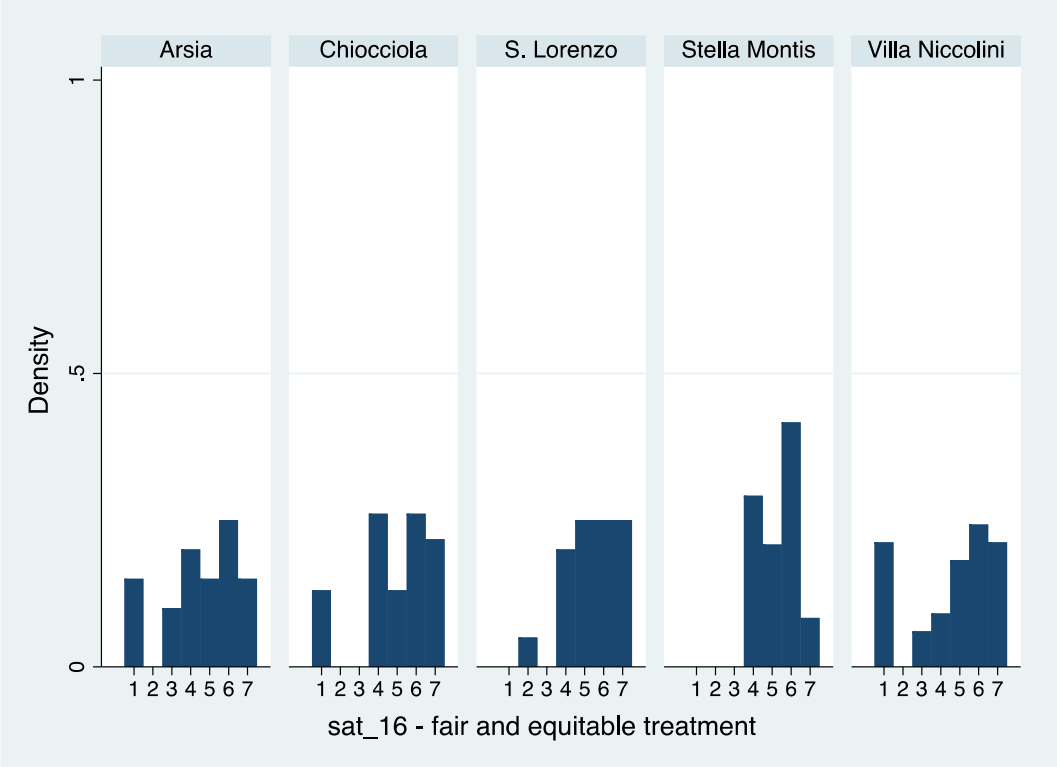


Figure 22 – Satisfaction due to the quality of relationships



If we create two indices of motivation and satisfaction that include all the aspects analyzed so far concerning internal relationships, as expected, correlation matrix (Table 18) shows that there is a correlation between motivation and satisfaction level of 0.25 which is lower than in case of the relationships with users (0.46) This is an important information; it means that the organizations (largely representing the first two categories) are not able to sustain motivations related to the quality of the internal relationships for which the organizations are responsible.

Table 19 – correlation matrix

	motivation2	**satisfaction2**
motivation2	1.0000	
satisfaction2	0.2533	1.0000
	(0.0079)	

Source: Author's calc. based on survey's data

Despite a negative relation can be identified between sick leave hours and intrinsic motivation to work due to internal relationships (see Figure 23), because of the self-selection problem, an additional index of intrinsic motivation is required. To this regard, the variable 'percentage of answer' can be considered as a valuable alternative for two important reasons. First, even if it is a synthetic index (as a percentage is) it concerns not the sample but the entire population. Second, it is a measure of the caregivers' motivation to actively participate to their organization's life that reasonably depends on the organization's ability to incentivize workers' cooperative behavior. As you can see in Figure 24, there is a negative relation between 'percentage of answer' and 'sick leave hours', suggesting, in line with the hypothesized model, that sick leave hours depend on caregivers' motivational level sustained by the organizational incentives.

Figure 23 – Relationship between motivation and sick leave hours

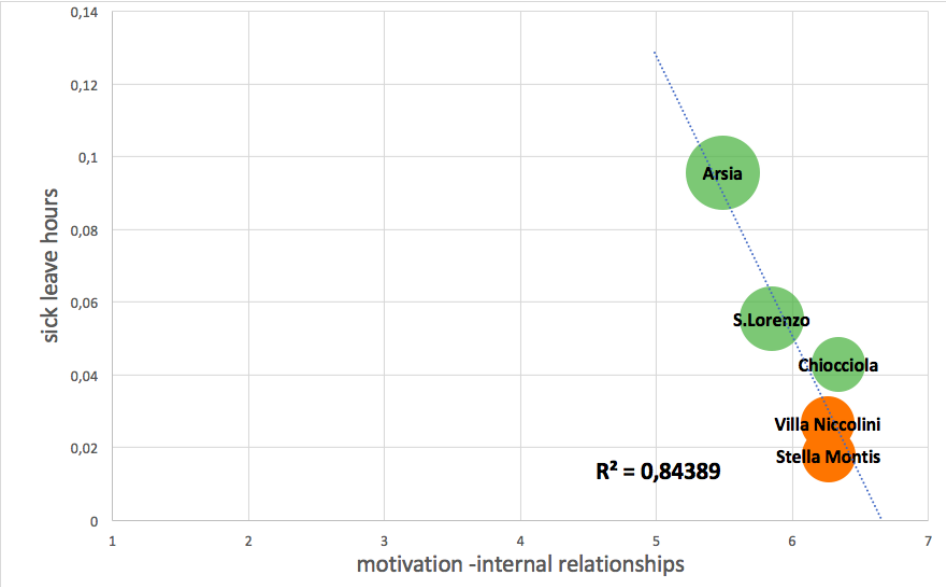
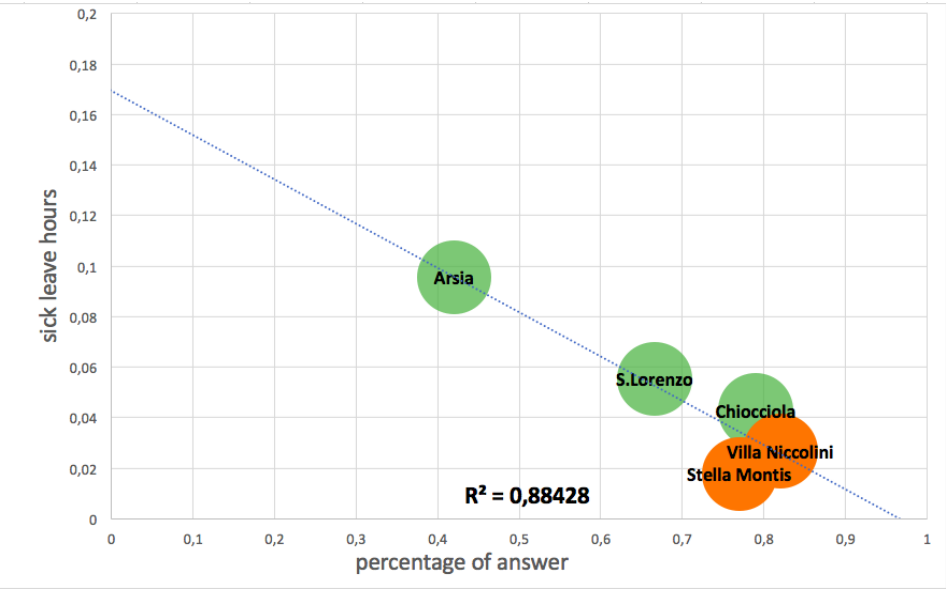


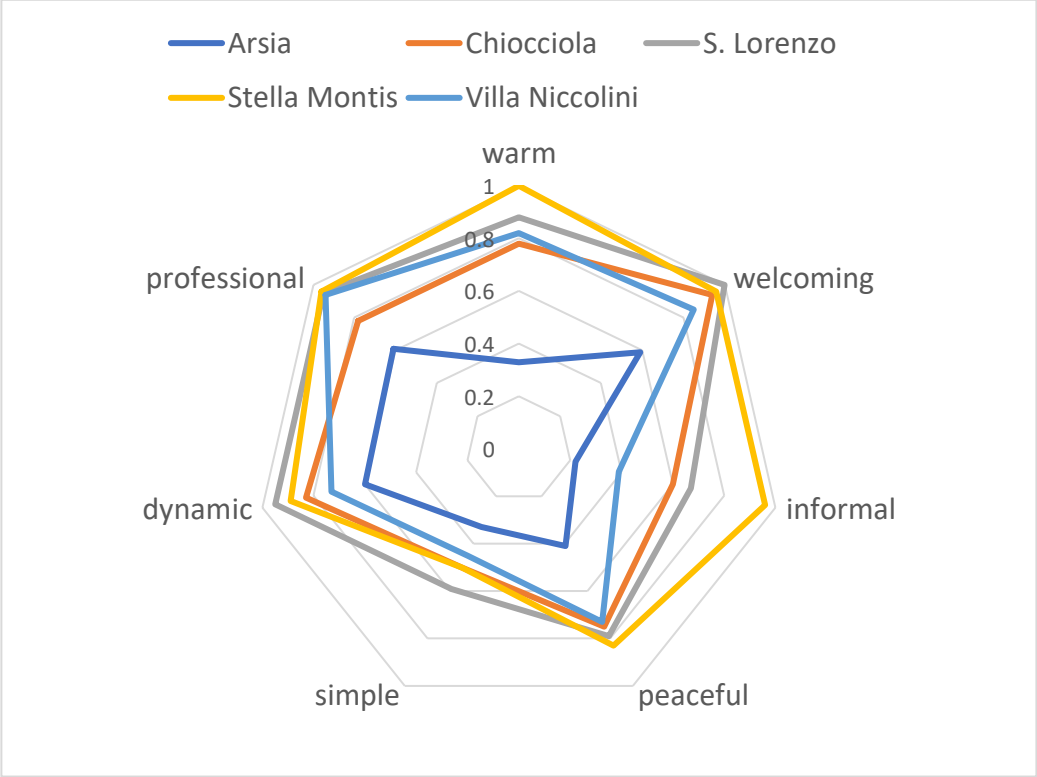
Figure 24 – Relationship between percentage of answer and sick leave hours



Along with variables on motivation and satisfaction, fundamental it is the respondents' evaluation of the organizational climate, which can be considered as an index of the quality of the relationships internal to the organizations and, hence, of the coordination capabilities so far developed within the organization. In fact, while motivation is highly subjective and may be the result of personal experiences, the latter takes necessarily into account the relationships existing within the working environment also for potentially highly demotivated colleagues, who may be,

because of the self-selection problem, did not answer. The fact that the climate variable is not significantly correlated with motivational factor is an element in support of this interpretation. As Figure 25 shows, differences among companies are clearly visible, with Stella Montis having been attributed the highest values for all the aspects and Arsia the lowest values.

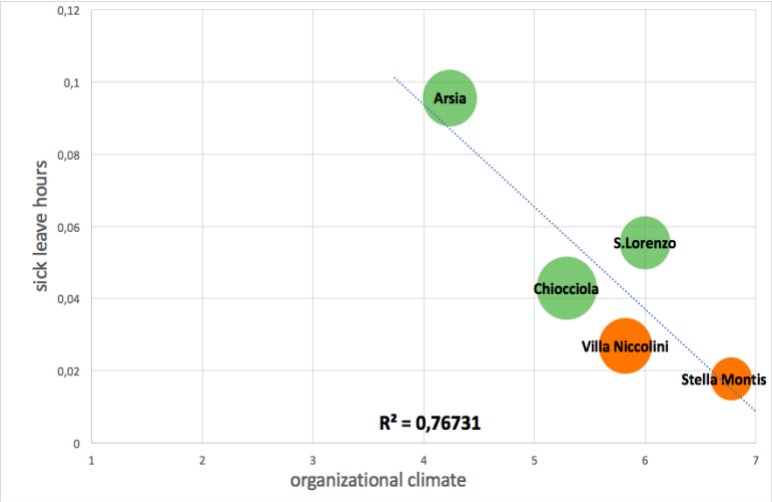
Figure 25 – Evaluation of organizational climate in each organization



If we build an index of the organizational climate made of the main variables[68], we see that a negative relation exists between the mean value of sick leave hours and the average value of organizational climate (see Figure 26). The dimensions of the balls, related to standard deviation, show that in Stella Montis (small dimension) is where respondents' evaluation is more concentrated on high values.

[68] The index is given by the sum of four variables corresponding to questions 9.1, 9.2, 9.4 and 9.7 of the survey in Appendix 1.

Figure 26 – Relation between organizational climate and sick leave hours



<u>Learning and ability to contribute to organizational goals</u>

The development of coordination capabilities could not be possible without workers' interest in learning new things (Mot_10), in possession of the knowledge required to carry out their job (Mot_11) and keen on contributing to reach the organization's goals (Mot_12). In this regard, Table 19 shows that, on average, caregivers attributed high values to all the three aspects (values around 6) and feel quite satisfied (values are around 5).

Table 20 – Learning and ability to contribute to organizational goals

Legend:

Mot_10/ Sat_11– Growing professionally and learning new things
Mot_11/ Sat_12– Having information necessary to do your job
Mot_12/ Sat_13– contributing to reach the organization's goals

I issue		**Arsia**	**Chiocciola**	**S. Lorenzo**	**Stella Montis**	**Villa Niccolini**
Mot_10	mean	6.14	6.64	6.3	6.08	6.57
	CV	0.21	0.11	0.11	0.11	0.11
Sat_11	mean	4.53	5.04	5.63	5.66	5.48
	CV	0.45	0.29	0.17	0.16	0.3
II issue		Arsia	Chiocciola	S. Lorenzo	Stella Montis	Villa Niccolini
Mot_11	mean	6.33	6.68	6.25	6.26	6.73
	CV	0.19	0.06	0.17	0.12	0.07
Sat_12	mean	5.04	4.91	5.26	5.38	5.42
	CV	0.36	0.32	0.26	0.18	0.32
III issue		Arsia	Chiocciola	S. Lorenzo	Stella Montis	Villa Niccolini
Mot_12	mean	6.24	6.54	5.95	6.25	6.60
	CV	0.09	0.09	0.2	0.08	0.09
Sat_13	mean	4.8	5.43	5.3	5.55	5.54
	CV	0.39	5.6	0.19	0.22	0.3

Source: Author's calc. based on survey's data

Correlation matrix (see Table 20) shows that some correlation exists between motivation and satisfactory levels (0.30), suggesting, hence, that the organizations are quite careful about these issues.

Table 21 – correlation matrix

	Motivation3	**satisfaction3**
Motivation3	1.0000	
satisfaction3	0.3025 (0.0011)	1.0000

Remuneration and conciliation of work with private life

The role of extrinsic motivations to work is analyzed in order to understand in which consideration they are taken by caregivers in comparison with the intrinsic motivations. For a type of work in which the quality of relationships reflects the quality of the service, the role of intrinsic

motivations is important. Table 21 shows that, among extrinsic motivations, the possibility to conciliate work and private life is on average more evaluated than the wage. As in the first chapter was posited, too much attention on extrinsic motivations could crowd out the intrinsic motivations necessary to develop coordination capabilities (Frey, 1997). The combined analysis of Tables 15 and 21 shows that the mean values on remuneration are a bit lower compared to intrinsic motivations to work with a higher dispersion of data around the mean. To this regard, it is interesting to compare the distribution on mot_4 (remuneration and contractual conditions) in Figure 27 and mot_16 (entering in tune harmony with users and his/her own needs) in Figure 28 as example of intrinsic motivation. While in case of mot_16 data are concentrated on the highest values (6-7), mot_2 displays lower evaluations. These figures show that in all the organizations respondents work especially on the basis of intrinsic motivations. Nevertheless, as Frey 1997 argues, remuneration remains an important motivating factor able to promote coordination capabilities to the extent that it is not the prevalent source of gratification. To this regard, data show that on average caregivers are not satisfied. In Arsia 47% has chosen a value below or equal to 4, in Chiocciola 57%, in S. Lorenzo 45%, in Stella Montis 54% and in Villa Niccolini 64%.

Table 22 – Remuneration and conciliation work – family life

Mot_2/Sat_2 - Being able to reconcile work and family life
Mot_4/Sat_4 - Remuneration and contractual conditions

		Arsia	Chiocciola	S. Lorenzo	Stella Montis	Villa Niccolini
Mot_2	mean	5.05	6.04	6	6.5	6.06
	CV	0.43	0.26	0.19	0.13	0.24
Sat_2	mean	4.8	5.83	5.05	5.63	5.27
	CV	0.37	0.31	0.3	0.19	0.27
Mot_4	mean	5.81	5.77	6	5.74	6.19
	CV	0.3	0.15	0.22	0.23	0.17
Sat_4	mean	4.77	4.04	4.2	4.34	3.52
	CV	0.33	0.4	0.34	0.3	0.56

Source: Author's calc. based on survey's data

Figure 27 – Contractual conditions and remuneration as extrinsic motivations

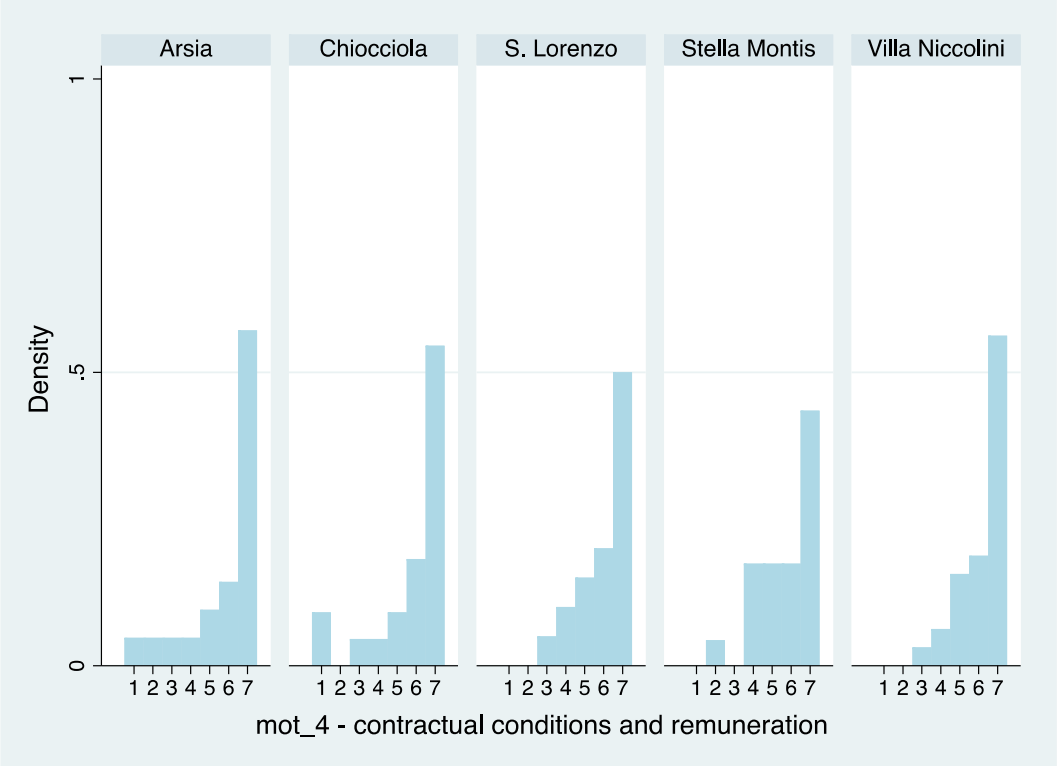


Figure 28 – Role of intrinsic motivations related to entering in synthon with users

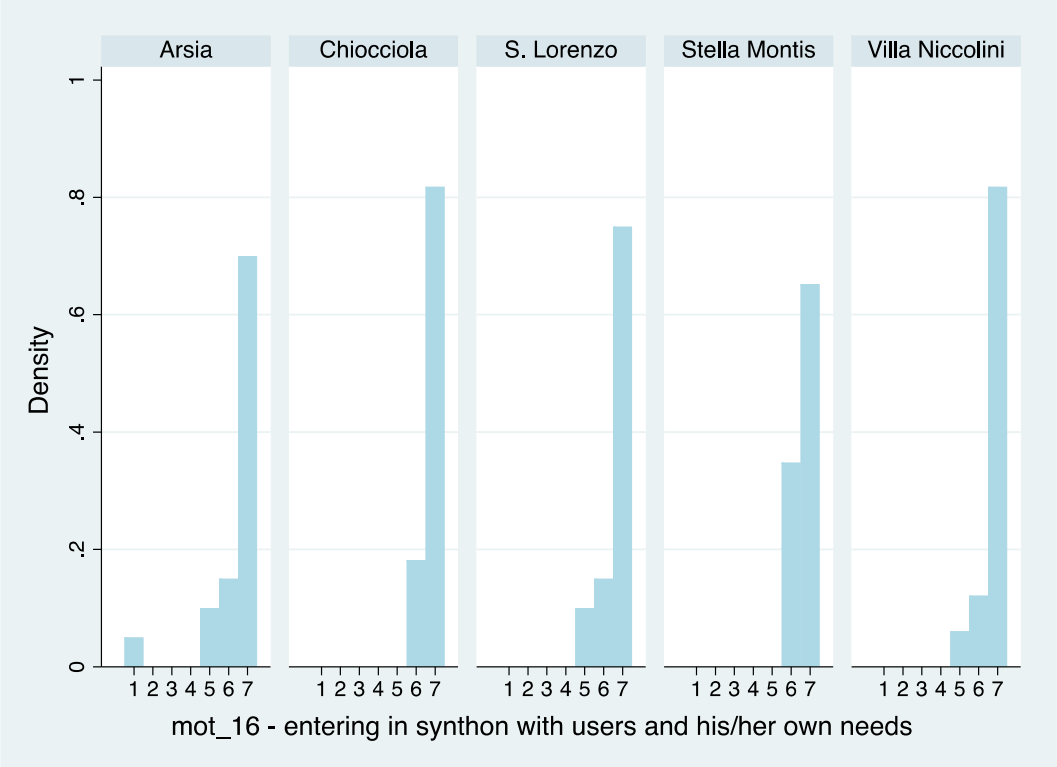
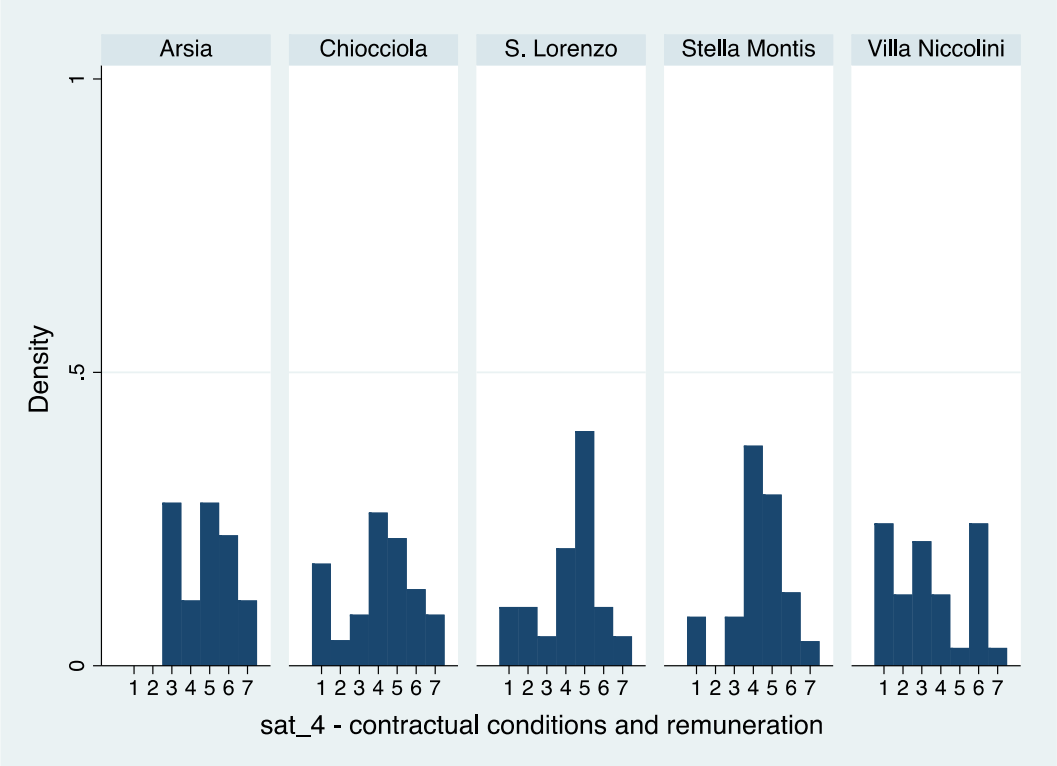


Figure 29 – Satisfaction related to contractual conditions and remuneration



In conclusion, it is noteworthy that initial evidence supports the hypothesis concerning a potential important role of intrinsic motivations, more than extrinsic ones, and their impact on the level of sick leave hours. Despite the level of intrinsic motivations is high across the organizations as explained on the basis of the self-selection problem, alternative measures have been identified – percentage of answers and the organizational climate - which allow to hypothesize an important role of the organization as source of motivation.

3.4.5. First case study: the organization of mass-customized services

In this section, I analyze how governance, service design and management are perceived by caregivers in the cooperatives Chiocciola (C.) and S. Lorenzo (S.L.). Because of their similar characteristics in terms of dimension, working population and membership in the same consortium, I analyze them in the light of the literal replication logic, by expecting similar results at governance, management and service design level. Preliminary interviews with the management allow to understand how labor is organized within both companies and, therefore, to better interpret caregivers' answers to the survey. According to the management, once a month the organization of work shift is defined. However, the monthly chart is not much reliable as many changes can occur because of requests of permission and other modifications required by caregivers (for instance temporary limitation to do night shifts or to perform some tasks, like manual handling of users). Hence, a weekly chart is then defined, which again may partly change for the above-mentioned reasons. For each shift, tasks are strictly defined as well as the expected execution time, so that caregivers should clearly know their function. Despite some training courses are sporadically organized on how to improve service quality in the relationship with users, no other specific support is provided to caregivers during their daily activity.

3.4.5.1. Hierarchical Governance

In the first chapter, governance – by intervening on the organization of labor - has been recognized as a fundamental source of production efficiency when product/service is to be personalized because of need complexity. In particular, two governance types have been compared, the hierarchical and participative ones. The former sustains workers' extrinsic motivations by defining strict and meticulous rules and procedures (standards and internal routines) about the way and time of implementation of production routines. The latter nurtures also intrinsic motivations by sustaining self-organization and self-control of performance quality and execution times.

In order to identify the type of governance characterizing our first case study, specific questions have been posed that, analyzed together, allow to evaluate whether governance is hierarchical or participative. Again, on a 1-7 scale, caregivers were asked to evaluate whether they agreed or not

with the following statements (1= completely disagree; 7= completely agree), as Table 22 shows. To these questions, caregivers of both organizations have answered similarly.

Table 23– Evaluation of governance in C. and S. L.

Legend:

Gov_5: Since a hierarchical structure among different roles exists, limit yourself to follow standardized procedures.
Gov_9: There are clear contact persons
Gov_10: The role of Union is important to guarantee fair and equal relationships
Gov_11: Workers, directly participating, reach better results than Union

		Gov_5	Gov_9	Gov_10	Gov_11
	Obs.	22	22	22	22
Chiocciola	Mean	5.31	6.32	4.40	4.32
	CV	0.36	0.18	0,5	0.51
	Obs.	17	18	17	16
S. Lorenzo	Mean	4.65	5.83	3.59	3.81
	CV	0.42	0.28	0.60	0.52

Source: Author's calc. based on survey's data

On average, the existence of hierarchy is perceived: in C. mean value was 5.31 and in S.L. 4.65 (see table 9). As Table 23 shows, in C. 54.54% of respondents agrees with this sentence (chose level 6-7), while in S. L., only 40%. Differences between the two organization exists but they are not significant: T-test on the means shows that means are not statistically different at 95% level ($p<0.05$).

Table 24– Evaluation of governance (gov_5) in C. and S. L.

	Chiocciola			S. Lorenzo		
Gov_5	Freq.	Percent.	Cum.	Freq.	Percent.	Cum.
1	2	9.09	9.09	2	11.76	11.76
2	1	4.55	13.64	1	5.88	17.65
3	0	0	13.64	1	5.88	23.53
4	2	9.09	22.73	3	17.65	41.18
5	5	22.73	45.45	2	11.76	52.94
6	4	18.18	63.64	6	35.29	88.24
7	8	36.36	100.00	2	11.76	100.00
Tot.	22	100.00		17	100.00	

Source: Author's calc. based on survey's data

The issues gov_10 and gov_11 together allow to understand if workers need Unions to obtain fair and equal relationships in the organization of work or, alternatively, they do not need Unions because they have entered into a constructive dialogue with colleagues and the manager (in other words, they directly participate to the discussion about the creation of a fair and positive working relationships). In this way, I obtain workers' subjective evaluation about the type of governance. For instance, if they need Unions about issues like fair work schedule (heaviness of shifts, organization of replacements for holidays, disease, injuries etc) and a fair assignment of tasks (preparation of meals, cleaning, handling, toileting of patients etc.) it means they do not have any type of control on the way and time of implementation of the production process, so the governance is hierarchical. Conversely, if they do not need Unions and affirm to obtain better results with their own direct participation, it means that they have a type of control over the production process that is the result of their direct effort to create a fair environment.

In Table 22, values of gov_10 and gov_11 show that hierarchy is not perceived as stringent; the low mean values obtained for questions on Union (3.95 in Chiocciola and 3.55 in S. Lorenzo) and workers' direct participation (4.59 in C. and 3.68 in S. L.) suggest, on the one hand, the lack of a strong internal opposition to directors, on the other hand the low caregivers' involvement in the solution of organizational problems. Moreover, as Figure 30 and 31 show, data are highly dispersed (especially concerning issues on Unions, in which CV is 0.56 in Chiocciola and 0.60 in S.

Lorenzo), meaning that a common vision about the role of Unions and direct participation does not exist.

Figure 30 – The role of Union in C. and S. L.

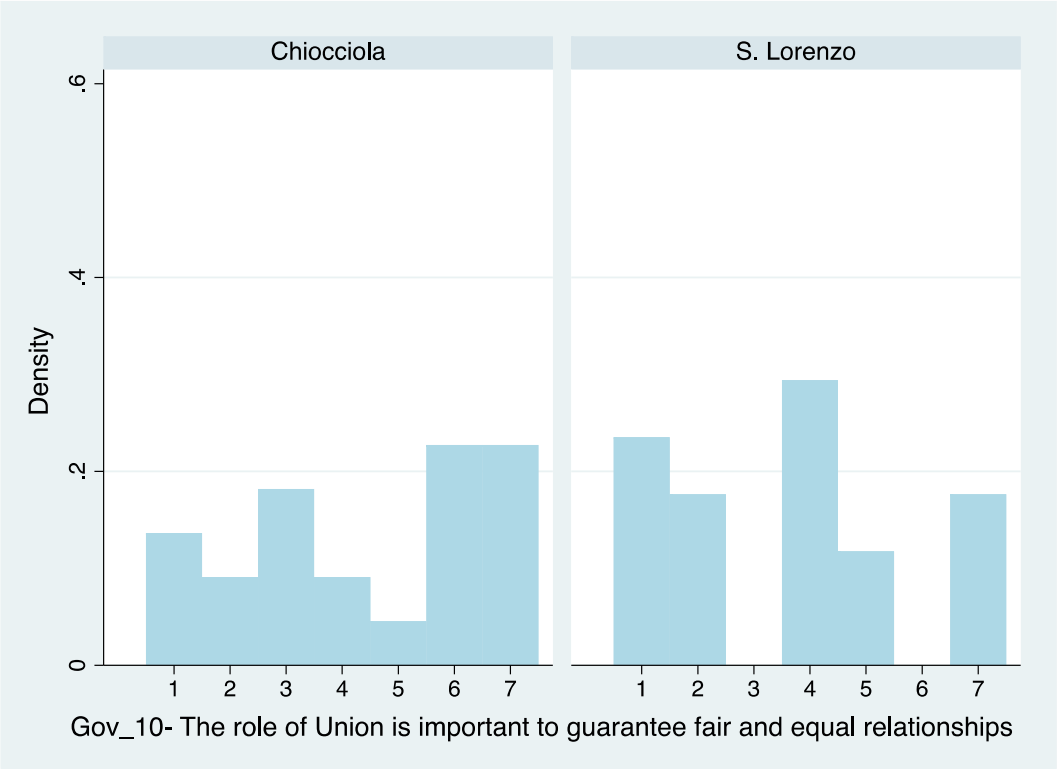
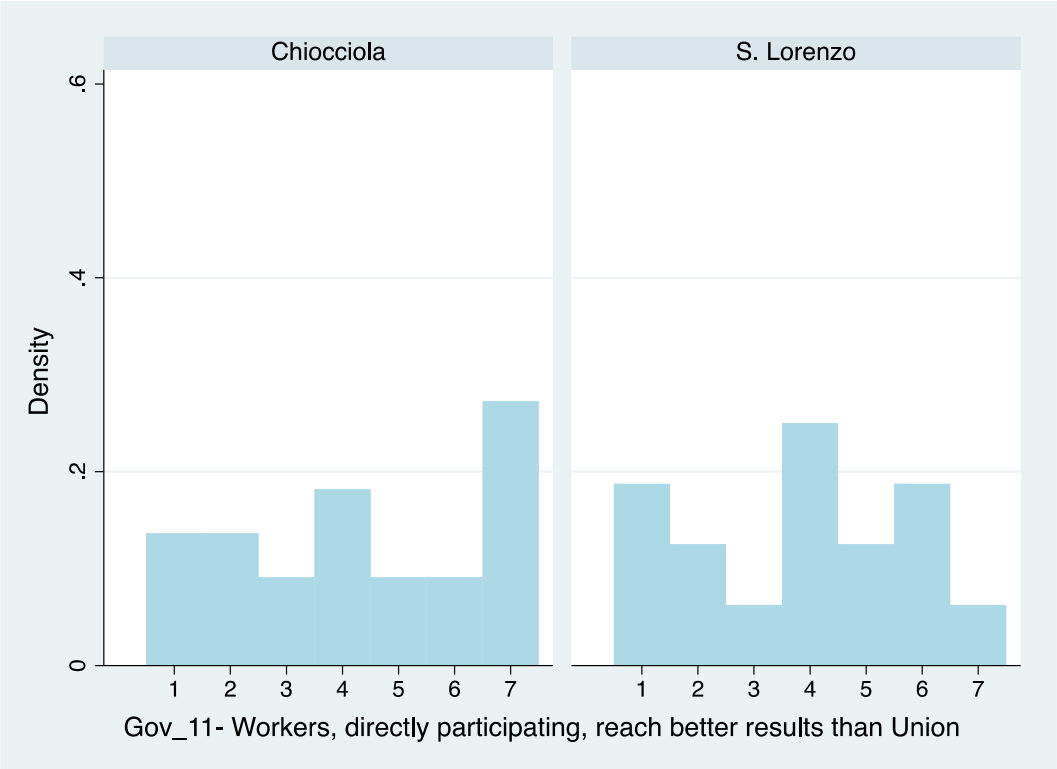


Figure 31- The role of workers' direct participation in C. and S. L.



In the light of Figure 32, we can see that a real difference between caregivers in C. and S. L. emerges about the clarity of their own roles (gov_2); of colleagues' roles (gov_6) and about the presence of clear contact persons (gov_9). 95% test on the mean of gov_2 shows that the organizations' means are statistically different with a p-value 0.0324. In C., roles and tasks are in general more defined than in S. L. where greater confusion may lead caregivers to experience a greater sense of frustration and to not identify the sources of organizational problems. This difference among the organizations will be confirmed in the part reserved to accreditation, where the problem of clarity of tasks emerges one more time.

Table 25 - Evaluation of clarity of roles in C. and S. L.

Legend:

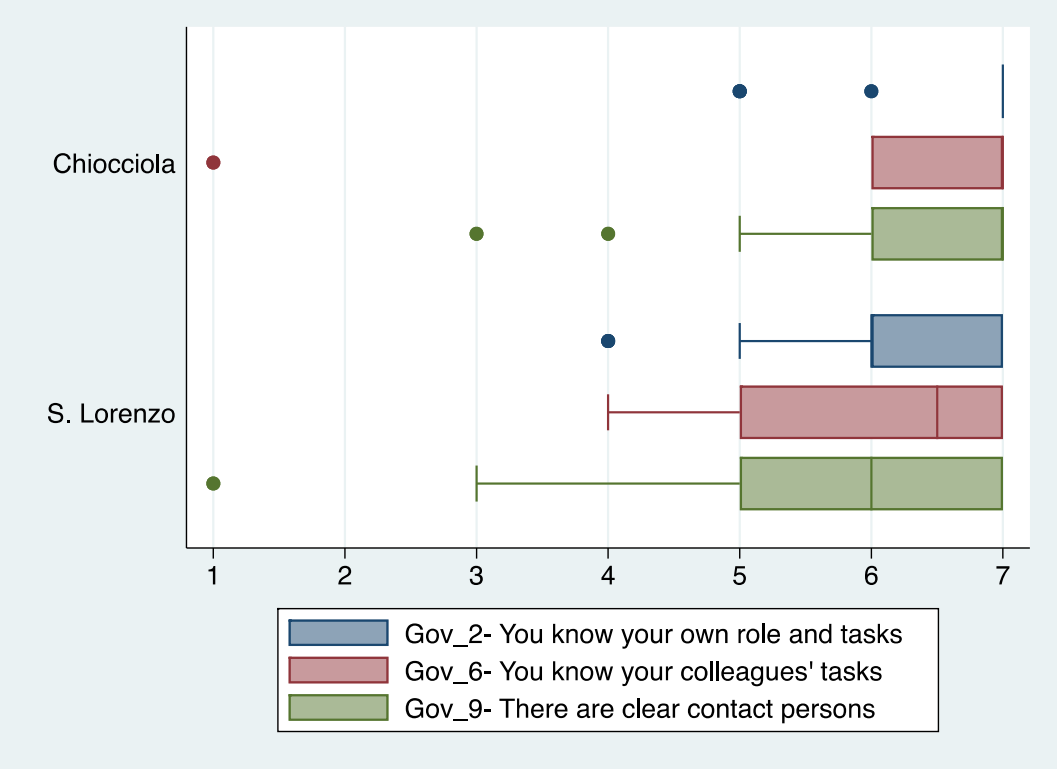
Gov_2 - You know your own role and tasks
Gov_6 - You know your colleagues' tasks
Gov_9 - There are clear contact persons

		Gov_2	Gov_6	Gov_9
Chiocciola	Obs	22	21	22
	Mean	6.77	6.29	6.31
	CV	0.08	0.21	0.18

	Obs	19	18	18
S. Lorenzo	Mean	6.16	6.11	5.83
	CV	0.16	0.17	0.28

Source: Author's calc. based on survey's data

Figure 32- Clarity of roles and tasks in C. and S. L.



An integrated analysis of the answers to the questions on the ability to cooperate with colleagues (gov_1, gov_3, gov_4) provides important information on the level of coordination capabilities so far developed by workers.

Table 26 - Evaluation of coordination capabilities developed in C. and S. L.

Legend:
Gov_1: You work in group and you are able to cooperate with colleagues
Gov_3: You would better work in another team
Gov_4: You would have problems in changing your team

		Gov_1	Gov_3	Gov_4
	Obs	22	22	22
Chiocciola	Mean	6.32	4.1	4.41
	CV	0.15	0.54	0.53
	Obs	19	18	18

S. Lorenzo	Mean	6	3.06	3.8
	CV	0.16	0.6	0.51

Source: Author's calc. based on survey's data

As Table 26 displays, in both organizations caregivers attribute themselves good capabilities to cooperate with colleagues (gov_1). With a low CV and negative skewness (in C. Skew= -1.17, in S.L. Skew= -0.76), most of answers are concentrated on values 6 and 7.

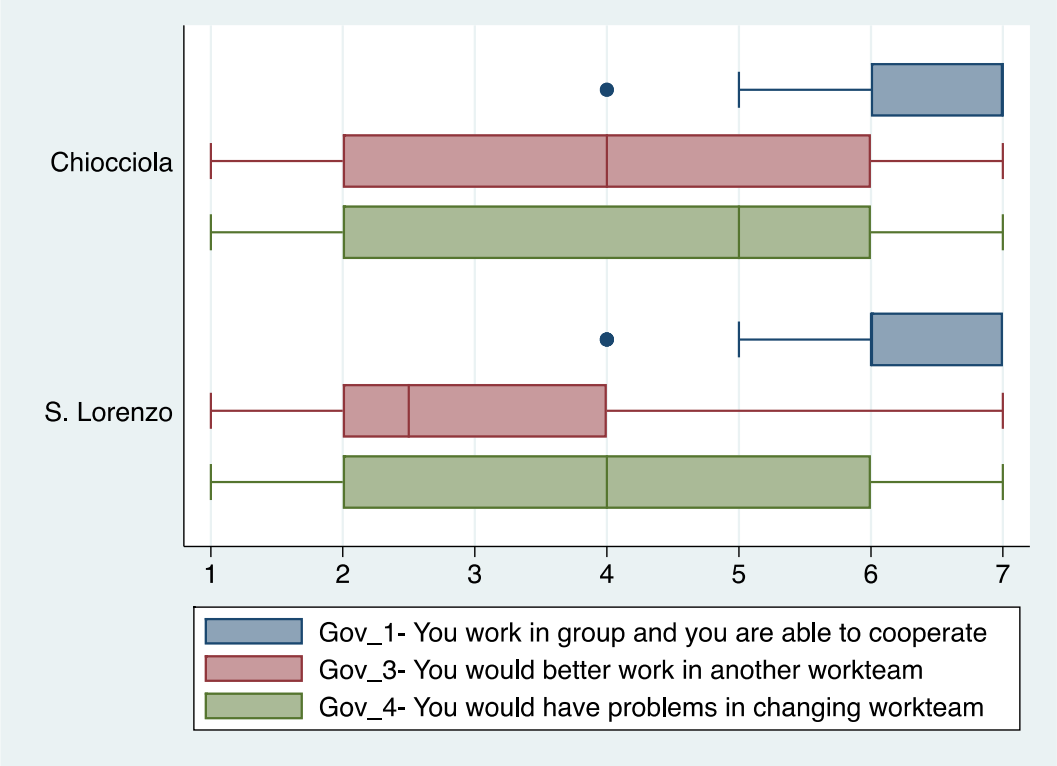
Table 27– Evaluation of capability to work in group in C. and S. L.

	Chiocciola			**S. Lorenzo**		
Gov_1	Freq.	Percent.	Cum.	Freq.	Percent.	Cum.
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	1	4.55	4.55	2	10.53	10.53
5	3	13.64	18.18	2	10.53	21.05
6	5	22.73	40.91	9	47.37	68.42
7	13	59.09	100.00	7	31.58	100.00
Tot.	22	100.00		19	100.00	

Source: Author's calc. based on survey's data

However, as Table 25 shows, their evaluation of personal coordination capabilities is not supported by the answers to questions gov_3 and gov_4, which are about the quality of relationships within the workteam; mean values are evidently low. It is to be noted that team work could have been interpreted both as the group of caregivers in the organization but also as the overall group of workers, including physiotherapists, nurses, animators, and managers. Independently of the dimension of the team, Figure 33 clearly reveals that caregivers have not a common opinion in this regard. In Table 25 the coefficients of variation of gov_3 and gov_4 show that data are highly dispersed around the mean (for both questions CV is greater than 0.5 in C. and in S. L.). This means that workers have not a common opinion and, especially, that their opinion does not reflect any organization's strategy to improve capability to work together.

Figure 33– Evaluation of coordination capabilities in C. and S. L.



In general, as the different mean values in Table 25 suggest, workers would have more problems to change their workteam rather than to maintain it. This result may be explained with the fact that – despite the lack of ad hoc organization's investments, good friendships have been developed on the basis of personal affinities. Low mean of gov_4 (4.41 in C. and 3.94 in S. L. that are not statistically different from each other) and high CV (respectively 0.53 and 0.51), in fact, do not suggest the development of a common sense of belonging. Because of this reason, the good answer to gov_1 about their capabilities to cooperate is to be explained by the fact that workers have answered on the basis of their personal capabilities to stay with colleagues and to change work-team and not thanks to any organization's support.

By taking into account the above results on the type of governance and the level of coordination capabilities so far developed with colleagues, we should analyze answers on the sources of coordination problems with colleagues (see Table 27). The mean question was "*In your opinion, why tensions and coordination problems emerge among colleagues?*". In this case, it was asked to tick only one box relative to a level to score between 0 (I do not agree) and 3 (I completely agree). For most of them, problems emerge in particular times of the day (coord_1). As Table 28 displays, in C. 52% and 29% agree and completely agree with this sentence, while in S.L. respectively the

33% and 28% of caregivers agree. This result suggests that in absence of shared rules and adequate coordination capabilities, individuals are more vulnerable to disputes when they are tired. However, an important source of coordination problems with colleagues is due also to difficult situations with users and with colleagues, hinting that caregivers have difficulties in providing a personalized service especially when patients show serious behavioral problems (for instance when affected by Alzheimer disease). Concerning the relationship with colleagues, in Chiocciola almost 60% have chosen level 2 and 3, while in S. Lorenzo 50%. F-test on the mean of coord_3 and coord_4 show that these are not statistically different, meaning that workers similarly perceive the gravity of these sources of coordination problems.

Table 28 – Evaluation of the sources of coordination problems with colleagues in C. and S. L

LEGEND

Coord_1: They emerge at certain times of the day
Coord_2: Lack of a clear leadership
Coord_3: Particularly difficult situations with some users
Coord_4: Bad interpersonal relationships with some colleagues

		Coord_1	Coord_2	Coord_3	Coord_4
	Obs.	21	22	22	22
Chiocciola	Mean	2.0	1.27	1.64	1.55
	CV	0.4	0.92	0.66	0.68
	Obs.	18	18	19	19
S. Lorenzo	Mean	1.78	0.5	1.79	1.42
	CV	0.56	1.24	0.63	0.75

Source: Author's calc. based on survey's data

Table 29– coordination problems in C. and S. L.

Coord_1	**Chiocciola**			**S. Lorenzo**		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.
0	1	4.76	4.76	2	11.11	11.11
1	3	14.29	19.05	5	27.78	38.89
2	11	52.38	71.43	6	33.33	72.22
3	6	28.57	100.00	5	27.78	100.00
Tot.	21	100.00		18	100.00	

Source: Author's calc. based on survey's data

3.4.5.2. Management: the lack of a leadership

Within a hierarchical organization, management could make the difference depending on the type of relationship established with workers. In the previous chapter, coordinators have been recognized as playing a crucial role in sustaining caregivers' intrinsic motivation to work. For this reason, in a survey section, caregivers were asked to answer this question "*How is your relationship with the manager?*" and to tick a box on a 0-3 scale, where 0 = I do not agree, 1 = I do not much agree, 2 = I agree, 3= I completely agree. As mean values in Table 29 show, in C. and S.L. management style combines authoritarian and supportive elements. If we adopt man_5 as index of manager's supportiveness, on average caregivers chose a value of 2.48 in C. and 2.58 in S.L., showing that workers completely agree with the fact that the management gives weight to their personal problems (in C. 65% and in S. L. 63% chose level 3). Man_3, instead, can be considered as a measure of management' authoritarian character. In Table 29, as the mean of man_3 is higher than 1.5 (in C. is 1.96 and in S.L. is 1.76), the relationship is to be considered as quite hierarchical. Moreover, most of respondents – 70% in C. and 53% in S. L. - maintain that in case of disagreement, the manager closes the debate relying on her own authority by choosing level 2 and 3(see Table 30). Team spirit (see Table 31) seems a little higher in C. than in S. L. (μ=1.91 in C. versus μ=1.67 in S.L.), but the result mainly shows that an important part of respondents does not feel sufficiently incentivized: only 39% in C. and 22% in S. L. completely agree with it (see Table 31). Minor differences, however, exist. Even if means are not statistically different, as Figure 34 shows, in S. L., the coordinator seems a bit more interested in treating workers fairly and equally (75% chose level 2 and 3 to man_1 in S.L., 61% in C.). To sum up, these data suggest that managers are empathic and able to create high quality personal relationships with single workers, but they are not sufficiently able to obtain workers' support in their decisions. They need to rely on their own authoritarian power in order to keep things running.

Table 30 – Evaluation of management in C. and S. L.

Legend:
Man_1 - Manager treats workers fairly and equally
Man_2 - Manager is able to incentivize team spirit
Man_3 - When at odds with you, the manager closes debate relying on his/her own authority
Man_4 - Manager involves you in decisions that impact on your life
Man_5 - Manager lends weight to your personal problems and supports you in difficult times

		Man_1	Man_2	Man_3	Man_4	Man_5
	Obs	23	23	23	23	23
Chiocciola	Mean	1.78	1.91	1.96	1.96	2.48
	CV	0.63	0.59	0.54	0.47	0.36
	Skew	-0.34	-0.62	-0.61	-0.26	-1.9
	Kurt	1.77	2.03	2.14	1.91	5.61
	Obs	20	18	17	17	19
S. Lorenzo	Mean	2.2	1.67	1.65	1.82	2.58
	CV	0.5	0.6	0.6	0.6	0.4
	Skew	-0.96	0.22	-0.1	0.13	-1.07
	Kurt	2.56	2.02	1.71	2.49	3.13

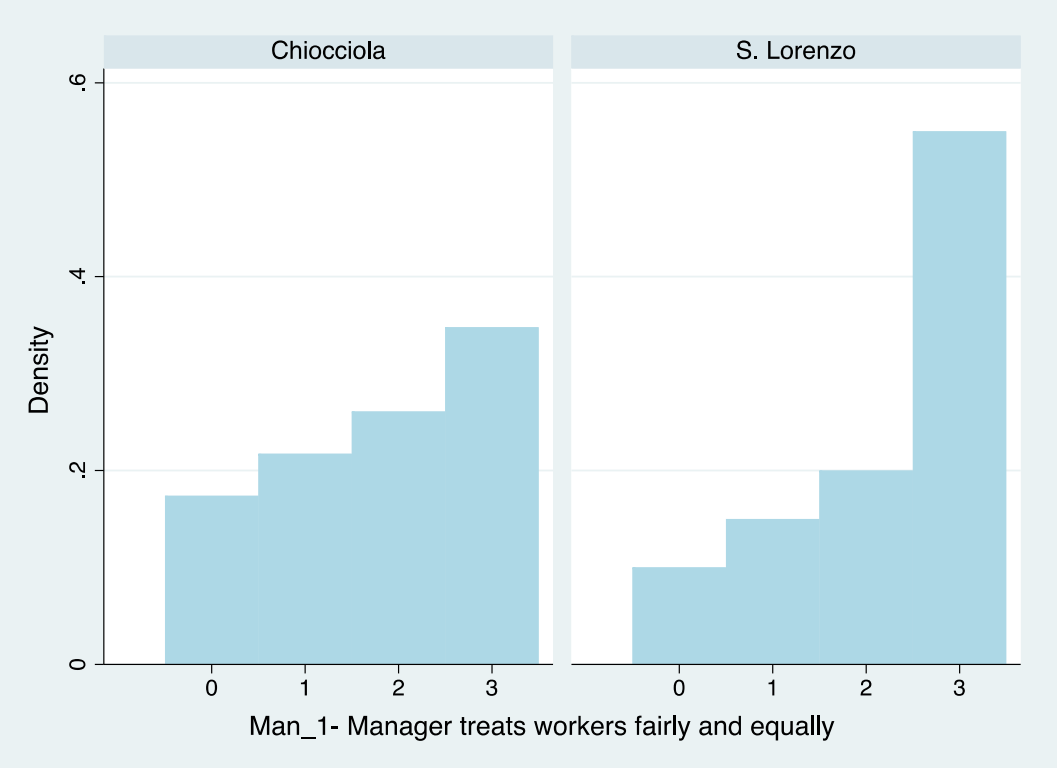
Source: Author's calc. based on survey's data

Table 31– Authoritarian character of management in C. and S. L.

man_3	**Chiocciola**			**S. Lorenzo**		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.
0	3	13.04	13.04	3	17.65	17.65
1	4	17.39	30.43	5	29.41	47.06
2	7	30.43	60.87	4	23.53	70.59
3	9	39.13	100.00	5	29.41	100.00
Tot.	23	100.00		17	100.00	

Source: Author's calc. based on survey's data

Figure 34– Evaluation of fairness of management in C. and S. L.



Source: Author's calc. based on survey's data

Table 32 – Evaluation of leadership in C. and S. L.

man_2	Chiocciola			S. Lorenzo		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.
0	4	17.39	17.39	1	5.56	5.56
1	3	13.04	30.43	8	44.44	50.00
2	7	30.43	60.87	5	27.78	77.78
3	9	39.13	100.00	4	22.22	100.00
Tot.	23	100.00		18	100.00	

Source: Author's calc. based on survey's data

3.4.5.3. Mass-Customized Service Design

In this section, I analyze the supporting processes to the service design and I employ and apply the knowledge so far collected on governance, capabilities and management to elaborate the model of service blueprint implicitly adopted in C. and S. L.. To understand which supporting processes characterize service design, I basically refer to data about professionals' training and accreditation, which inform about the workers' perception respectively on 1) the quantity and quality of training

received to improve their coordination capabilities and 2) the way public quality standards support service quality. Then, I employ information so far collected about governance and management to identify the work team profile in both organizations, which is necessary to build service blueprint. What emerges is a not cohesive group in which coordination capabilities are not sufficiently able to sustain high quality personalized interfaces with users.

Survey question on training was "*How do you consider training received by your organization*?" to be answered by choosing among four options, where 0 = I disagree with, 1 = I do not quite agree, 2 = I agree with, 3 = I very much agree with. First, it was asked whether they received an adequate training and orientation to start working in the organization (i.e. presentation of the organization of labor and schedules, charts to fill out, presentation to colleagues and users, visit of the building etc.) (form_1); whether they received training required by law and necessary to the profession (which are HACCP system[69], occupational safety, the CPR emergency procedure[70] and manual handling) (form_2); whether so far they have received additional training to improve their own competence in the relationship with hosts and their families (form_4) and with colleagues (form_3). In line with information provided by managers, data clearly exhibit that workers have received initial orientation and, especially, training required by law: as Table 32 shows, in C. such items received a mean value respectively of 2.18 and 2.52; in S.L. mean value was 2.2. and 2.6, with low coefficient of variation in all the four answers. Conversely, respondents agree but not fully agree with the fact of having received training in support to their relationships with users (form_4) and colleagues (form_3): mean values are visibly lower than in case of form_1 and form_2. These data should be interpreted in the light of the interview with the managers. Both organizations have organized classes to face issues like the humanization of care, conflict management, relations with patients affected by Alzheimer disease. However, as Table 33 shows, only 39% in C. and 20% in S. L. completely agree with the fact of having received training to support their relationship with users, while for relationships with colleagues only 41% in C. and 25% in S. L. is fully unanimous (see Table 34). This means that a problem exists in training courses maybe due to the contents – not sufficiently focused on the resolution of their real problems – or due to their sporadic character. Caregivers feel that they could be more trained and receive more support, especially in their relationships with colleagues. As expected, t-test shows that means of

[69] HACCP is the acronym of *Hazard Analysis and Critical Control Point*, which is a systematic preventive approach to food safety.
[70] CPR is the acronym of *Cardiopulmonary resuscitation.*

form_3 and form_4 are not statistically different and, hence, that the consortium provided similar levels of training.

Table 33 – Evaluation of training in C. and S. L.

Form_1: You have initially received an adequate training and orientation
Form_2: You have received training required by law
Form_3: You have received additional training to improve your competences in relationships with colleagues
Form_4: You have received additional training to improve your competences in relationships with hosts and their families

		Form_1	Form_2	Form_3	Form_4
		22	23	22	23
Chiocciola	Mean	2.18	2.52	1.86	1.91
	CV	0.31	0.13	0.63	0.52
		20	20	20	20
S. Lorenzo	Mean	2.2	2.6	1.8	1.8
	CV	0.4	0.23	0.48	0.24

Source: Author's calc. based on survey's data

Table 34 – Evaluation of training in C. and S. L. (form_4)

Form_4	**Chiocciola**			**S. Lorenzo**		
	Freq.	Percent.	Cum.	Freq.	Percent.	Cum.
0	3	17.39	17.39	3	15.00	15.00
1	4	13.04	30.43	2	10.00	25.00
2	7	30.43	60.87	11	55.00	80.00
3	9	39.13	100.00	4	20.00	100.00
Tot.	23	100.00		20	100.00	

Source: Author's calc. based on survey's data

Table 35 – Evaluation of training in C. and S. L. (form_3)

Form_3	**Chiocciola**			**S. Lorenzo**		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.
0	4	18.18	18.18	1	5.00	5.00
1	4	18.18	36.36	7	35.00	40.00
2	5	22.73	59.09	7	35.00	75.00
3	9	40.91	100.00	5	25.00	100.00
Tot.	22	100.00		20	100.00	

Source: Author's calc. based on survey's data

Along with training, accreditation is to be considered as an important supporting process that over the last 6 years has largely influenced service design by formalizing a number of procedures to be

followed during service delivery in order to guarantee minimum service quality. The accreditation system is expected to influence caregivers' work both directly and indirectly. First, caregivers are required 1) to document all their tasks by filling out several tables every day (see Table 35) and 2) to fill out documents required when participating to the building of the *Personalized Intervention Plan*[71] together with other professionals (this occurs every time a new patient enters and then every six months). These tasks subtract time to high quality relationships with the users and shift caregivers' attention toward the fulfilment of formal requisites rather than to the satisfaction of users. Second, most of bureaucratic burden falls on the manager's shoulders (as he/she is the final responsible for the satisfaction of public requirements) and on the other professionals', who in turn are less prompt to sustain coordination among workers. In this way, this system may produce a general impoverishment of personal relationships leading to the standardization of interfaces with users and, consequently, with colleagues.

Table 36 - Number and types of records daily filled out by caregivers in C. and S.L.

- Record of hydration (when it occurs);
- Record of shaves;
- Record of baths;
- Record of defecation (when occurs);
- Placement and mobilization (every three hours);
- Records about cleaning of equipment;
- Record on change of linen;
- Kitchen daily journal;
- Record for monitoring fridge temperature (twice a day);
- Record for sanitization of taps (once a week);
- Record about kitchen cleaning (twice a day);
- Check of fire blankets.

Green records are filled out for each patient

Source: Interview to manager

[71] English translation of the Italian '*Piano Assistenziale Individualizzato' (PAI),* which is a project sheet in which information about medical and social diagnosis are collected and updated along with a set of health and social-health care services. For each PIP, usually only one caregiver is involved.

The survey section on accreditation was reserved to caregivers having spent at least six years in their organizations (see Table 36). First, it was asked whether they knew the accreditation system. In Chiocciola, 83% of the respondents (19 individuals) have spent at least six years in the organization and among them only 68% (13) affirmed to know the procedures; In S. Lorenzo 80% (16 individuals) has been working for this period and among them, just 69% (11) knew the procedure. This means that a consistent share of the population did not know the procedures even if they have been working for a long time in the organization.

Table 37 – Number of caregivers knowing accreditation

	Chiocciola	S. Lorenzo
Tot. of respondents	23	20
Having worked $\geq$ 6 years	19 (83%)	16 (80%)
Having worked $\geq$ 6 years and knowing the procedure	13 (68%)	11 (69%)

Source: Author's calc. based on survey's data

Leading question was *"How has your working activity changed with the introduction of the accreditation system?"* It was asked to tick only one box between 1 (I do not agree) and 7 (I completely agree). In general, what emerges is the lack of a common vision about the benefit and problems due to the accreditation system. As the coefficients of variation display in Table 37, data are quite dispersed concerning the quality of relationships within team work. More than half of respondent agree with the fact that cooperation capabilities with colleagues are greater than in the past (accr_1) with 54% and 55% of respondents choosing a value higher than 4. However, Figure 35 shows the presence of a bimodal distribution in both organizations that in case of S.L. can be interpreted as a measure of the lack of a common opinion on this issue, while in C. seems to reflect quite opposite visions. Such difference can be partly explained by the fact that in C. tasks and role are more defined than in S.L. (see answers to gov_2 discussed above), so that caregivers can have a more defined idea of the role of the accreditation system.

Table 38 – Evaluation of accreditation system

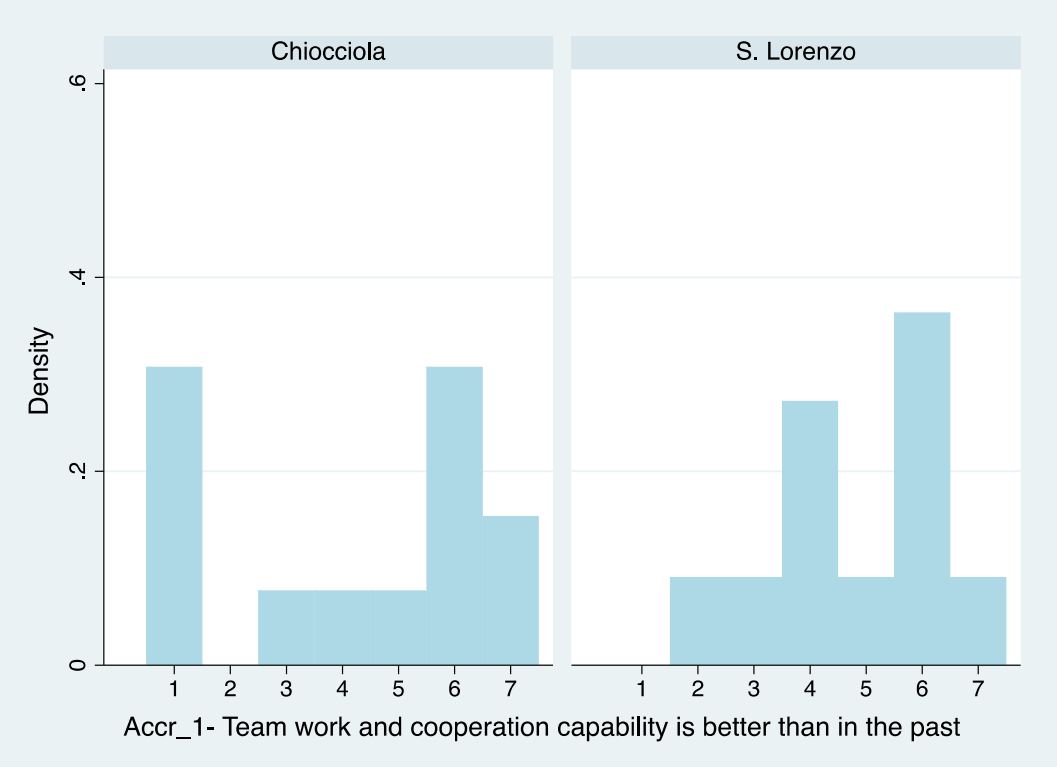
Legend:

Accr_1: Team work is better than in the past and cooperation capabilities with colleagues are greater.
Accr_2: You know better your role and your tasks.
Accr_3: Compared to the past, your autonomy of decision is greater.
Accr_4: Compared to the past, your autonomy of decision is lower.
Accr_8: Compared to the past, Union's role is more important to create just and equal relationships.
Accr_9: Compared to the past, workers, participating directly, reach greater results than Union.
Accr_10: Compared to the past, the Union's role has not changed.

		Accr_1	Accr_2	Accr_3	Accr_4	Accr_8	Accr_9	Accr_10
	Obs	13	13	13	13	13	13	13
Chiocciola	Mean	4.15	5.08	4.46	3.54	3	4.31	5.31
	CV	0.63	0.45	0.57	0.68	0.83	0.86	0.36
	Obs	11	11	11	11	10	10	11
S. Lorenzo	Mean	4.82	5.6	4.36	3.54	3.2	3.6	4.5
	CV	0.32	0.20	0.37	0.53	0.51	0.46	0.49

Source: Author's calc. based on survey's data

Figure 35 – Evaluation of accreditation on the role of team work in C. and S.L.



Similarly, Table 37 shows various opinions concerning how their autonomy of decision has changed over time. On average, workers agree more with the sentence "*your autonomy of decision has increased*" (accr_3) rather than with the sentence "*your autonomy of decision has decreased*" (accr_4): in C. the mean value is 4.46 of accr_3 vs 3.54 of accr_4; in S. L. it is 4.36 vs 3.54. As Figure 36 confirms, accreditation, by formalizing procedures, has clarified roles and tasks. This means that caregivers may have perceived an increased autonomy in their working activity so that the boundaries of their power of action are now well known. Because of the increased formalization of caregivers' tasks, we could expect also an increased ability of Union to fight its battles by better identifying the potential sources of working problems. However, Table 38 shows that 62% in C. and 60% in S.L. agree with the fact that the Union's role is not more important now than in the past, while they do not agree with the fact that workers are now more able to reach positive results than Union: only 38% in C. and 10% in S.L. chose values 6-7. Anyway, differences between C. and S.L. about workers' and Union' role (gov_10 and gov_11) and about knowledge of their own tasks (gov_2 and gov_6) are here confirmed. On average in C. people believe that workers' active participation is more useful than Union; while 54% chose level 1 concerning the increased Union's role, 54% chose level from 4 to 7 concerning the improved workers' role. This in part can be explained by the fact that, workers – knowing better than in S.L. their own role – are more able to formulate specific issues that, in presence of a tolerant management, can be solved. On the contrary, in S.L., where roles and tasks are still less clear (despite the positive role of the accreditation to this regard), workers are not able to directly promote their own interests. Such condition, however, does not lead to rely on Union, on which workers have very different opinions. This fact may be due to the presence of a tolerant management able to avoid the creation of an opposition with workers. Finally, the low importance of the Union in both cases may be explained by the fact that LTC services in both organizations have been created and always been managed by the same cooperative. This fact may have contributed to the creation of sense of belonging and reduced the need of opposition with the cooperative direction.

Figure 36 – Evaluation of accreditation on the roles and tasks in C. and S.L.

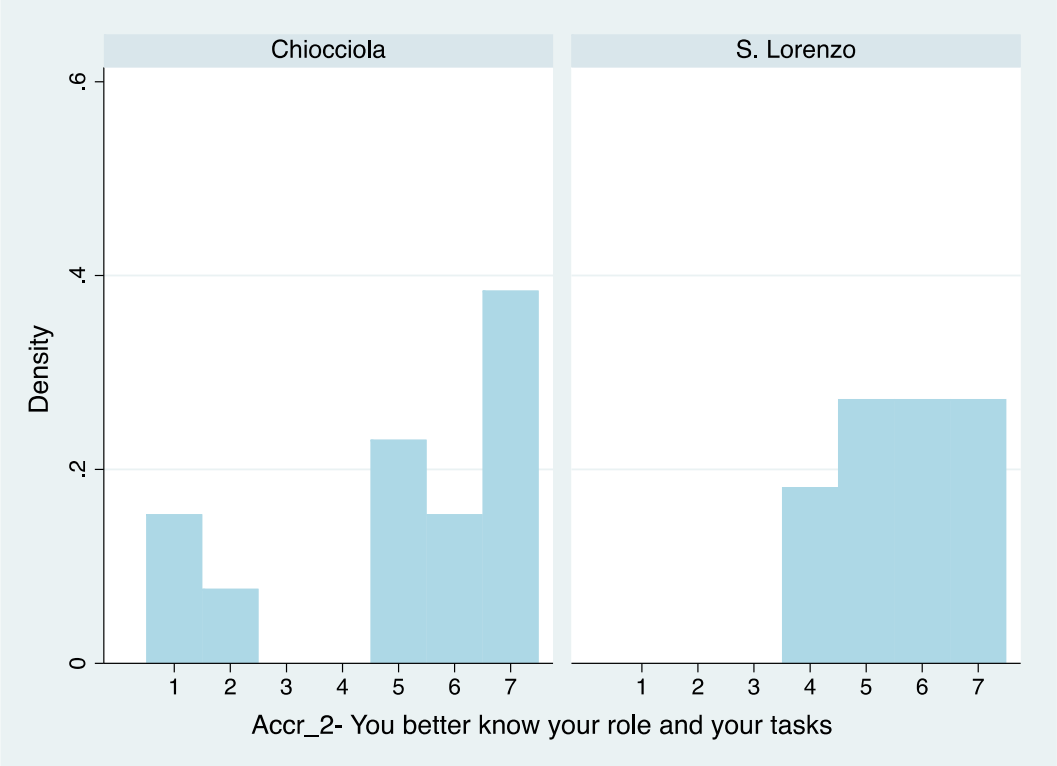


Table 39 - Evaluation of accreditation on the Union's role

	Chiocciola			S. Lorenzo		
Accr_8	Freq.	Percent.	Cum.	Freq.	Percent.	Cum.
1	7	53.85	53.85	2	20.00	20.00
2	0	0	53.85	1	10.00	30.00
3	1	7.69	61.54	3	30.00	60.00
4	1	7.69	69.23	2	20.00	80.00
5	1	7.69	76.92	1	10.00	90.00
6	1	7.69	84.62	1	10.00	100.00
7	2	15.38	100.00	0	0	100.00
Tot.	13	100.00		10	100.00	

Source: Author's calc. based on survey's data

Concerning the relation with patients and their families, opinions are positive (see Table 39). As Table 39 shows, 61% of caregivers in C. and 55% in S.L. maintain that the quality of their relationship with the users and their families increased (accr_5) and the patient is considered more at the center of the service than in the past (see Figure 37). This evaluation may be

explained by the fact that the formalization of procedures allows to better taking into account the patients' basic needs, which are highly kept under control (frequency of hydration, handling, evacuation). However, in the two organizations, the effect of the accreditation is different on the time spent by caregivers in personal relationships with users. As Table 41 displays, in S.L. a greater number of respondents than in C. thinks that time for personal relationship has decreased (73% in S.L. versus 46% in C. chose level 5 to 7). This may be explained by the fact that in C. the introduction of the accreditation system has increased the number of procedures to follow but has not dramatically changed caregivers' way of working. Instead, in S.L., the introduction of the accreditation system has been oriented to the complete formalization of jobs and, hence, largely changed workers' way of working (not only of caregivers but also of the other professionals, included managers). In this institution, collective attention is still on the right fulfillment of the procedures, which is perceived as subtracting much time to personal relationship with users, at least more than the manual compilation of forms.

Table 40 – Evaluation of accreditation on the relationship with users

Legend:
Accr_5: Compared to the past, you relate better with the host and his/her own family.
Accr_6: Compared to the past, the user is more at the center of service.
Accr_7: Compared to the past, time for personal relationships with the guest has been reduced because of the increased number of procedures to follow.

		Accr_5	Accr_6	Accr_7
Chiocciola	Obs	13	13	13
	Mean	5	4.61	4.38
	CV	0.49	0.52	0.47
S. Lorenzo	Obs	11	11	11
	Mean	5.27	5.72	5.27
	CV	0.29	0.22	0.34

Source: Author's calc. based on survey's data

Table 41 – Evaluation of accreditation on the relationship with users

	Chiocciola			S. Lorenzo		
Accr_5	Freq.	Percent.	Cum.	Freq.	Percent.	Cum.
1	2	15.38	15.38	0	0	0
2	1	7.69	23.08	0	0	0
3	0	0	23.08	2	18.18	18.18
4	1	7.69	30.77	2	18.18	36.36
5	1	7.69	38.46	1	9.09	45.45
6	4	30.77	69.23	3	27.27	72.73
7	4	30.77	100.00	3	27.27	100.00
Tot.	13	100.00		11	100.00	

Source: Author's calc. based on survey's data

Figure 37 – Evaluation of accreditation on user's centrality in C. and S.L.

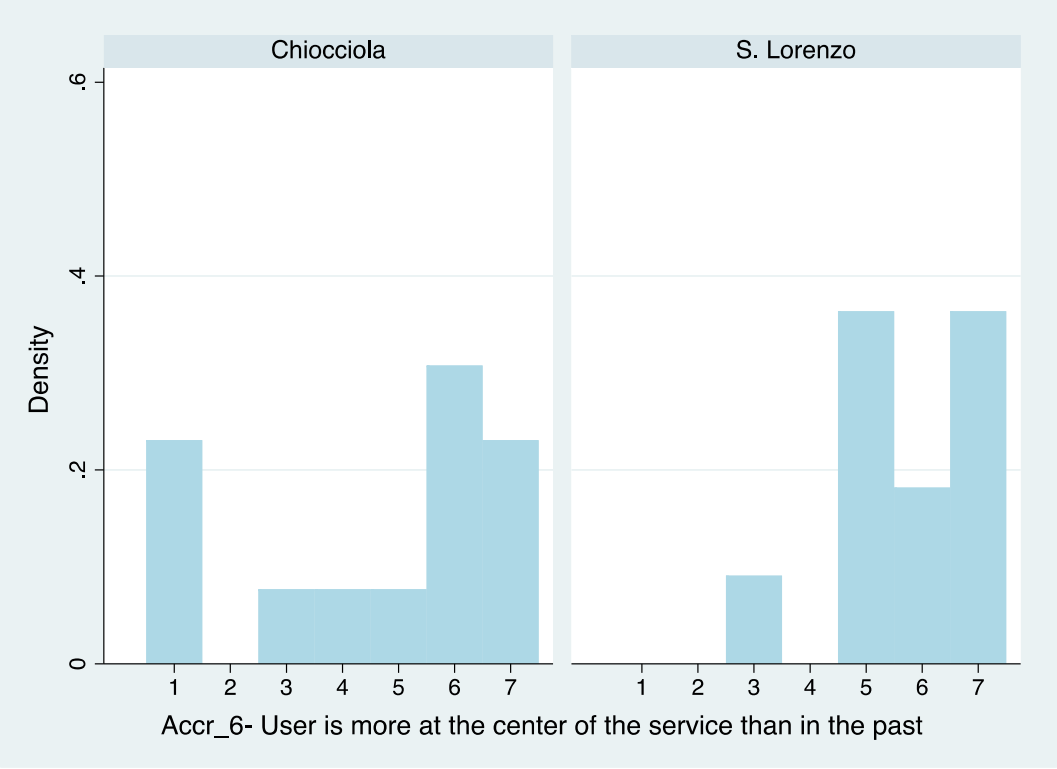


Table 42 – Evaluation of accreditation on time for personal relationship with users

	Chiocciola			S. Lorenzo		
Accr_7	Freq.	Percent.	Cum.	Freq.	Percent.	Cum.
1	2	15.38	15.38	1	9.09	7.69
2	0	0	15.38	0	0	7.69
3	2	15.38	30.77	0	0	7.69
4	3	23.08	53.85	2	18.18	27.27
5	2	15.38	69.23	2	18.18	45.45
6	1	7.69	76.92	3	27.27	72.73
7	3	23.08	100.00	3	27.27	100.00
Tot.	13	100.00		11	100.00	

Source: Author's calc. based on survey's data

The positive role of procedures is confirmed by answers to the issue gov_7 that involves all respondents (not only those with 6 years of length of service) '*compiling forms subtracts valuable time that you would rather spend in solving problems concerning the relationship with users and in managing other operations'* (see Table 42). In both organizations, 50% of population has chosen a level equal or below 4, even if another important share considers this activity as detrimental (see Table 43). This means that spending time in compiling forms is considered as an integral part of work, which is well accepted by most of them.

In other words, in these organizations, despite the role of accreditation, the formalization of requirements has improved –by clarifying tasks – caregivers' ability to satisfy patients' needs so that time for personal relationships is efficiently used. However, in the perspective of promoting service personalization, this means that caregivers' attention is focused more on the satisfaction of basic users' needs rather than on their full wellbeing. For this reason, most of the services they provide can be regarded as mass customized.

Table 43 - Evaluation of time subtracted to relationships by bureaucratic tasks

		Gov_7
Chiocciola	Obs	22
	Mean	4.14
	CV	0.63
S. Lorenzo	Obs	18
	Mean	3.72
	CV	0.56

Source: Author's calc. based on survey's data

Table 44 – Evaluation of time subtracted to relationships by bureaucratic tasks (gov_7) in C. and S.L.

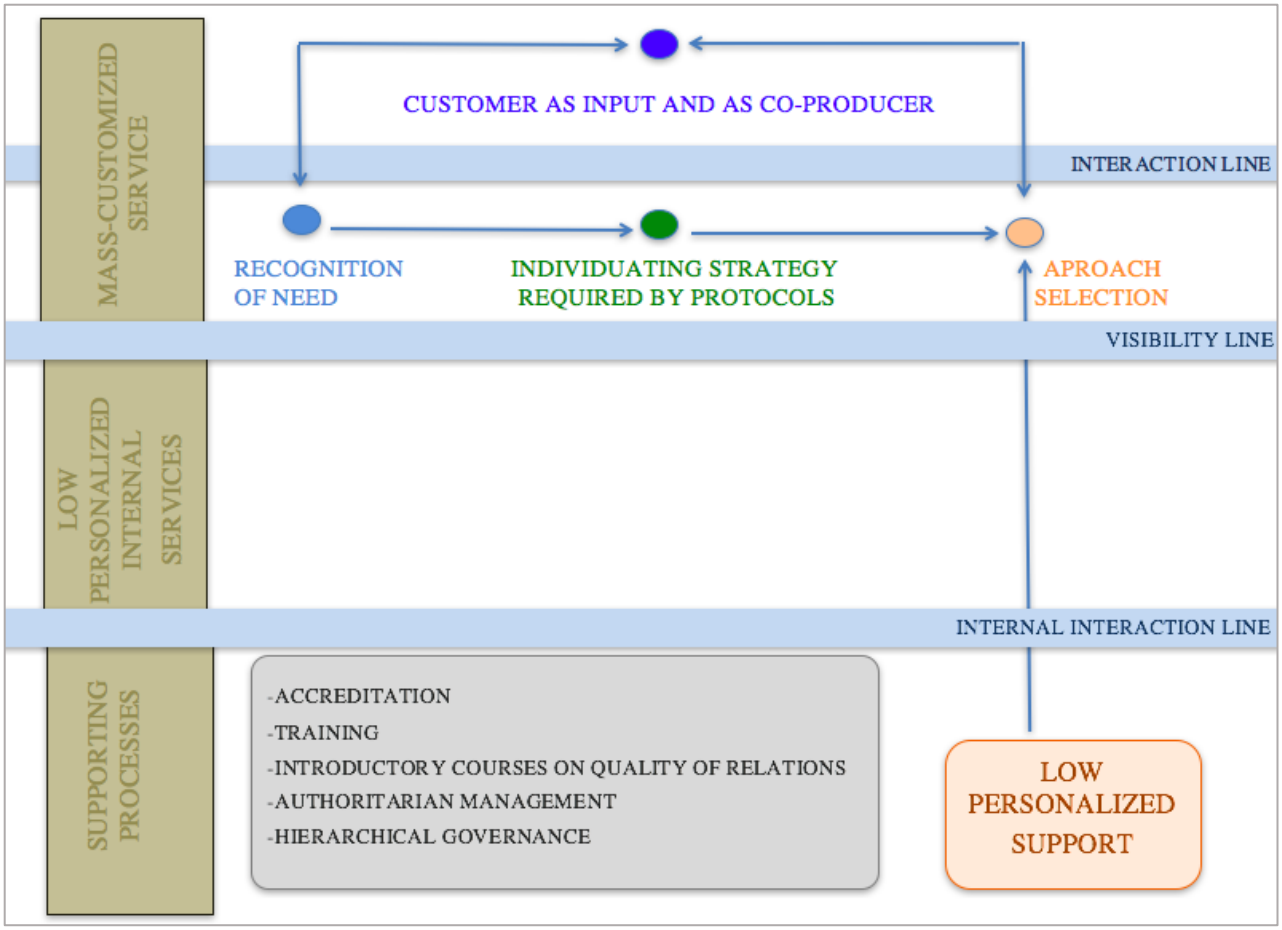
	Chiocciola			**S. Lorenzo**		
Gov_7	Freq.	Percent.	Cum.	Freq.	Percent.	Cum.
1	7	31.82	31.82	5	27.78	27.78
2	1	4.55	36.36	1	5.56	33.33
3	2	9.09	45.45	2	11.11	44.44
4	1	4.55	50.00	1	5.56	50.00
5	1	4.55	54.55	5	27.78	77.78
6	3	13.64	68.18	3	16.67	94.44
7	7	31.82	100.00	1	5.56	100.00
Tot.	22	100.00		18	100.00	

Source: Author's calc. based on survey's data

The chart below (Figure 38) shows the model of the service blueprinting implicitly adopted in C. and S.L., which represent the third category (low level of standards and low level of capabilities). Despite front-office caregivers receive some personalized support from management and to a lesser extent from colleagues, this support depends also on the quality of relationships established with them, which not always is positive. Moreover, their help is not on the content of tasks to perform, which is standardized, but only on the approach to follow in order to incentivize users to receive the standardized care. For this reason, even if experiences of personalized care could

emerge (especially in case of difficult patients to whom more attention is required), the overall service is expected to be mass-customized. In this case, the patient receives a personalized package of standardized services on the basis of common and clearly identified needs. In order to identify whether a relation exists between this type of service and the level of sick leave hours experienced in these organizations, a comparison is required with the organizations belonging to the other categories.

Figure 38 – Service blueprint in C. and S.L.



Source: Author's contribution

3.4.5.4. Second case study: the organization of highly personalized service

The comparison with the organization, Stella Montis, representing the first category (high coordination capabilities and low standard level) should allow to identify a benchmark in the light of the theoretical framework developed in the previous chapter. Given the complexity of LTC need, the most efficient organization is the one that, thanks to its internal structure, is the most

able to face customer uncertainty. The organization included in the fourth categories reflects the characteristics required to be efficient and, as such, can be considered as a benchmark.

As section on general characteristics highlights, Stella Montis is a cooperative organization similar to Chiocciola and S. Lorenzo in terms of dimensions, mean age of population, gender and level of education, while it differs because of the low number of foreigners and members among employees. The highly cooperative experience of Stella Montis suggests that membership status is not an essential condition in the promotion of cooperative experience, at least at the level of labor organization. The creation of a participative governance could have been facilitated by the reduced number of problems (in terms of lack of language and cultural barriers) that an organization with a low number of strangers, experiences. However, independently of the number of barriers that an organization may face, what matters is a constant persistence toward the creation of reciprocal and trustworthy relationships. The preliminary interview with the management of Stella Montis allowed to understand the number of efforts and difficulties that a path toward effective cooperation may involve. Work shifts are monthly defined by the management and partly may be changed on the basis of workers' requests. Caregivers participate to the organization of labor in different ways. First, tasks are not strictly defined: there are three work shifts during which team-mates self-organize concerning which tasks to perform. Caregivers have increasingly learned how to behave and which tasks to choose in order to improve cooperation with colleagues and, therefore, satisfy at their best personal needs of patients. For instance, if one has prepared breakfasts twice in a row, then he/she knows that should propose him/herself for helping patients with getting up (which is a tougher task than preparing breakfast). If a caregiver prefers to work without team-mates and a patient prefers individual relationship, caregiver and patient may find a common ground. According to the manager, cooperation among caregivers is nurtured mainly thanks to the organization of specific training courses and the bottom-up creation of thematic team works. These, in particular, emerge in case of specific problems to address (i.e. with some user or colleagues) or to suggest new animation activities or training courses and are managed by coordinators. Some teams break up when the problem is solved, other may keep on working for many months. On the basis of the interview, we can detect that caregivers are highly empowered especially for three reasons. First, they are not merely executors of tasks, but they can decide which task to perform and their timing. Second, if they recognize the existence of a problem, they can suggest the creation of a workteam to solve it.

Finally, they are not required to provide a manual support during animation activities, because, if they want, they can organize and carry out new animation activities and tours on their own. Answers to survey questions provide caregivers' subjective evaluation of the internal organization of labor, which is consistent with the depiction of given by the manager. Such data allow to advance some explanation about the low level of sick leave hours experienced by this company.

3.4.5.4.1. Participative governance and high coordination capabilities

Caregivers in Stella Montis (S.M.) do not consider their organization hierarchical (see Table 44). Respondents (77% of population) affirm that they do not limit themselves to follow standardized procedures (gov_5). Looking at Figure 39, if we compare distribution of answers in S.M. with the one of C. and S.L. concerning the organization's hierarchical character, we can see that distribution of data is not concentrated on the right side of the distribution: mode is on level 5, while in S.L. is on 6 and in C. is on 7. F-Test on the means of gov_5 shows that means of C. and S.L., which are not statistically different from each other, are instead statistically different from that of S.M with a p-value 0.0135. Besides as Table 44 displays, Union is not considered as much helpful to guarantee fair and equal relationships (gov_10) and, in any case, it is regarded as it was less important than their direct participation (gov_11).

Table 45 – Evaluation of governance

Legend

Gov_5: Since a hierarchical structure among different roles exists, limit yourself to follow standardized procedures.
Gov_10: The role of Union is important to guarantee fair and equal relationships
Gov_11: Workers, directly participating, reach better results than Union

		Gov_5	Gov_10	Gov_11
	Obs.	**24**	**24**	**24**
Stella Montis	**Mean**	**3.63**	**3.42**	**4.92**
	CV	**0.52**	**0.64**	**0.39**
	Obs.	22	22	22
Chiocciola	Mean	5.31	4.40	4.32
	CV	0.36	0,5	0.51
	Obs.	17	17	16
S. Lorenzo	Mean	4.65	3.59	3.81
	CV	0.42	0.60	0.52

Source: Author's calc. based on survey's data

Figure 39 – Evaluation of the hierarchical character of governance in S.M.

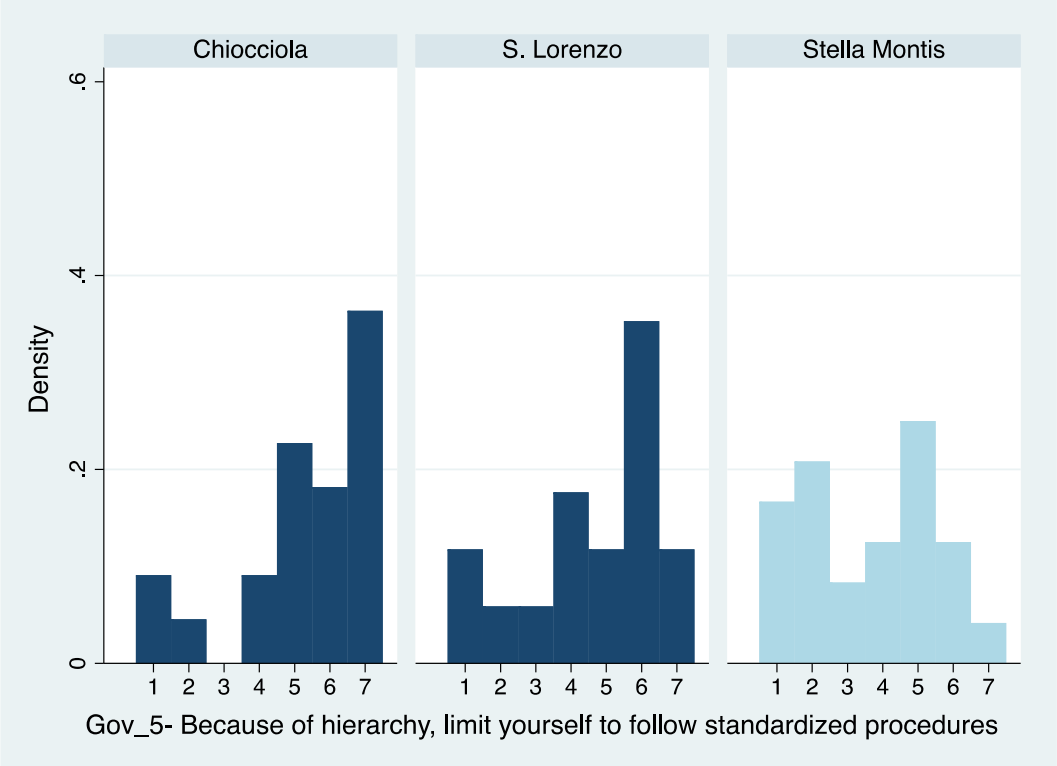


Figure 40 and Figure 41 clearly show that in S.M. – differently from C. and S.L. - workers trust much more on their own active participation (gov_11) than the Union's action (gov_10): while most of data in gov_11 are concentrated on the highest value (with mode on 7), in gov_10 answers focused on the first values (with mode on 1). Therefore, in S.M. what emerges – in line with manager's interview – is a highly participative governance.

Figure 40 – Evaluation of the role of Union in S.M.

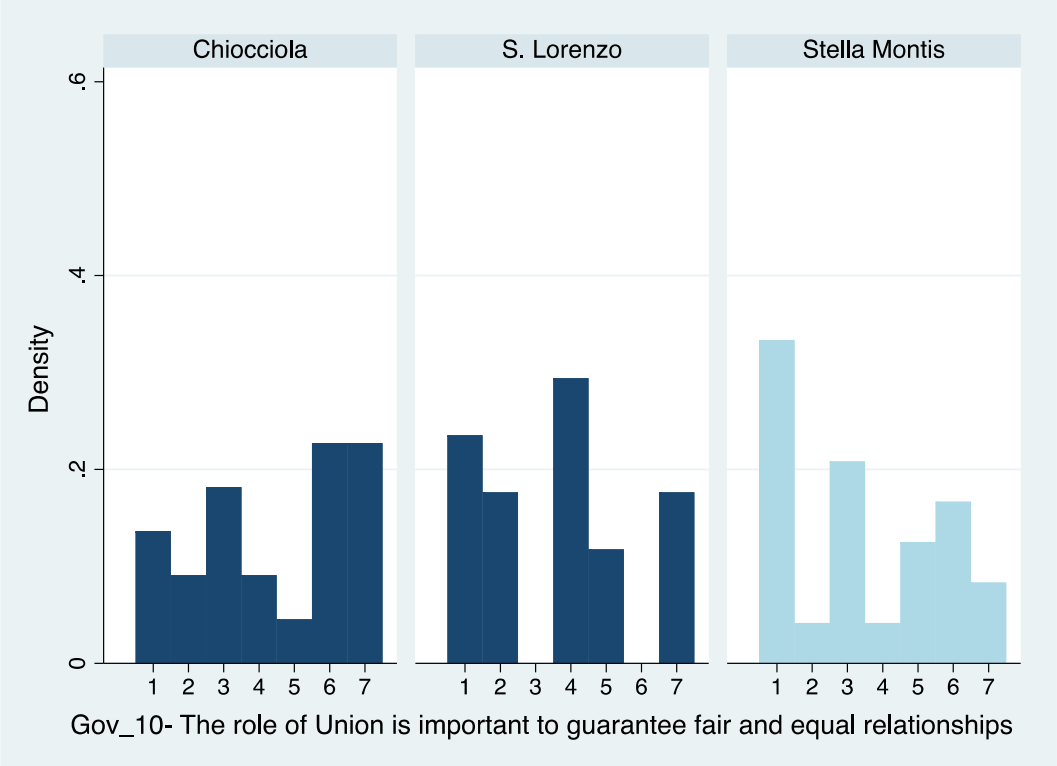
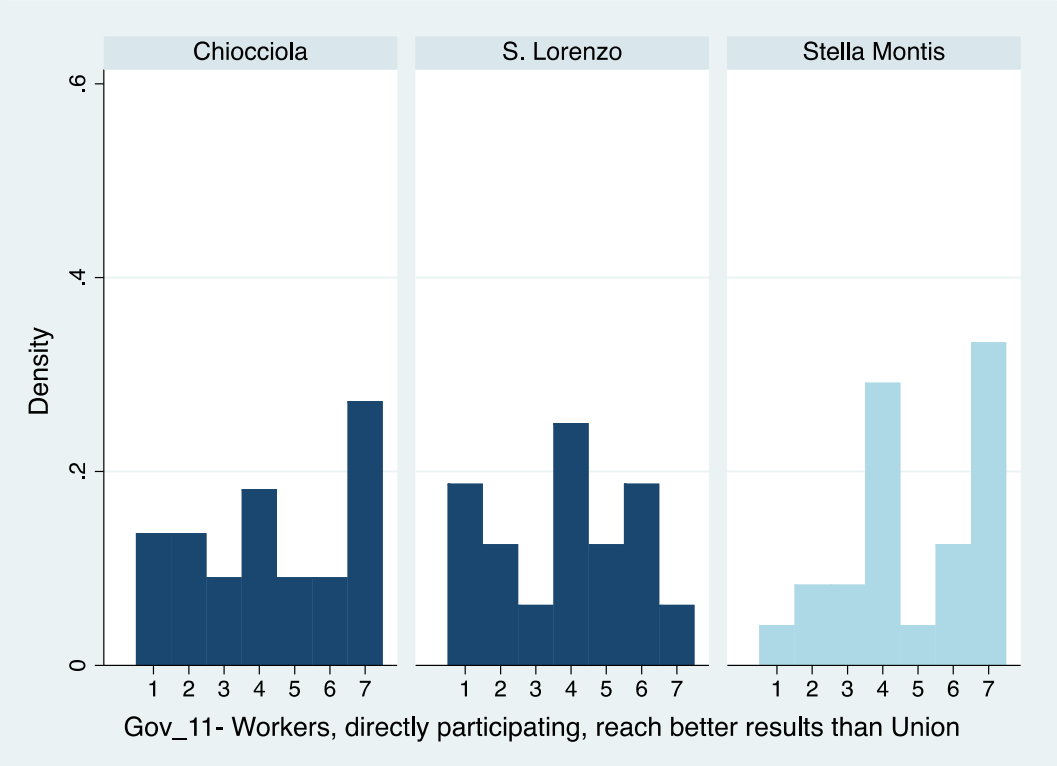


Figure 41 – Evaluation of workers' participation in S.M. (gov_11)



Answers to questions gov_3 and gov_4 display the level and type of coordination capabilities so far developed by caregivers (see Table 45). As it can be seen in Figure 42, while in case of gov_3 answers are quite dispersed (CV=0.62) and 54% does not think that would better work in another

team, distribution of gov_4 in Figure 43 shows tendency toward the highest values as negative skewness (-0.62) and high kurtosis (2.74) shows. This may mean that caregivers have difficulties in changing work team and would not work better in another one because they have developed cooperation capabilities to work that can be used only with their specific team mates and in that specific context. They know how to relate with their colleagues especially because of the rules and habits that they have developed and accepted to share together and in which each specific person makes the difference.

Table 46 – Evaluation of coordination capabilities

Legend:
Gov_3: You would better work in another workteam
Gov_4: You would have problems in changing your workteam

		Gov_3	Gov_4
	Obs.	24	23
Stella Montis	Mean	3.38	4.7
	CV	0.62	0.37
	Obs.	22	22
Chiocciola	Mean	4.1	4.41
	CV	0.54	0.53
	Obs.	18	18
S. Lorenzo	Mean	3.06	3.8
	CV	0.6	0.51

Source: Author's calc. based on survey's data

Figure 42 – Evaluation of coordination capabilities in S.M. (gov_3)

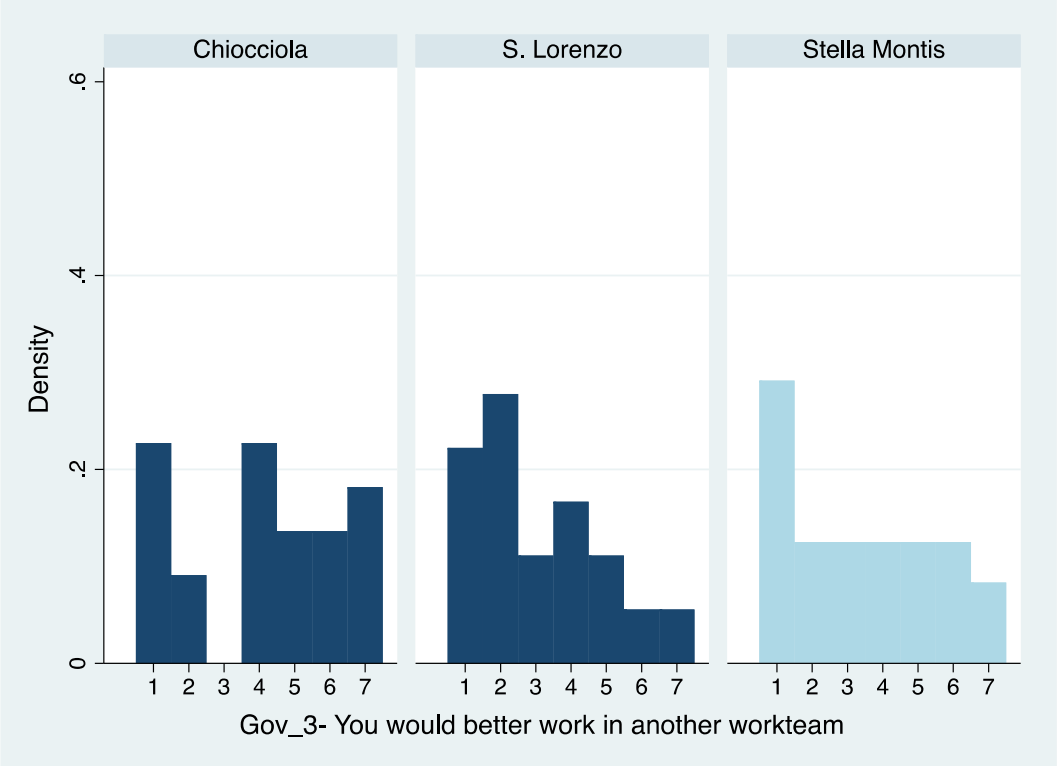
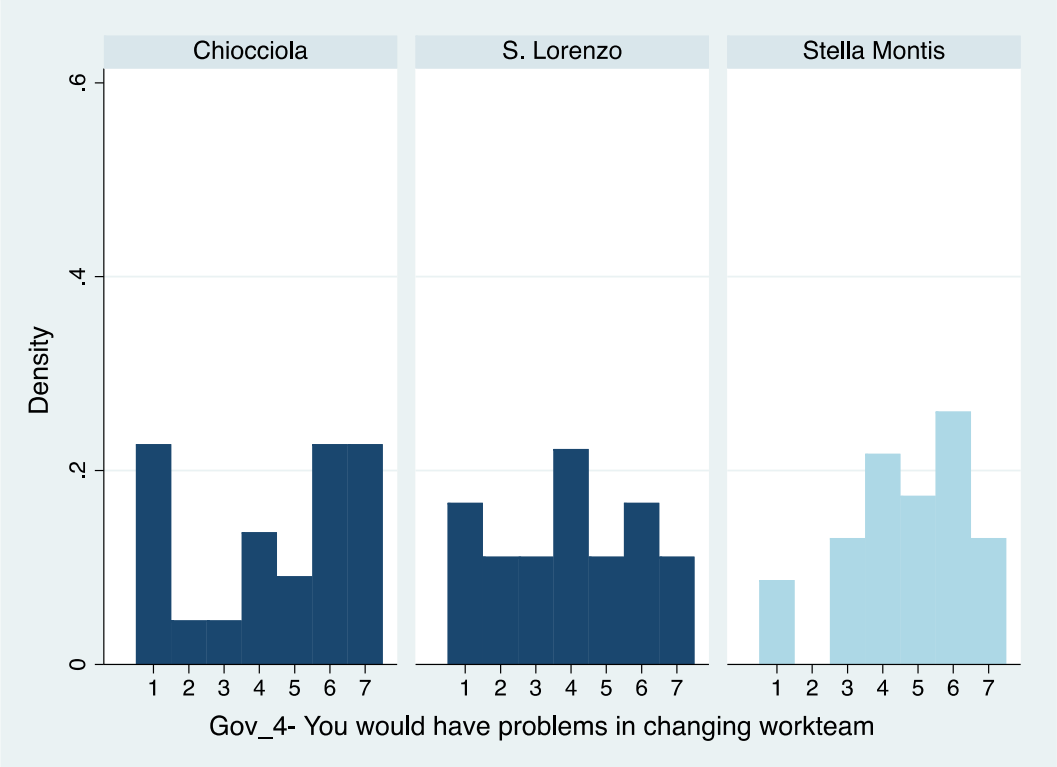


Figure 43 – Evaluation of coordination capabilities in S.M. (gov_4)



3.4.5.4.2. Supportive Management

Management in Stella Montis received a different evaluation compared to those in C. and S.L. especially concerning one important aspect, the one related to authority (man_3). As Table 46 shows, most of caregivers (79%) do not consider their coordinator as authoritarian. They do not agree with the sentence *"When at odds with you, manager closes debate relying on his/her own authority"* and F-test on the mean shows that the mean of S.M. is statistically different at 99% level ($p<0.01$) from those of C. and S.L. (which, as seen above, are not statistically different). This means that the manager prefers to obtain consensus on his own decisions rather than imposing its view on how things should work.

Table 47 – Evaluation of management

Legend:
Man_1 - Manager treats workers fairly and equally
Man_2 - Manager is able to incentivize team spirit
Man_3 - When at odds with you, manager closes debate relying on his/her own authority
Man_4 - Manager involves you in decisions that impact on your life
Man_5 - Manager lends weight to your personal problems and supports you in difficult times

		Man_1	Man_2	Man_3	Man_4	Man_5
	Obs.	**24**	**24**	**24**	**24**	**24**
Stella Montis	**Mean**	**1.71**	**1.79**	**0.83**	**1.88**	**2.17**
	CV	**0.56**	**0.43**	**1.25**	**0.55**	**0.4**
	Obs	23	23	23	23	23
Chiocciola	Mean	1.78	1.91	1.96	1.96	2.48
	CV	0.63	0.59	0.54	0.47	0.36
	Obs	20	18	17	17	19
S. Lorenzo	Mean	2.19	1.73	1.76	1.72	2.55
	CV	0.5	0.6	0.6	0.6	0.4

Source: Author's calc. based on survey's data

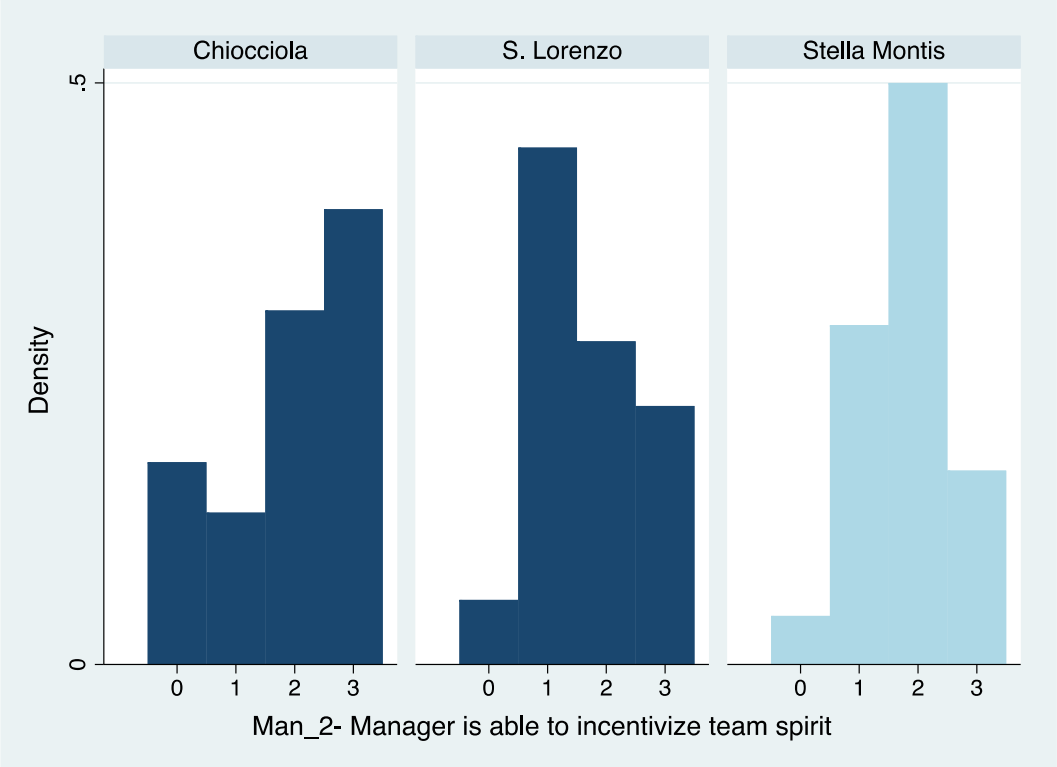
Table 48 – Evaluation of management

	Man_3			Man_2		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.
0	12	50.00	50.00	1	4.17	4.17
1	7	29.17	79.17	7	29.17	33.33
2	2	8.33	87.50	2	50.00	83.33
3	3	12.50	100.00	3	16.67	100.00
Tot.	24	100.00		24	100.00	

Source: Author's calc. based on survey's data

Moreover, as Figure 44 shows, most workers believe that the manager is quite able to incentivize team spirit, as 50% have chosen level 2 while 17% level 3.

Figure 44 – Evaluation of management in S.M. (man_2)



Finally, manager in S.M. does not seem to lend high value to personal problems as much as in C. and in S.L.. As Figure 45 shows, while in C. and S.L., mode is on level 3, in S.M. mode is on level 2. This fact may be due to the manager's interest to create a cohesive work team so that not always he is able to satisfy workers' personal problems. In conclusion, manager in S.M. appears highly supportive in the creation of coordination capabilities and a unified work team.

Figure 45 – Evaluation of management in S.M. (man_5)

3.4.5.4.3. Highly Personalized Service Design

Evaluation of training in S.M. is very high not only concerning the one received at the beginning (form_1) and required by law (form_2), but also about the acquisition of competences for relating with colleagues (form_3) and users (form_4), as the average means show in Table 48. These data confirm information given by the manager about the importance of training activities to improve coordination capabilities with users and colleagues.

Table 49 – Evaluation of training

Legend:
Form_1: You have initially received an adequate training and orientation
Form_2: You have received training required by law
Form_3: You have received additional training to improve your competences in relationships with colleagues
Form_4: You have received additional training to improve your competences in relationships with hosts and their families

		Form_1	Form_2	Form_3	Form_4
	Obs.	**24**	**24**	**23**	**24**
Stella Montis	**Mean**	**2.42**	**2.5**	**2.61**	**2.46**
	CV	**0.24**	**0.24**	**0.19**	**0.26**
	Obs.	22	23	22	23
Chiocciola	Mean	2.18	2.52	1.86	1.91
	CV	0.31	0.13	0.63	0.52
	Obs.	20	20	20	20
S. Lorenzo	Mean	2.2	2.6	1.8	1.8
	CV	0.4	0.23	0.48	0.24

Source: Author's calc. based on survey's data

Comparison with distribution of C. and S.L. in figure 46 highlights particular attention for relationships among colleagues, that, hence, are considered as instrumental to the production of highly personalized services. Unlike C. and S.L., in S.M. all values are concentrated on the levels 2 and 3, highlighting that no one among respondents, states to have received an insufficient training, while mode on level 3 informs that most (61%) states to have received much education on this issue (see Table 49). F-tests on the mean confirms this deep difference: in case of form_3, means are statistically different with P-value = 0.0004 and in case of form_4 with p-value 0.0167. In other words, these values are highly informative about the existence of an organization's strategy on training as recognized source of external efficiency. In this perspective, the coordination capabilities developed could be defined as 'relational capabilities' which are able to reduce a specific type of dynamic transaction costs, similarly defined as 'relational' transaction costs.

Figure 46 – Evaluation of training in S.M. (form_3)

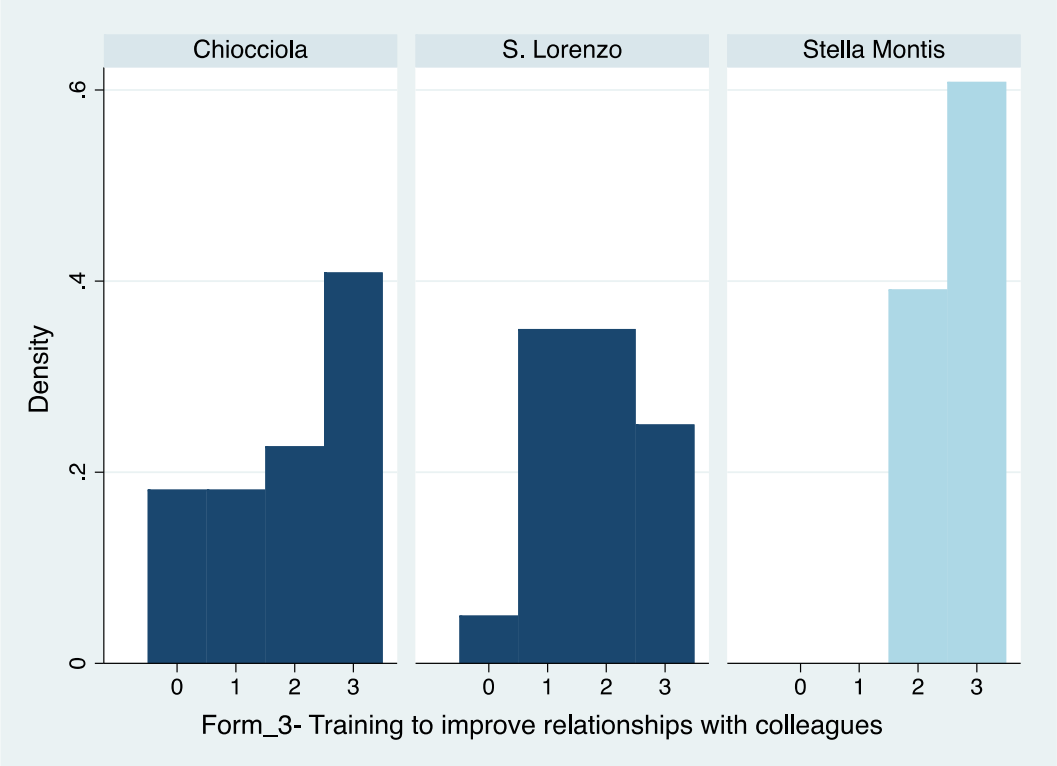


Table 50 – Evaluation of training

	Form_3			Form_4		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.
0	0	0	0	0	0	0
1	0	0	0	2	8.33	8.33
2	9	39.13	39.13	9	37.50	45.83
3	14	60.87	100.00	13	54.17	100.00
Tot.	23	100.00		24	100.00	

Source: Author's calc. based on survey's data

Concerning accreditation, we can see in Table 50 that the percentage of respondents is very high; (96%) have worked more than 6 years and 78% knows the procedures.

Table 51 – Number of respondents knowing accreditation procedure

Tot. of respondents	24
Having worked ≥ 6 years	23 (96%)
Having worked ≥ 6 years and knowing the procedure	18 (78%)

Source: Author's calc. based on survey's data

What emerges, unlike the other organizations, is the existence of a common opinion on the procedure's ability to improve service quality, which is quite negative. According to Table 51 in S.M. respondents on average have attributed a low value to the sentences related to the quality of the relationships with users and families and lower than in C. and in S.L.. Sentence "*you better relate with patients and their families*" (accr_5) has received an average value 3.5 and it is statistically different (p-value=0.0272) and lower than the mean values in C. and S.L. (5 in C. and 5.27 in S.L.), which are not statistically different between each other (see above). Similarly, the user is not considered more at the center of the service than in the past (accr_6) and again, mean (3.44) is statistically different (p-value=0.0026) from the ones of C. and S.L. (in C. 4.61 and in S.L. 5.72). Finally, as Table 52 shows, 50% of respondents considers that time for personal relationships has decreased. These values suggest that caregivers agree on the fact that the publicly imposed request for a detailed documentation of tasks shifts workers' attention to the promotion of a formal quality of service rather than to its effectiveness.

Table 52 – Evaluation of accreditation on the relationship with users

Legend:

Accr_5 – You better relate with patients and their families
Accr_6 – User is more at the center of the service than in the past
Accr_7 – Time for personal relationships with users has decreased

		Accr_5	Accr_6	Accr_7
Stella Montis	Obs.	18	18	18
	Mean	3.5	3.44	4.78
	CV	0.57	0.59	0.47
Chiocciola	Obs.	13	13	13
	Mean	5	4.61	4.38
	CV	0.49	0.52	0.47
S. Lorenzo	Obs.	11	11	11
	Mean	5.27	5.72	5.27
	CV	0.29	0.22	0.34

Source: Author's calc. based on survey's data

Figure 47 – Evaluation of accreditation in S.M. (accr_6)

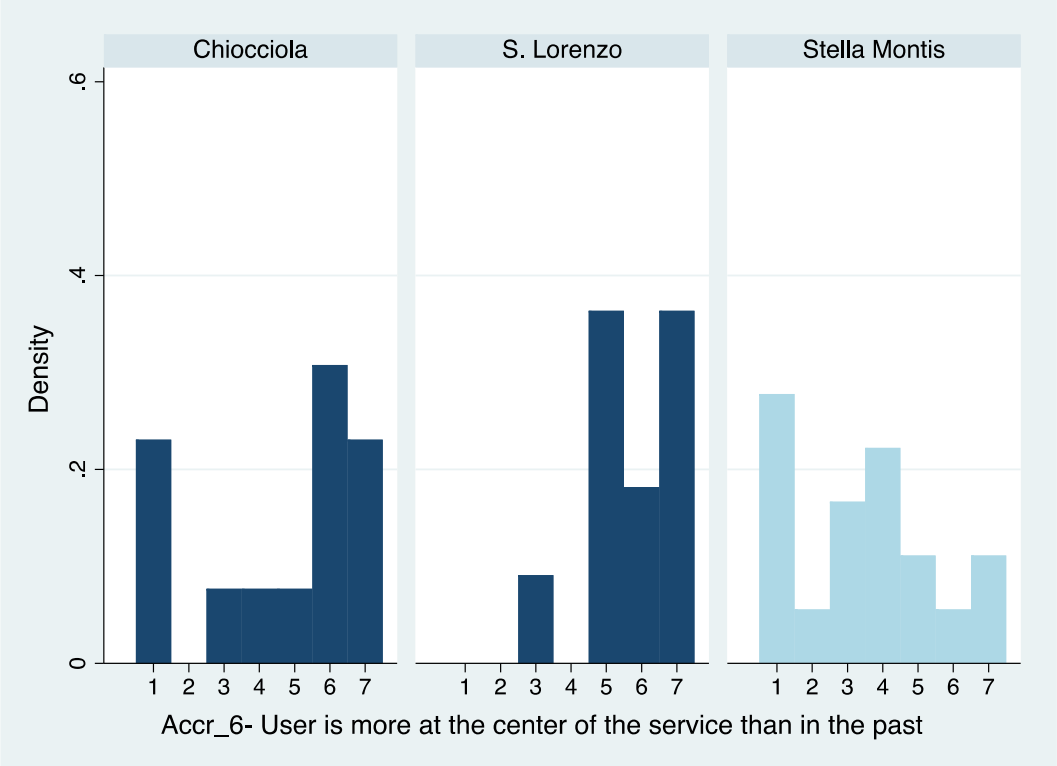


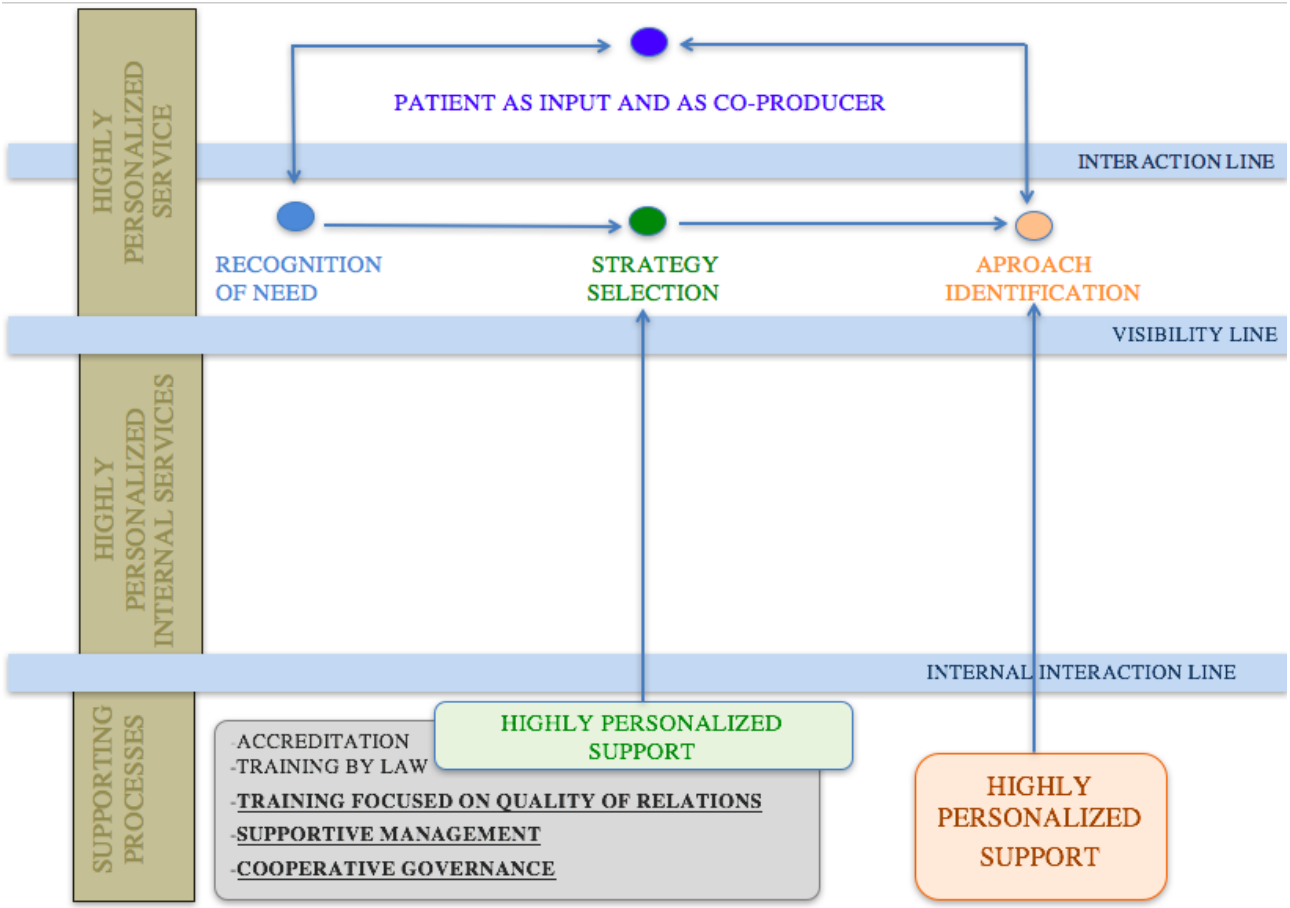
Table 53 – Evaluation of accreditation on the time for personal relationship with users

Accr_7	Freq.	Percent	Cum.
1	3	16.67	16.67
2	0	0	16.67
3	3	16.67	33.33
4	1	5.56	38.89
5	2	11.11	50.00
6	3	16.67	66.67
7	6	33.33	100.00
Tot.	18	100.00	

The graph below (Figure 48) sums up the characteristics of the service design adopted by Stella Montis by using again the service blueprint technique. On the basis of information collected in the above analysis, care service is highly centered on customer. Caregivers can establish a personal interaction with patients in order to identify their complex needs and are highly supported by their colleagues and the management both in the identification of the right strategy and the approach to adopt. Refusal of care can be reduced thanks to the collaboration of colleagues more in harmony with patients or thanks to the experimentation of new animation activities that indeed work as supportive strategies to the one required by the protocols. This chart, resulting from the

above analysis, is consistent with the presence of a very low level of the UPC_2. The organization's attention to the creation of cooperation capabilities allows to maintain high intrinsic motivation to work.

Figure 48 - Service blueprinting in S.M.



Source: Author's contribution

Caregivers know that their presence is not easily substituted by someone else that does not know users and his/her own colleagues. Therefore, he/she expected to sick to a lesser extent than in other organizations. In turn, the low level of sick leave hours, by allowing the continuity of care, is consistent with the strengthening of coordination capabilities. Unlike the case of C. and S.L., in S.M. the organization is able to promote a virtuous cycle toward a progressive improvement of the quality of care.

3.4.5.5. Third case study: the organization of highly mass-customized service

Arsia, representative of the fourth category (high level of standards, low level of capabilities) is a large IOE providing LTC services for 150 users. Owners of Arsia are also owner of another nursing home, geographically close and of similar dimensions, Paravia. Given the potentiality of scale economies, this fact partly explains the adoption of operation management principles in the design and management of LTC services. Moreover, standards are here considered as strategic to clearly define each specific sequence of care path and, therefore, reduce uncertainty of caregivers' performances (for instance, omissions in care, patients' falls, caregivers' injuries etc.). Standardization of tasks, in fact, is reached thanks to the analysis of tasks according to a top-down method. Task is decomposed in sub-components that are more knowable and easier to be managed. OM principles have also been adopted in order to introduce innovative systems in the near future to support each phase of care path and, this way, reduce caregivers' workload and improve service quality. According to management, the organization of work-shift is made once a year and can be changed by employees only in presence of two conditions; request of permission can be done until three days before and only if the worker finds someone else in substitution. Given these characters, we expect to find a highly standardized organization of service that leaves low room for the emergence of coordination capabilities, suggesting this reason as leading explanation of the high level of UPC experienced by the company.

3.4.5.5.1. Hierarchical Governance

The hierarchical character of the governance is confirmed by caregivers' evaluation in survey. Despite in Figure 49, it seems more marked than in case of C. and S.L., organizations' means are not statistically different from each other. However, it is important to take into account the different percentage of answer to the survey: in A. the sample represents only 42% against 79% in C. and 67% in S.L., correspondingly, respondents' answers could not adequately represent the evaluation of the population. Additional information about the hierarchical character can be obtained by the analysis of the distributions about the role of Union (gov_10) and of direct participation of caregivers(gov_11). Figure 50 and Figure 51 show that – in comparison with distributions of C. and S.L - answers are polarized. This may be due to the fact that in A. both democratic instruments are used more often than in C. and in S.L., testifying the presence of some conflict with the directors, and, hence, the existence of a more hierarchical structure.

Table 54 – Evaluation of governance

Legend:
Gov_5: Since a hierarchical structure among different roles exists, limit yourself to follow standardized procedures.
Gov_10: The role of Union is important to guarantee fair and equal relationships
Gov_11: Workers, directly participating, reach better results than Union

		Gov_5	Gov_10	Gov_11
	Obs.	**21**	**21**	**22**
Arsia	**Mean**	**5.57**	**3.9**	**4.04**
	CV	**0.25**	**0.64**	**0.58**
	Obs.	22	22	22
Chiocciola	Mean	5.31	4.40	4.32
	CV	0.36	0,5	0.51
	Obs.	17	17	16
S. Lorenzo	Mean	4.65	3.59	3.81
	CV	0.42	0.60	0.52

Source: Author's calc. based on survey's data

Figure 49 – Evaluation of governance in A. (gov_5)

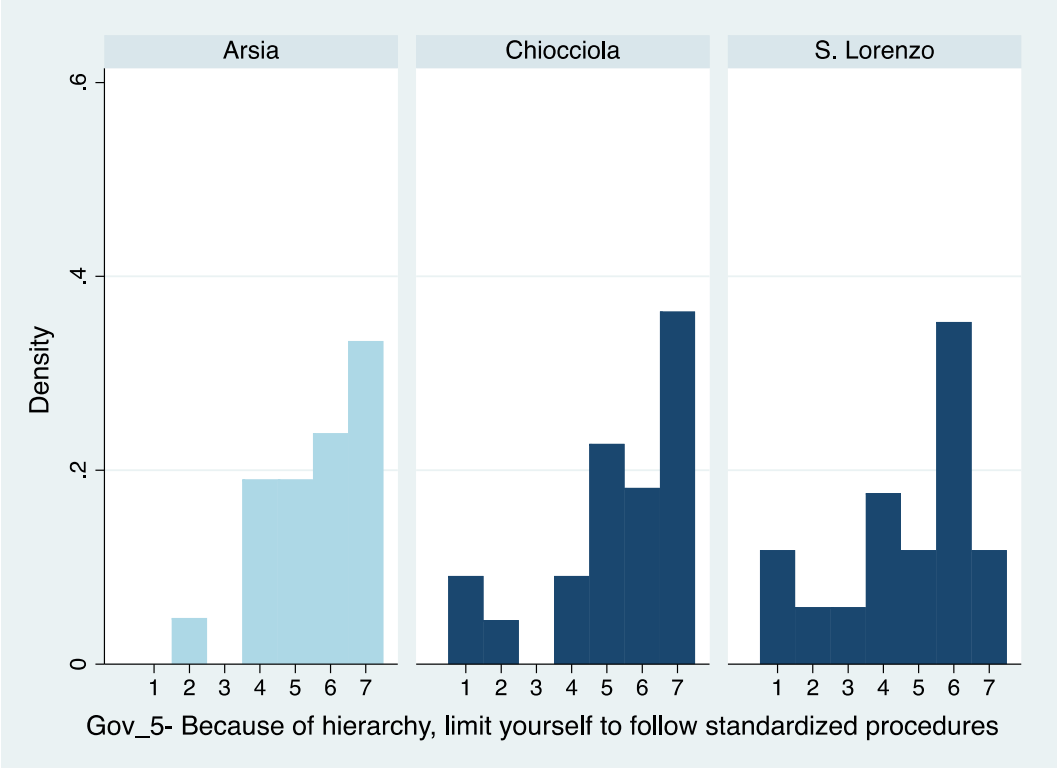


Figure 50 – Evaluation of governance in A. (gov_10)

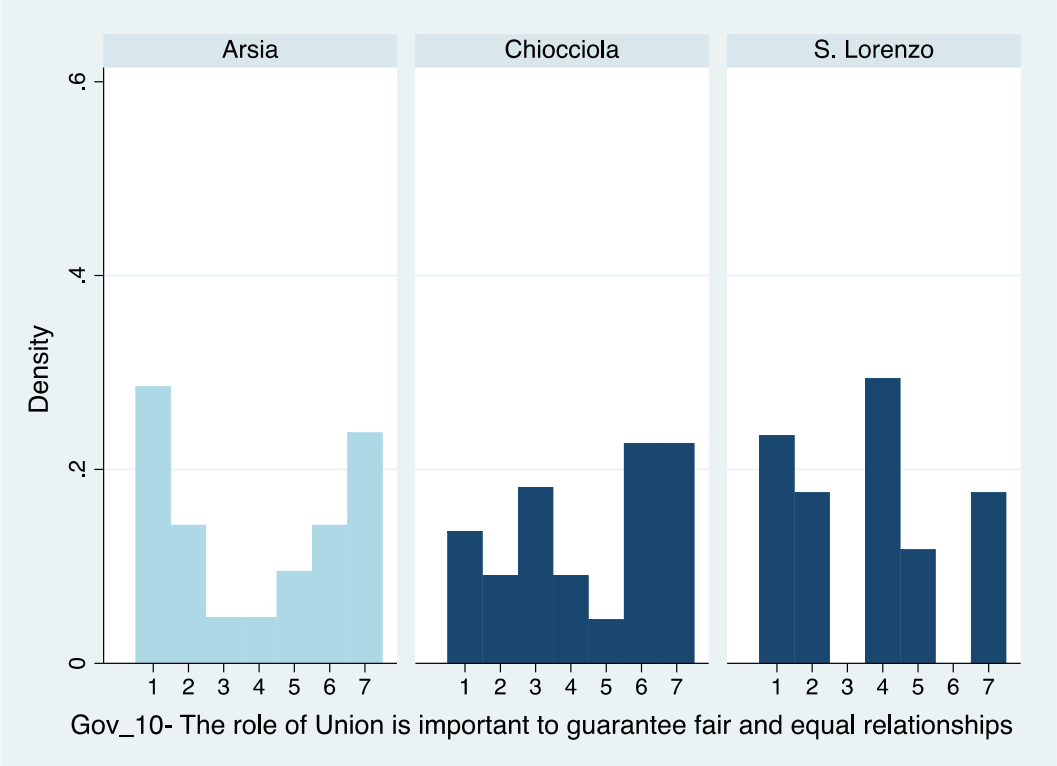
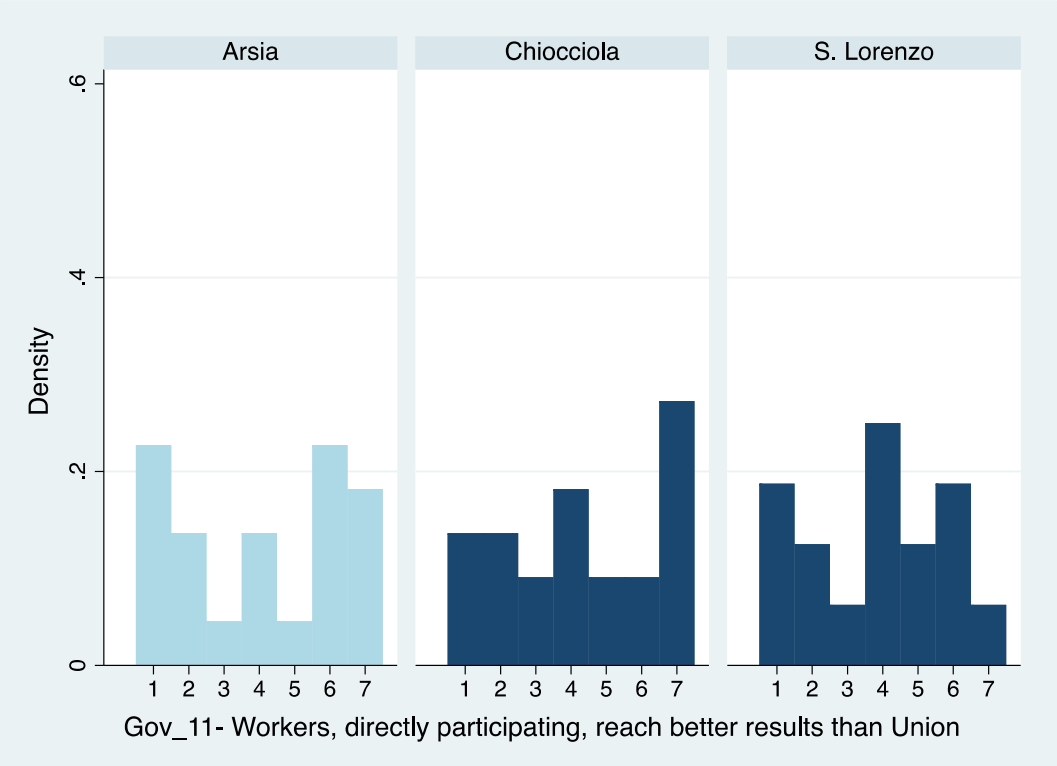


Figure 51 – Evaluation of governance in A. (gov_11)



Having due regard to the low percentage of answers, more information can be gathered about the cooperative capabilities developed so far by the organization (see Figure 52 and Figure 53). 30% of respondents believe that they would work better in another team work (gov_3) and 35% would

not have problem in changing it (gov_4). There is a low number of respondents (20%) that does not think to improve his/her own working capabilities by changing team (having chosen level 1-2 to issue gov_3) and 35% that would have problems in changing it (having chosen level 1-2 to issue gov_4). Noteworthy is the distribution of gov_4 (Figure 53), which shows opposite positions within the team, suggesting that caregivers nurture very different feelings concerning their workteam; while someone has settled in (those having selected values 5,6,7), someone else does not feel comfortable in the team (especially those having chosen level 1). In this condition, as it is unclear the role of governance in promoting coordination capabilities, what appears most interesting is that the organization, indeed, has played a marginal role and, hence, coordination capabilities developed so far are low. data on coordination problems can be read in favor of this interpretation.

Table 55 – Evaluation of governance

Legend:
Gov_3: You would better work in another workteam
Gov_4: You would have problems in changing your workteam

		Gov_3	Gov_4
	Obs.	20	20
Arsia	Mean	4.35	4
	CV	0.44	0.59
	Obs.	22	22
Chiocciola	Mean	4.1	4.41
	CV	0.54	0.53
	Obs.	18	18
S. Lorenzo	Mean	3.06	3.8
	CV	0.6	0.51

Source: Author's calc. based on survey's data

Figure 52 – Evaluation of governance in A. (gov_3)

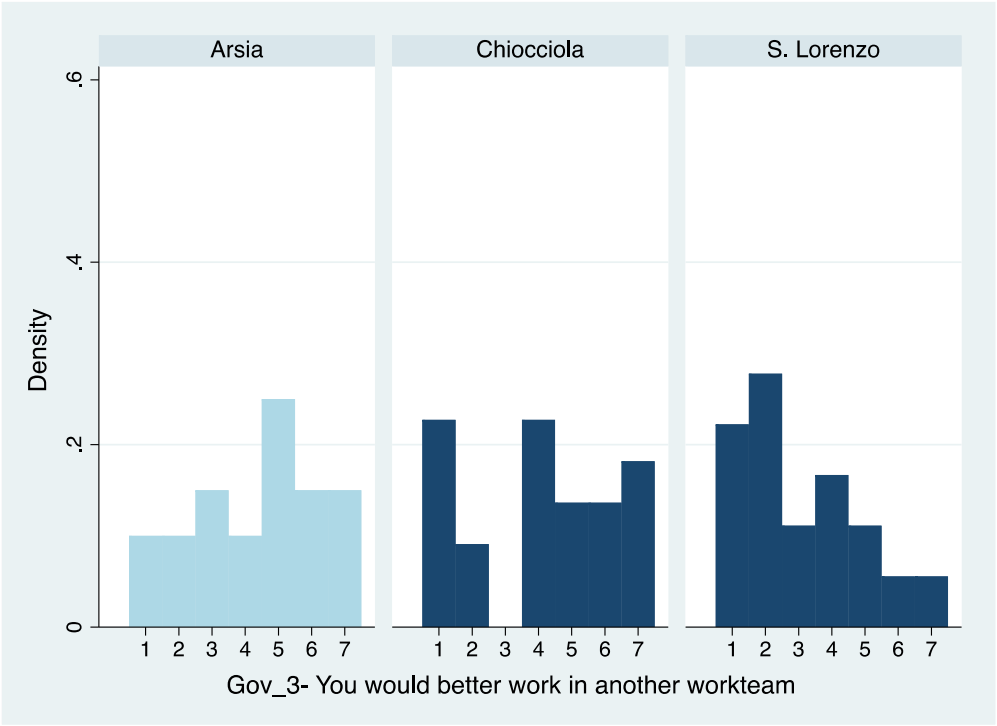
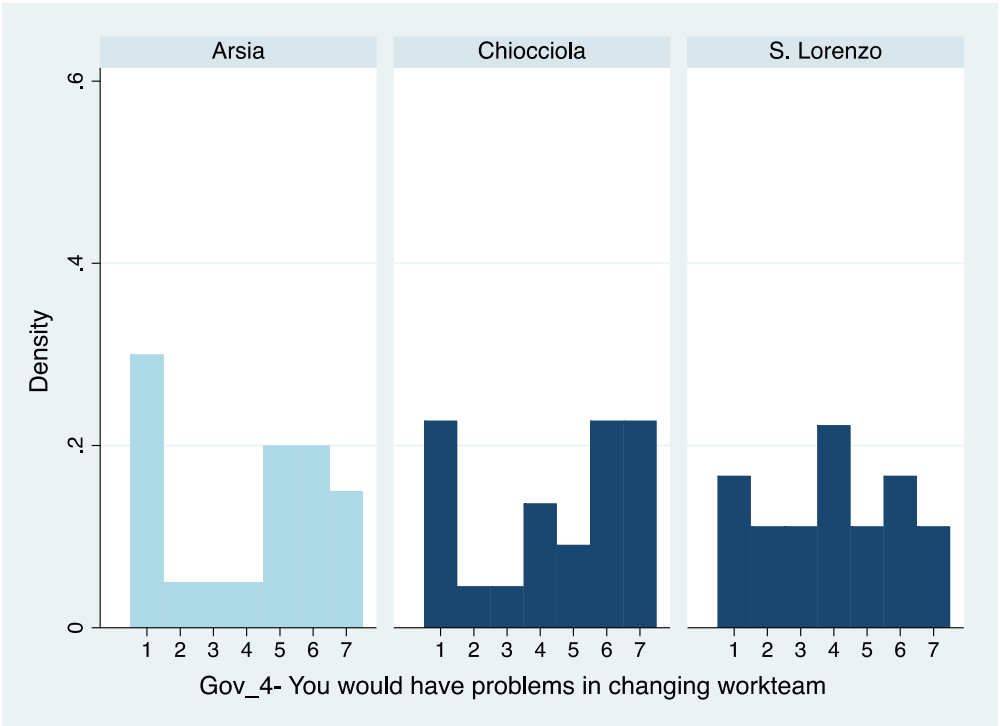


Figure 53 – Evaluation of governance in A. (gov_4)



Caregivers clearly admit that most of coordination problems with colleagues are due to particularly difficult situations with some users (coord_3) and bad interpersonal relationships with some colleagues (coord_4). As Table 55 below shows, means of coord_3 and coord_4 are very

high (respectively 2.06 and 2) with CV quite low (0.37 and 0.29) compared to the other two identified sources of coordination problems (coord_1) and (coord_2). The analysis of distributions (see Figure 54 and Figure 55) provides additional information on coord_3 and coord_4 thanks to the comparison with the case of C. and S.L. Unlike respondents in those organizations, caregivers' evaluations are concentrated on level 2 hinting that these sources of coordination problems (relationships with users and colleagues) are so serious in A. that caregivers commonly recognize them. F-test on the mean of coord_4 (concerning bad relationships with colleagues) shows that in case of A. the means is statistically different from C. and S.L. (which are not statistically different from each other) with a p-value 0.0665. This information indirectly reveals that low coordination capabilities have been developed.

Table 56 – Evaluation of sources of coordination problems with colleagues

LEGEND

Coord_1: They emerge at certain times of the day
Coord_2: Lack of a clear leadership
Coord_3: Particularly difficult situations with some users
Coord_4: Bad interpersonal relationships with some colleagues

		Coord_1	Coord_2	Coord_3	Coord_4
	Obs	**18**	**17**	**16**	**18**
Arsia	**Mean**	**1.83**	**1.18**	**2.06**	**2**
	CV	**0.5**	**0.75**	**0.37**	**0.29**
	Obs	21	22	22	22
Chiocciola	Mean	2.0	1.3	1.64	1.55
	CV	0.4	0.92	0.66	0.68
	Obs	18	18	19	19
S. Lorenzo	Mean	1.78	0.5	1.79	1.4
	CV	0.56	1.24	0.63	0.75

Source: Author's calc. based on survey's data

Figure 54 – Evaluation of coordination problems (coord_3)

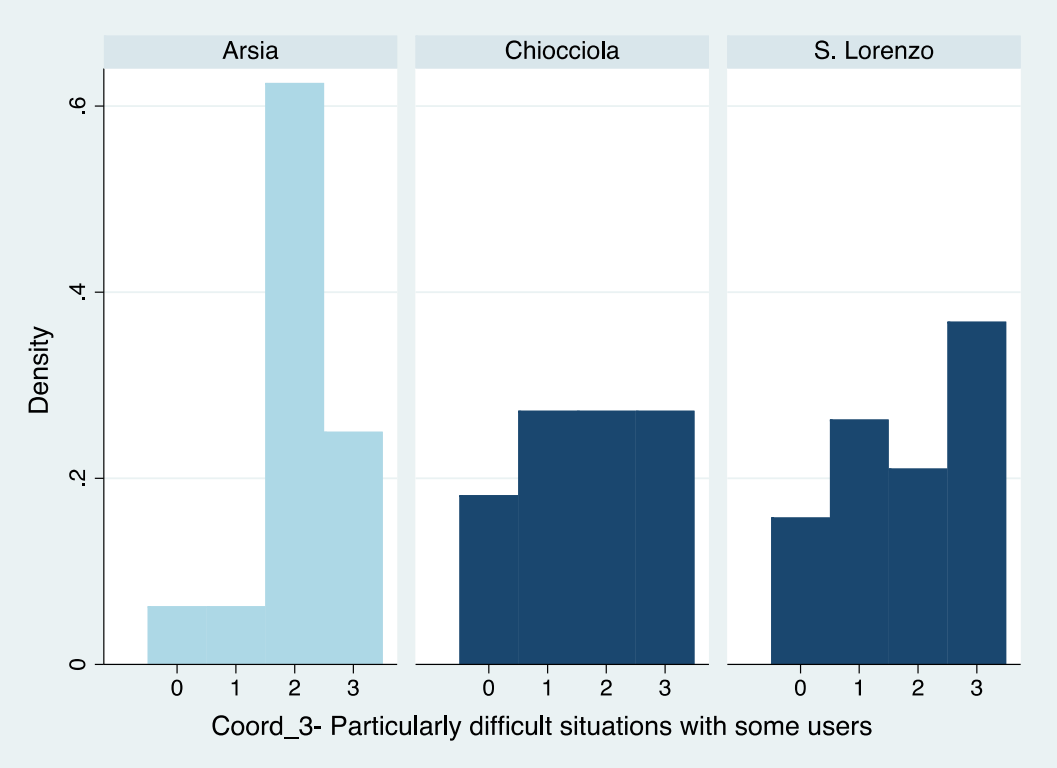
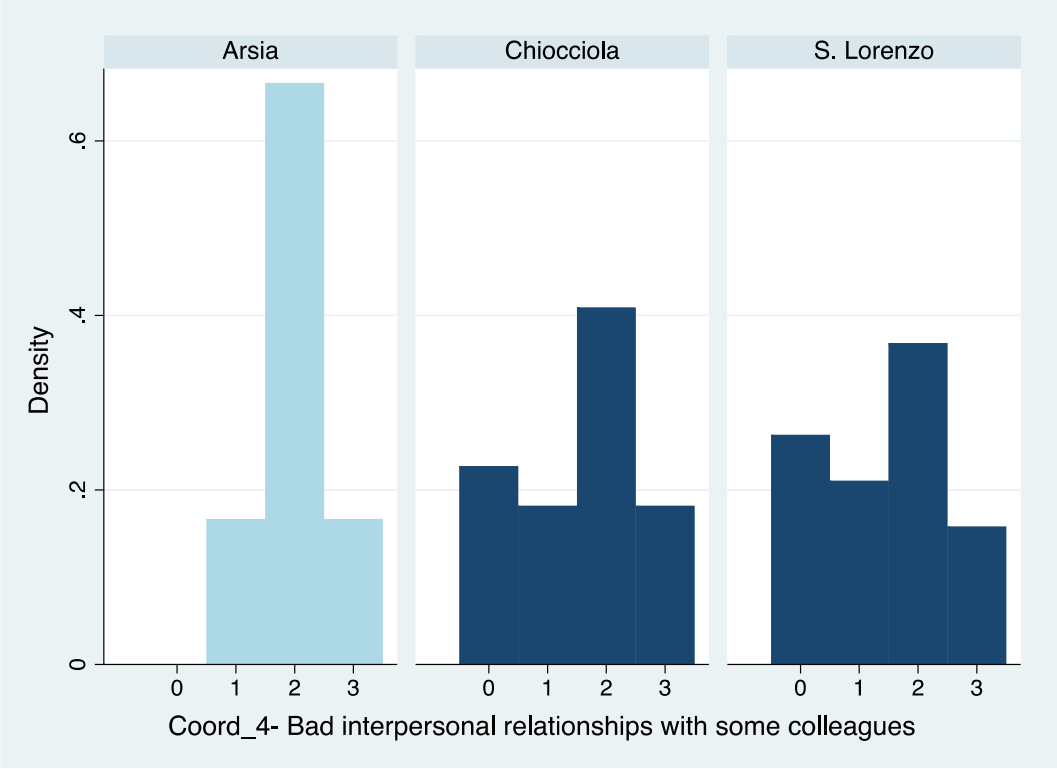


Figure 55 – Evaluation of coordination problems (coord_4)



3.4.5.5.2. Authoritarian Management

On average, as Table 56 shows, managers receive lower evaluation than in case of C. and S. L., showing the existence of problems in management-workers relationships under different perspectives. Half of population feels to be treated fairly, while the other half affirms to be treated unfairly (see Table 57). Mean is statistically different and lower than in C. and S.L. with a p-value equal to 0.0375. Interesting is that – by looking at distribution of (man_2) in Figure 56 –no one has chosen maximum level about the ability of management to incentivize team spirit, but most have chosen level 2, showing hence that this element is only partially recognized. According to table 57, a number of respondents (56%) agree with the fact that the manager relies on his own authority in case of discussions (man_3) and mean value (1.45) is not statistically different from the one of C. (1.96) and S.L. (1.76). Finally, 47% of workers do not feel involved in decisions that impact on their lives against 35% in C. and 29% in S.L. (man_4); and 53% do not think that the coordinator lends weight to their personal problems against 9% in C. and 5% in S.L (man_5). In conclusion, according to respondents, the manager in Arsia is authoritarian and in many cases perceived as unfair and not able to involve adequately workers.

Table 57 – Evaluation of management

Legend:
Man_1 - Manager treats workers fairly and equally
Man_2 - Manager is able to incentivize team spirit
Man_3 - When at odds with you, manager closes debate relying on his/her own authority
Man_4 - Manager involves you in decisions that impact on your life
Man_5 - Manager lends weight to your personal problems and supports you in difficult times

		Man_1	Man_2	Man_3	Man_4	Man_5
	Obs.	20	19	18	19	19
Arsia	Mean	1.35	1.16	1.45	1.53	1.32
	CV	0.74	0.72	0.75	0.97	0.75
	Obs	23	23	23	23	23
Chiocciola	Mean	1.78	1.91	1.96	1.96	2.48
	CV	0.63	0.59	0.54	0.47	0.36
	Obs	20	18	17	17	19
S. Lorenzo	Mean	2.19	1.73	1.76	1.72	2.55
	CV	0.5	0.6	0.6	0.6	0.4

Source: Author's calc. based on survey's data

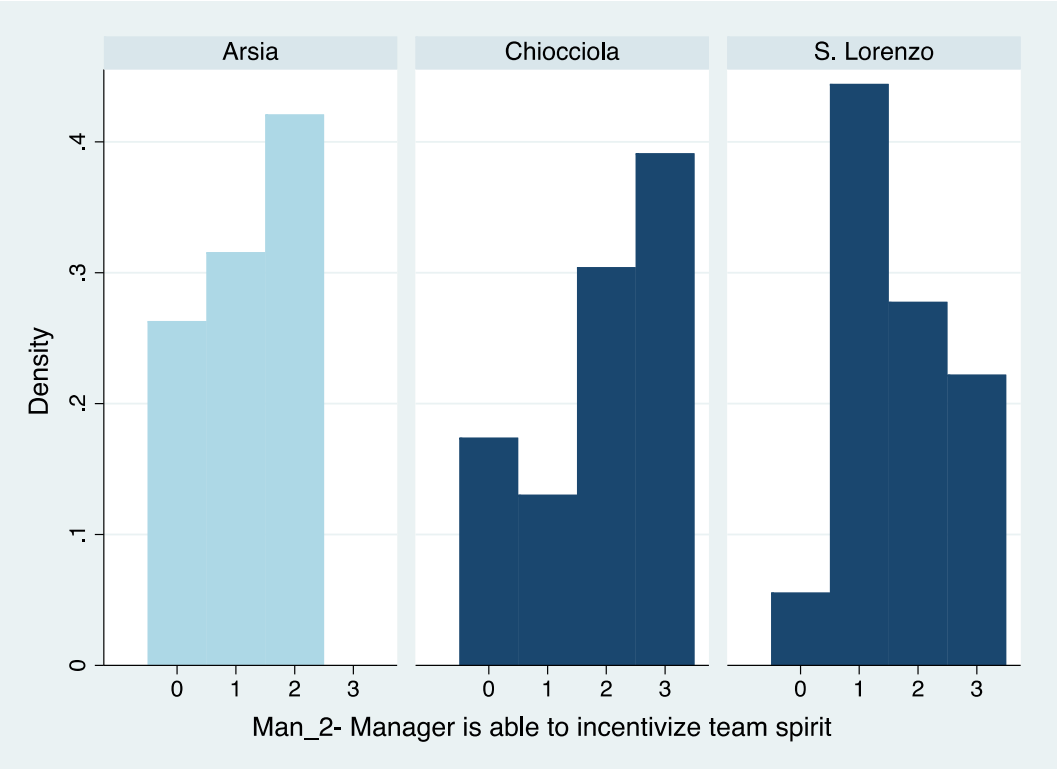
Table 58 – Evaluation of management

	Man_1			Man_2			Man_3		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
0	5	25.00	25.00	5	26.32	26.32	5	27.78	27.78
1	5	25.00	50.00	6	31.58	57.89	3	16.67	44.44
2	8	40.00	90.00	8	42.11	100.00	7	38.89	83.33
3	2	10.00	100.00	0	0	100.00	3	16.67	100.00
Tot.	20	100.00		19	100.00		18	100.00	

	Man_4			Man_5		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.
0	3	15.79	15.79	5	26.32	26.32
1	6	31.58	47.37	5	26.32	52.63
2	7	36.84	84.21	7	36.84	89.47
3	3	15.79	100.00	2	10.53	100.00
Tot.	19	100.00		19	100.00	

Source: Author's calc. based on survey's data

Figure 56 - Evaluation of management (man_2)



3.4.5.5.3. Mass-customized Service Design

Concerning training, on average, caregivers state to have received a sufficient, but not satisfying level of education. Even in case of form_1 and form_2, concerning orientation and training required by law, 21% (4 individuals) does not much agree with the fact of having received it, while one person affirms not to have received it at all. Indeed, mean of form_2 is statistically different (lower) from mean of C. and S.L with a p-value 0.0476. In Figure 57, 58, 59, 60 distributions show that modes are always on level 2 (including form_1 which, however, displays a bimodal distribution).

Table 59 – Evaluation of training

Legend:
Form_1: You have initially received an adequate training and orientation
Form_2: You have received training required by law
Form_3: You have received additional training to improve your competences in relationships with colleagues
Form_4: You have received additional training to improve your competences in relationships with hosts and their families

		Form_1	Form_2	Form_3	Form_4
	Obs.	19	19	18	19
Arsia	Mean	2	2	1.89	2
	CV	0.5	0.44	0.57	0.56
	Obs.	22	23	22	23
Chiocciola	Mean	2.18	2.52	1.86	1.91
	CV	0.31	0.13	0.63	0.52
	Obs.	20	20	20	20
S. Lorenzo	Mean	2.2	2.6	1.8	1.8
	CV	0.4	0.23	0.48	0.24

Source: Author's calc. based on survey's data

Figure 57 – Evaluation of training (form_1)

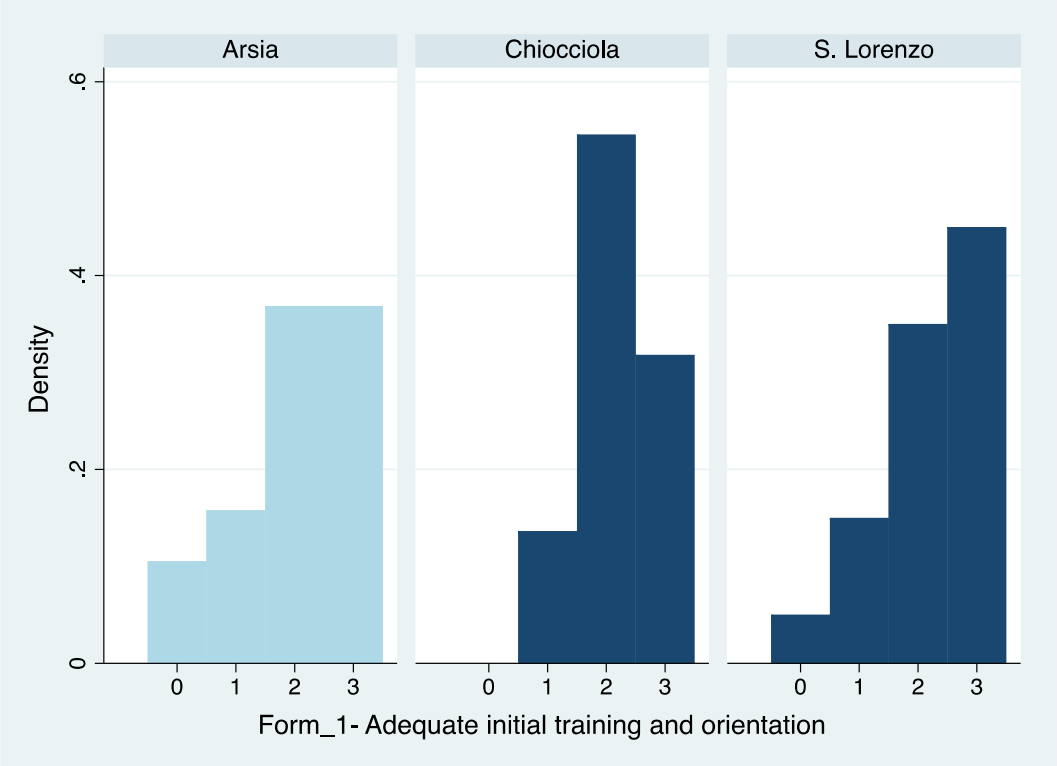


Figure 58 – Evaluation of training (form_2)

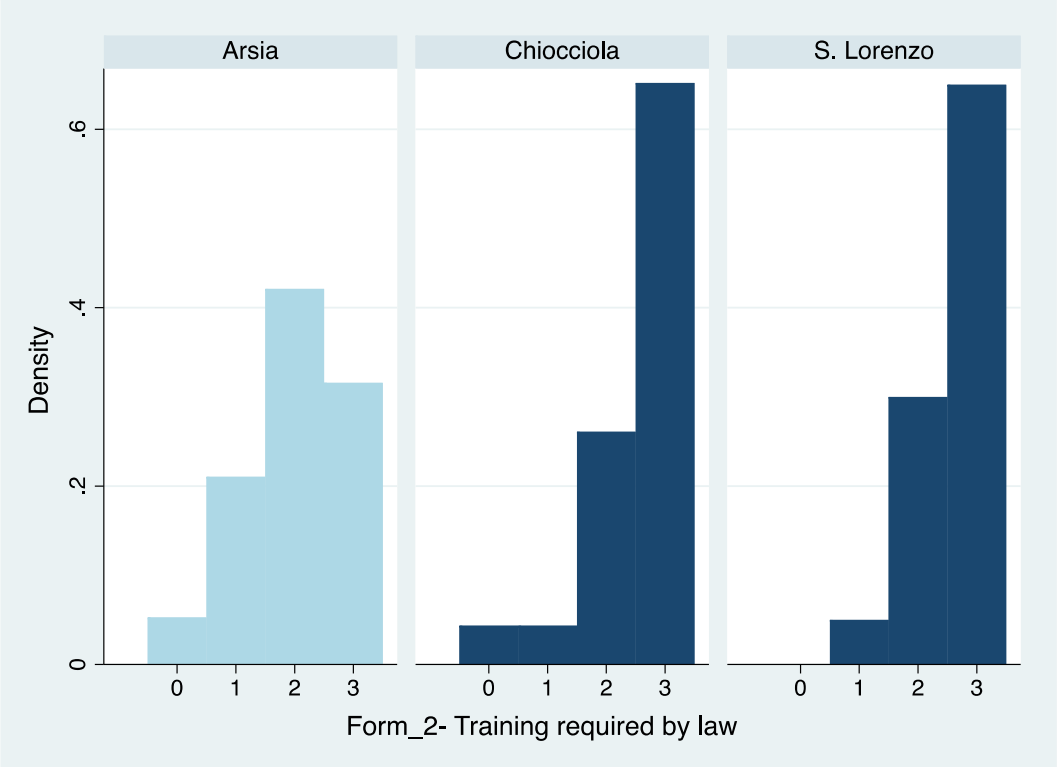


Figure 59 – Evaluation of training (form_3)

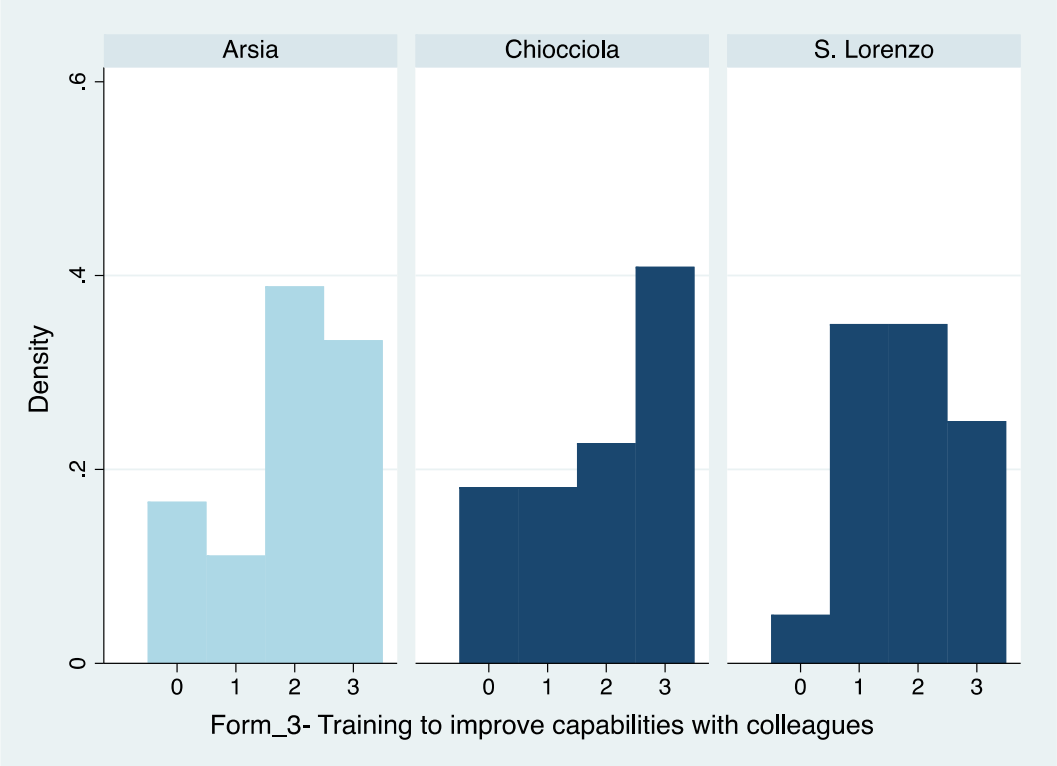
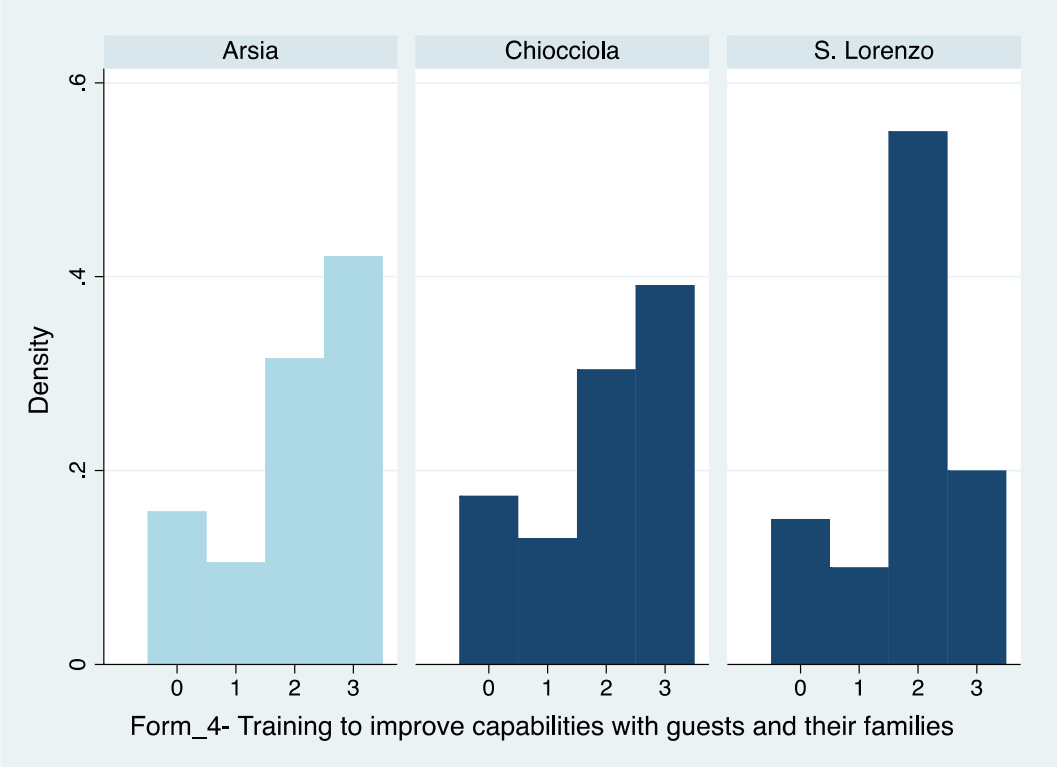


Figure 60 – Evaluation of training (form_4)



Concerning accreditation, as Table 59 shows, 82% of respondents have worked more than 6 years and among them 67% declares to know the procedure. Similarly, to C. and S.L., they have not

developed a negative evaluation of the accreditation procedure, considering the implementation of the formal requirement a structural and unchangeable part of their working activity. As Figure 61 reveals, most of respondents think that –thanks to accreditation – they relate better with users and their families (accr_5). This may be due to the fact that the accreditation has clarified caregivers' knowledge about their own tasks and function in the provision of LTC services, as in case of C. (see Figure 62). However, more than in the other organizations, they recognize that time for personal relationships has decreased (see Figure 63). Mean of accr_7 in A. is statistically different from the one of C. and S.L. within a 90% confidence level. This fact may be due to the organization's greater attention for the fulfillment of procedures due to the implementation of operation management principles.

Table 60 – Number of respondents knowing accreditation procedures

Tot. of respondents	22
Having worked ≥ 6 years	18 (82%)
Having worked ≥ 6 years and knowing the procedure	12 (67%)

Source: Author's calc. based on survey's data

Table 61 – Evaluation of accreditation

Legend:

Accr_5 – You better relate with patients and their families
Accr_6 – User is more at the center of the service than in the past
Accr_7 – Time for personal relationships with users has decreased

		Accr_5	Accr_6	Accr_7
	Obs.	12	12	12
Arsia	Mean	5.58	5.25	5.92
	CV	0.31	0.42	0.17
	Obs.	13	13	13
Chiocciola	Mean	5	4.61	4.38
	CV	0.49	0.52	0.47
	Obs.	11	11	11
S. Lorenzo	Mean	5.27	5.72	5.27
	CV	0.29	0.22	0.34

Source: Author's calc. based on survey's data

Figure 61 – Evaluation of accreditation (accr_5)

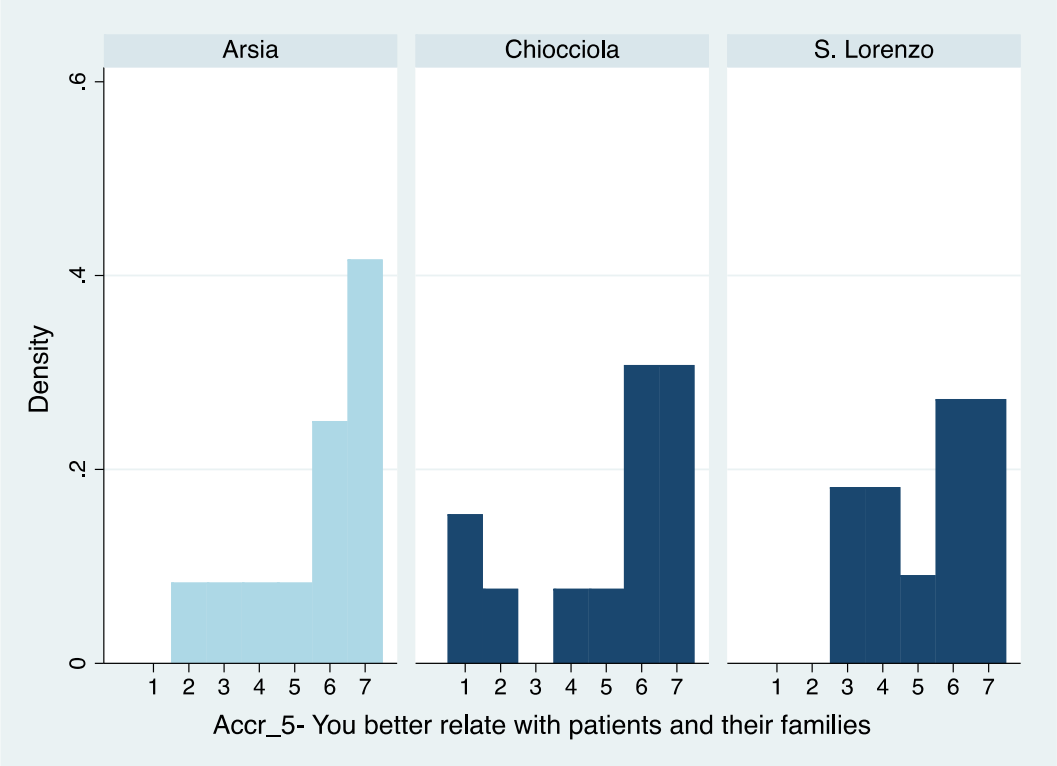


Figure 62 – Evaluation of accreditation (accr_2)

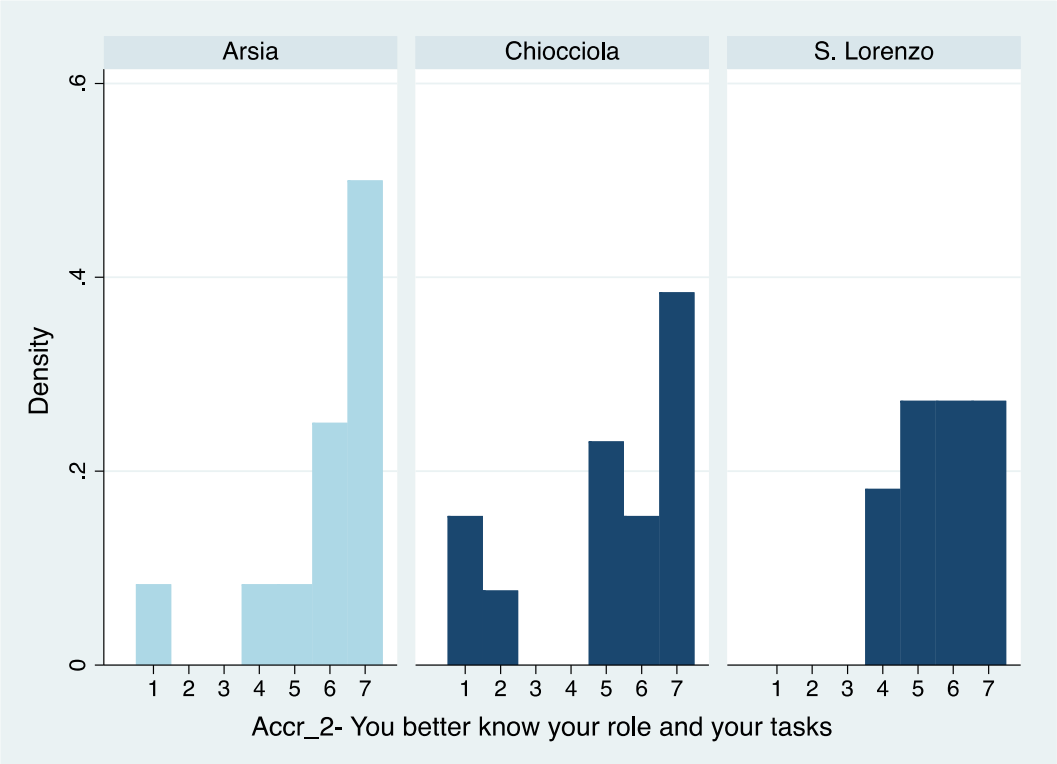
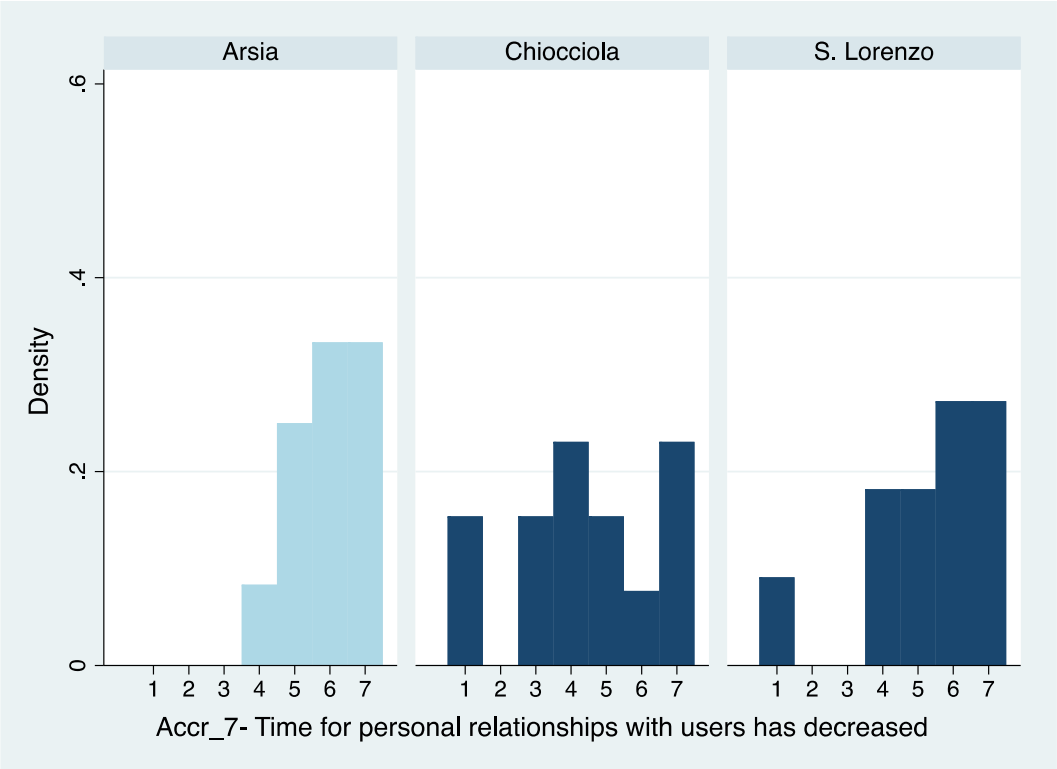


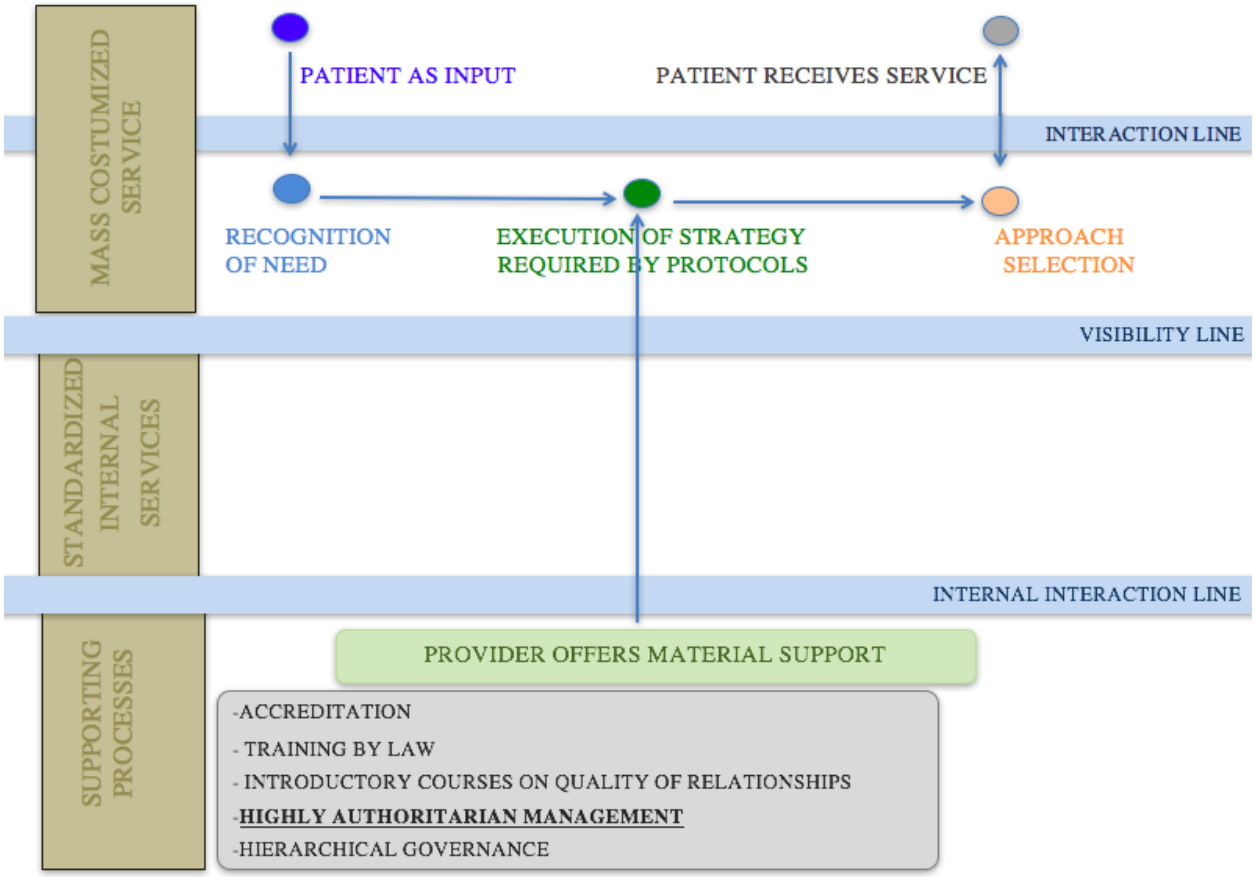
Figure 63 – Evaluation of accreditation (accr_7)



As the graph below shows (Figure 64), the type of service provided in A. is highly sequential and mass-customized. Because of the pervasive role of the procedures and strict timing to follow, the development of coordination capabilities is hindered. Caregivers are oriented to execute tasks required by protocols and expect only a material and standardized support by colleagues and management. If the approach in the provision of care is not standardized depends on the personal capabilities of caregivers, supported by introductory training courses received from the organization. For this reason, unlike C. and S.L., patients can hardly be considered as co-producer. Not only the interface with the user is highly standardized, but the adoption of the operation management standards makes it difficult for caregivers to obtain support in the management of problematic relationships with users. In these cases, caregivers' role is to inform, as required by protocols, the manager and to document any refusal of care by users in ad hoc records. This chart, resulting from the above analysis, is consistent with the presence of a very high level of UPC within a vicious cycle that progressively reduces the possibility to develop the capabilities required. The lack of attention by the organization for the creation of cooperation capabilities does not allow to defend the innate intrinsic motivations to work, but, instead, leads to their reduction. Caregivers

feel to be easily substituted by someone else as his/her own particular knowledge of users is not useful for improving service quality. Moreover, sick leave can be more easily accepted and increased, since it does not hinder the production process. Therefore, he/she gets sick to a greater extent than in the other organizations.

Figure 64 – Service blueprinting in Arsia



Source: Author's contribution

3.4.5.6. Fourth case study: the organization of low personalized service

Villa Niccolini - a IOE providing LTC services for 82 users - has been chosen as representative of the second category (namely having high level of standards and high level of coordination capabilities). The organization presents a high level of standards, because – along with having implemented the accreditation system - it adopts job rotation as organization of labor. Every day caregivers receive a different color corresponding to specific tasks to perform over their work-shift. In this way, on the one hand, caregivers – by continuously changing their function – are highly substitutable and their function is highly standardized; on the other hand, their work is more dynamic. According to the manager, caregivers learn to cooperate with everyone by changing always their team-mates. Moreover, the re-organization of labor is easier in case of unexpected events. Along with this characteristic of the organization of labor, the presence of a psychologist facilitates the development of coordination capabilities. Two morning a week the professional receives workers for providing a therapeutic support against the burn-out risk. When required by specific problematic situations, she organizes thematic training courses. The specificities of this organization suggest that the level of coordination capabilities among workers is improved by the organization, which is consistent with the low level of sick leave hours experienced.

3.4.5.6.1. Low Hierarchical Governance

In Villa Niccolini (V.N.), the governance – intended as the organization of labor – is considered by caregivers as less hierarchical than in the cooperatives C. and S.L, despite its investor owned nature. As Table 62 shows, only 33% of respondents (here representing 82,5% of total population) affirms that their function is limited to the fulfillment of standardized procedures (gov_5) against 55% in C. and 47% in S.L.. Indeed, the mean of gov_5 in V.N. is statistically different and lower than in C. and S.L. within a 90% confidence level. The perception of a low hierarchical character may be explained with the fact that caregivers know very well how to coordinate with their own colleagues, so that the intervention of the manager is not usually required. In fact, to the question gov_6 "*You know your colleagues' tasks"*, 64% of respondents chose level 7 versus 52% in C. and 50% in S.L.

Table 62 – Evaluation of governance

Legend:
Gov_5: Since a hierarchical structure among different roles exists, limit yourself to follow standardized procedures.
Gov_10: The role of Union is important to guarantee fair and equal relationships
Gov_11: Workers, directly participating, reach better results than Union

		Gov_5	Gov_10	Gov_11
	Obs.	**33**	**32**	**32**
Villa Niccolini	**Mean**	**3.91**	**4.56**	**4.5**
	CV	**0.61**	**0.50**	**0.48**
	Obs.	22	22	22
Chiocciola	Mean	5.31	4.40	4.32
	CV	0.36	0,5	0.51
	Obs.	17	17	16
S. Lorenzo	Mean	4.65	3.59	3.81
	CV	0.42	0.60	0.52

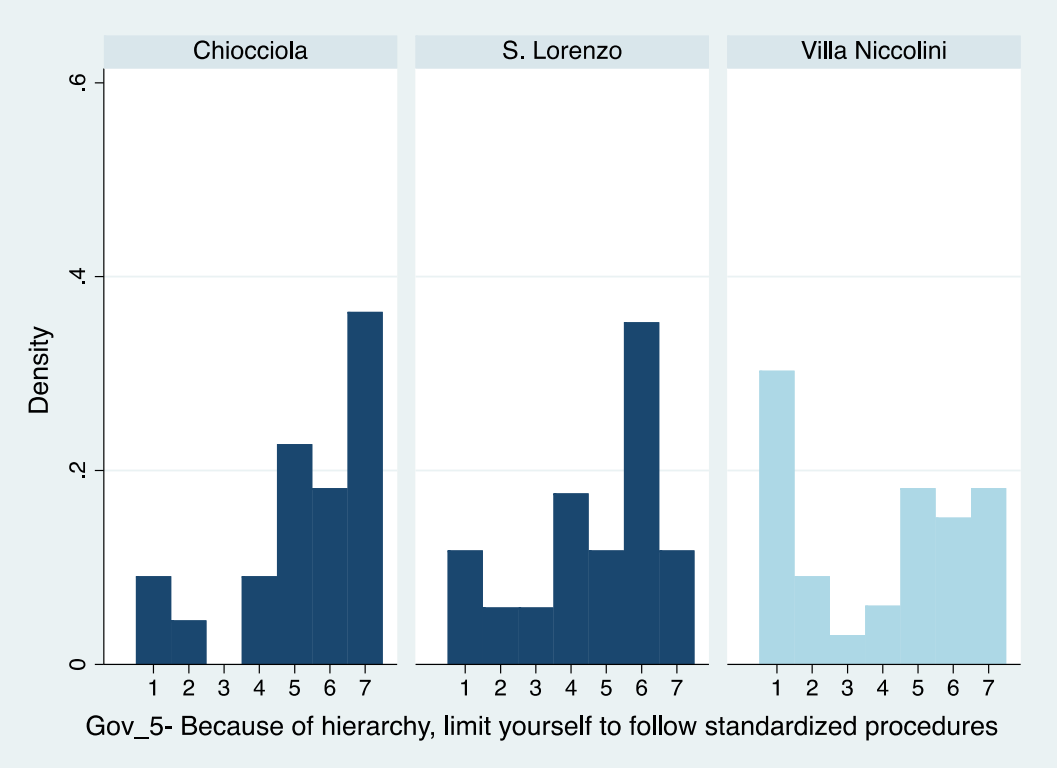
Source: Author's calc. based on survey's data

Table 63 – Evaluation of governance

	Gov_5			**Gov_10**			**Gov_11**		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
1	10	30.30	30.30	6	18.75	18.75	5	15.62	15.62
2	3	9.09	39.39	2	6.25	25.00	3	9.09	25.00
3	1	3.03	42.42	2	6.25	31.25	2	6.25	31.25
4	2	6.06	48.48	4	12.50	43.75	4	12.50	43.75
5	6	18.18	66.67	3	9.38	53.12	5	15.62	59.38
6	5	15.15	81.82	6	18.75	71.88	5	15.62	75.00
7	6	18.18	100.00	9	28.12	100.00	8	25.00	100.00
Tot.	33	100.00		32	100.00		32	100.00	

Source: Author's calc. based on survey's data

Figure 65 – Evaluation of governance (gov_5)



Looking at Table 62, in V.N., 47% considers Union's activity as highly important (gov_10) – not much differently from C. (45% of the sample) - but their perspective on the value of this instrument does not exclude the possibility (especially for the 41% of respondents choosing level 6-7) to rely on the direct participation of workers to face organizational problems (gov_11). Differently from C. and S.L. where a common vision is not identifiable, here caregivers quite agree on the value of both democratic instruments, as Figure 66 and Figure 67 show.

Figure 66 – Evaluation of governance (gov_10)

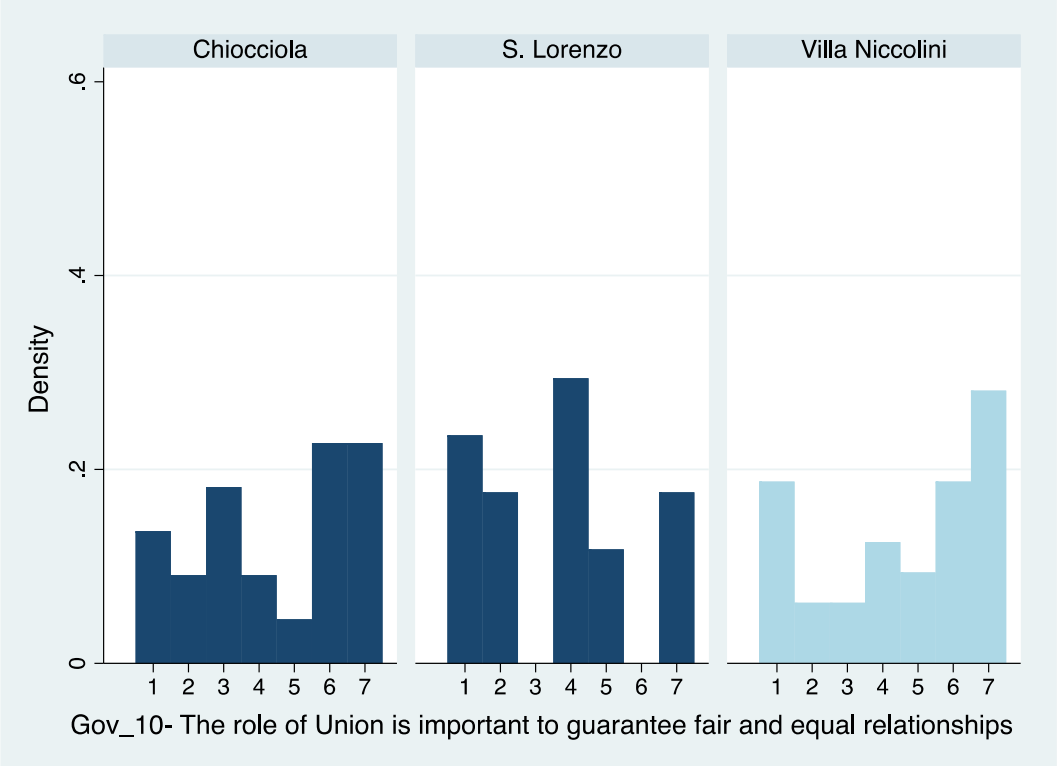
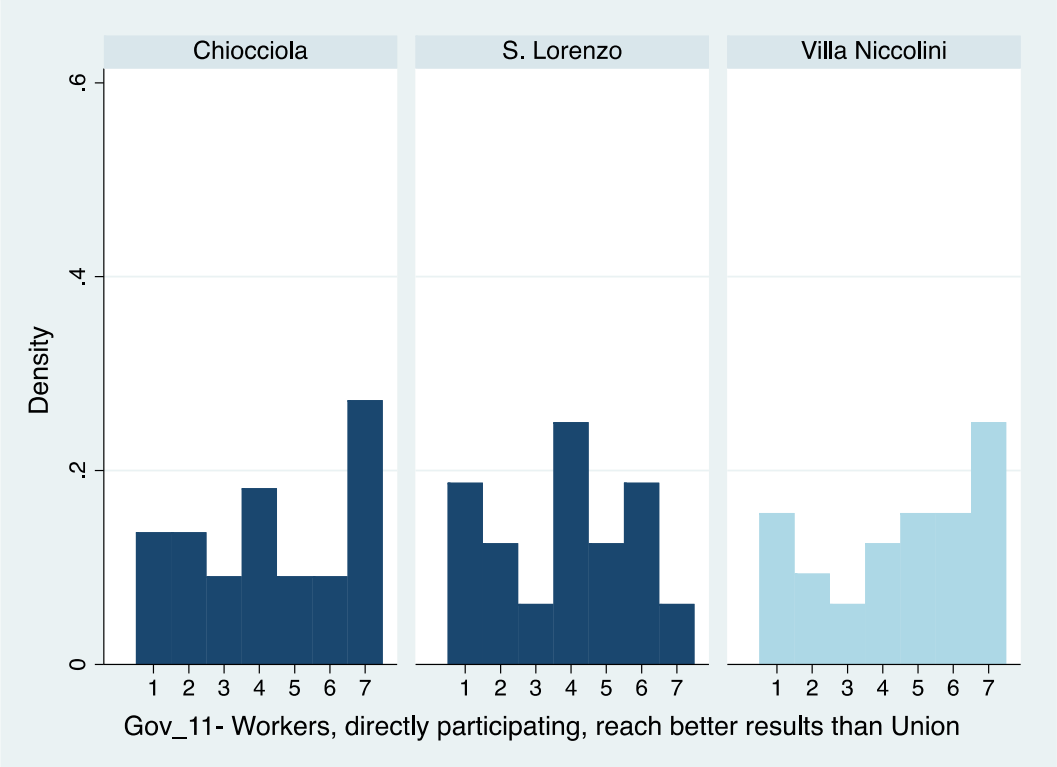


Figure 67 – Evaluation of governance (gov_11)



Distribution of gov_4 (Figure 68) shows important information about the type of coordination capabilities so far developed in V.N.. Most of respondents (62,5%) clearly affirms that they would

not have problems to change work-team. These data can be explained by the fact that the working plan is organized in a rotating way. Every day caregivers change not only tasks but also their own team-mates, so that over time they have developed adequate capabilities to coordinate with their colleagues, also thanks to the psychological support of a professional. This type of coordination capabilities does not require a deep knowledge of colleagues' ability, knowledge and mood, because – as they affirm - they would not have problems in changing team-mates. In this sense, such capabilities are very different from those developed in C., S.L. and A. on the one hand and in S.M. on the other hand. In C., S.L. and in A. coordination capabilities have emerged not thanks to an organization's investment, but spontaneously mainly in case of friendships and thanks to a stock of caregivers' personal knowledge about how to relate with others. Conversely in case of S.M. and V.N. coordination capabilities seem to emerge thanks to the sharing of coordination rules. In particular, in the case of V.N. – where caregivers' tasks are strictly defined – coordination rules are basically language strategies (for instance by adopting the words and tone of voice for a question rather than for a command). These are fundamental against the risk of burn-out and, indirectly, they support good personal relationships with users. Instead, in case of S.M. shared rules concern not only the way of interaction (the approach) but also the content of tasks (workers have to decide which tasks to perform in coordination with colleagues). Indeed, capabilities on the approach are instrumental to the full participation of workers to the governance and, through that, to a full personalization of services (for instance, the adoption of a despotic approach by one may prevent the active participation of the others). In this case, colleagues need to know each other to coordinate in the best possible way. To sum up, we could affirm that in V.N., coordination capabilities have a reduced content compared to those in S.M. as they are focused only on the approach.

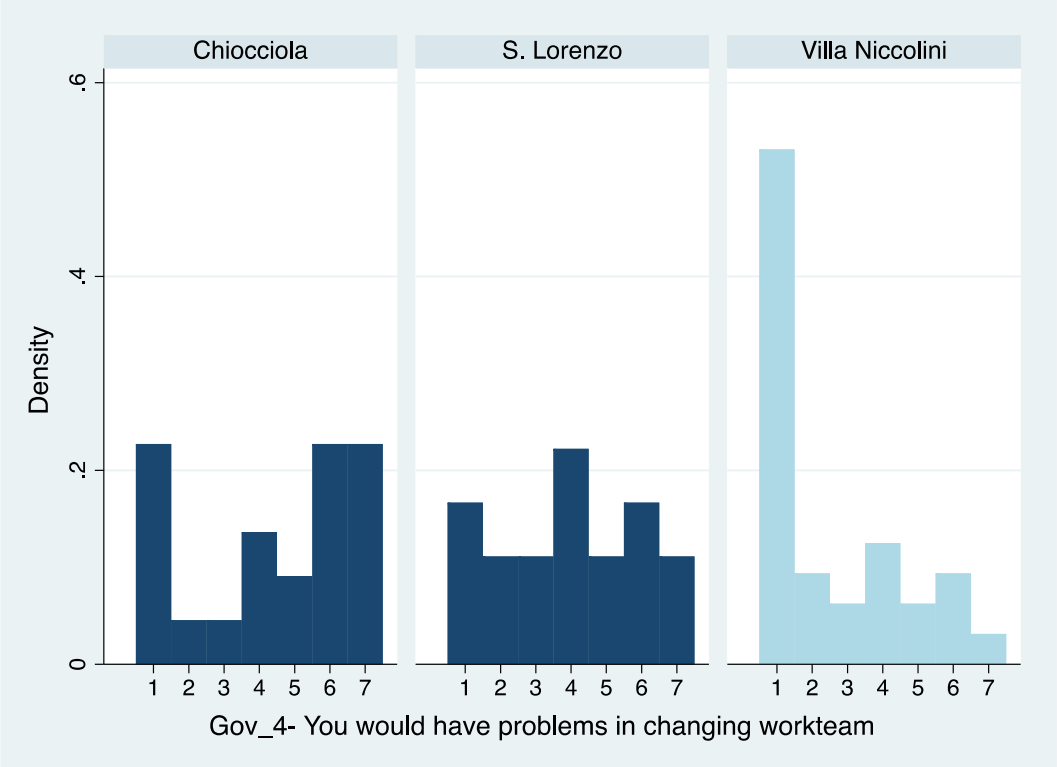
Table 64 – Evaluation of governance

Legend:
Gov_3: You would better work in another workteam
Gov_4: You would have problems in changing your workteam

		Gov_3	Gov_4
	Obs.	33	32
Villa Niccolini	Mean	3.45	2.5
	CV	0.57	0.78
	Obs.	22	22
Chiocciola	Mean	4.1	4.41
	CV	0.54	0.53
	Obs.	18	18
S. Lorenzo	Mean	3.06	3.8
	CV	0.6	0.51

Source: Author's calc. based on survey's data

Figure 68 – Evaluation of governance (gov_4)



3.4.5.6.2. Authoritarian Management

Characteristics attributed to the management in V.N. are not much different from those identified in C. and S.L. As Table 65 displays, most of respondents (67%) feels to be treated fairly and equally by the management (man_1), while 55% attributes the coordinator incentivizing capabilities (man_2). Caregivers recognize that she pays attention to their personal problems (mean value of man_5 is 2.3) and involve them in decisions that impact on their lives (mean value of man_4 is 1.82). However, she is recognized also with an authoritarian style by 61% of respondents (man_3), as Table 65 and Figure 69 show.

Table 65 – Evaluation of management

Legend:
Man_1 - Manager treats workers fairly and equally
Man_2 - Manager is able to incentivize team spirit
Man_3 - When at odds with you, manager closes debate relying on his/her own authority
Man_4 - Manager involves you in decisions that impact on your life
Man_5 - Manager lends weight to your personal problems and supports you in difficult times

		Man_1	Man_2	Man_3	Man_4	Man_5
	Obs.	**33**	**33**	**33**	**33**	**33**
Villa Niccolini	**Mean**	**1.76**	**1.64**	**1.73**	**1.82**	**2.3**
	CV	**0.57**	**0.62**	**0.63**	**0.55**	**0.44**
	Obs.	**23**	**23**	**23**	**23**	**23**
Chiocciola	Mean	1.78	1.91	1.96	1.96	2.48
	CV	0.63	0.59	0.54	0.47	0.36
	Obs.	20	18	17	17	19
S. Lorenzo	Mean	2.19	1.73	1.76	1.72	2.55
	CV	0.5	0.6	0.6	0.6	0.4

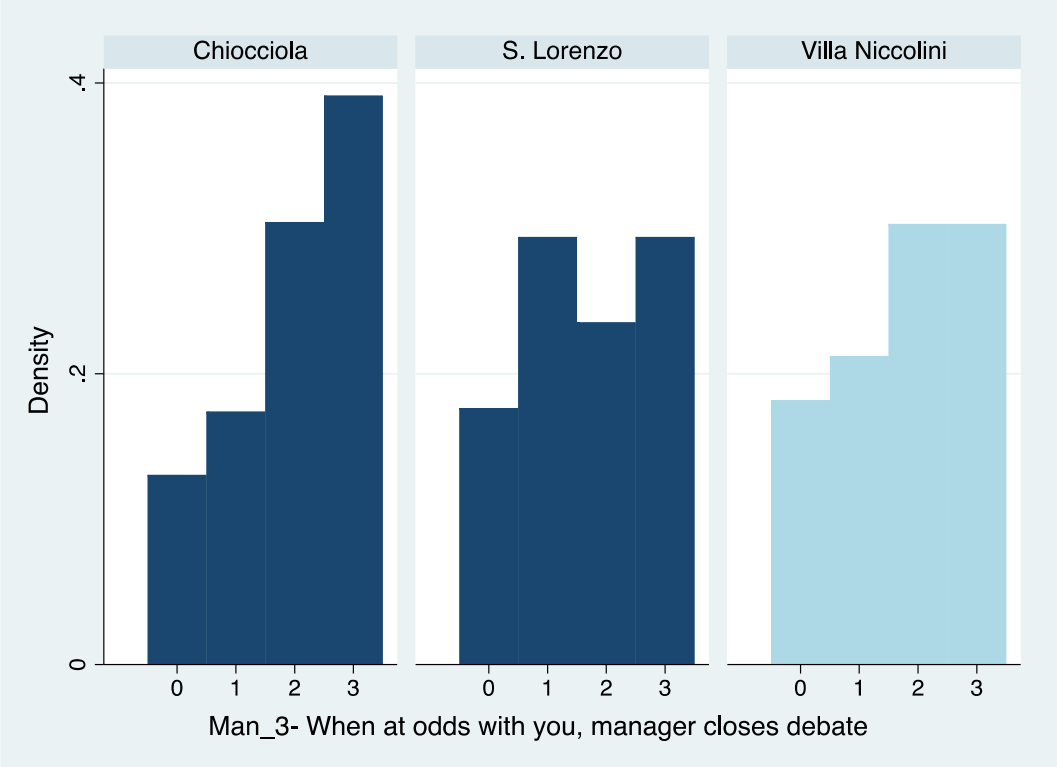
Source: Author's calc. based on survey's data

Table 66 – Evaluation of management

	Man_1			**Man_2**			**Man_3**		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
0	5	15.15	15.15	5	15.15	15.15	6	18.18	18.18
1	6	18.18	33.33	10	30.30	45.45	7	21.21	39.39
2	14	42.42	75.76	10	30.30	75.76	10	30.30	69.70
3	8	24.24	100.00	8	24.24	100.00	10	30.30	100.00
Tot.	33	100.00		33	100.00		33	100.00	

Source: Author's calc. based on survey's data

Figure 69 – Evaluation of management (man_3)



3.4.5.6.3. Personalized Service Design

Respondents in V.N. display similar values to C. and S.L. also concerning the evaluation of training activity, in particular about orientation (form_1) and courses required by law (form_2). To be noted in Figure 70 is that an important share of the sample (45%) has chosen level 0 and 1, namely feels to not have received sufficient education on how to relate with colleagues (form_3). Conversely, in case of education to improve competences with users, a low share (only 21%) believes to not have obtained adequate support (see Figure 71).

Table 67 – Evaluation of training

Legend:
Form_1: You have initially received an adequate training and orientation
Form_2: You have received training required by law
Form_3: You have received additional training to improve your competences in relationships with colleagues
Form_4: You have received additional training to improve your competences in relationships with hosts and their families

		Form_1	Form_2	Form_3	Form_4
	Obs.	**33**	**33**	**33**	**33**
Villa Niccolini	**Mean**	**2.34**	**2.61**	**1.7**	**2**
	CV	**0.36**	**0.25**	**0.56**	**0.45**
	Obs.	22	23	22	23
Chiocciola	Mean	2.18	2.52	1.86	1.91
	CV	0.31	0.13	0.63	0.52
	Obs.	20	20	20	20
S. Lorenzo	Mean	2.2	2.6	1.8	1.8
	CV	0.4	0.23	0.48	0.24

Source: Author's calc. based on survey's data

Figure 70 – Evaluation of training (form_3)

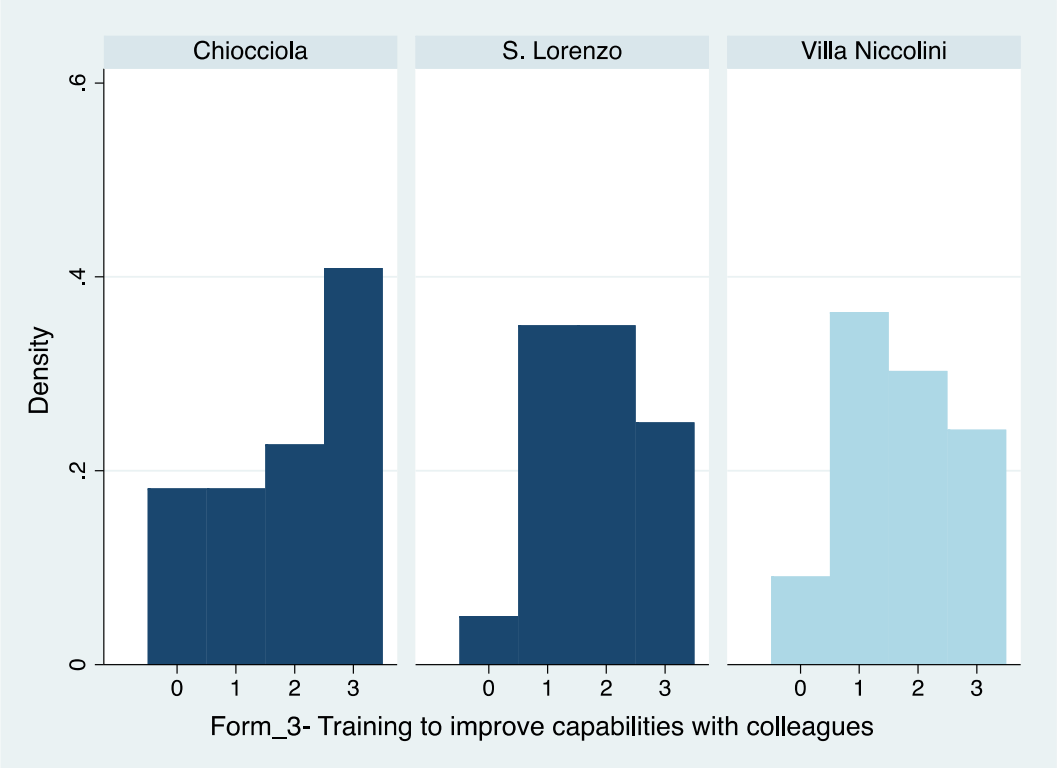
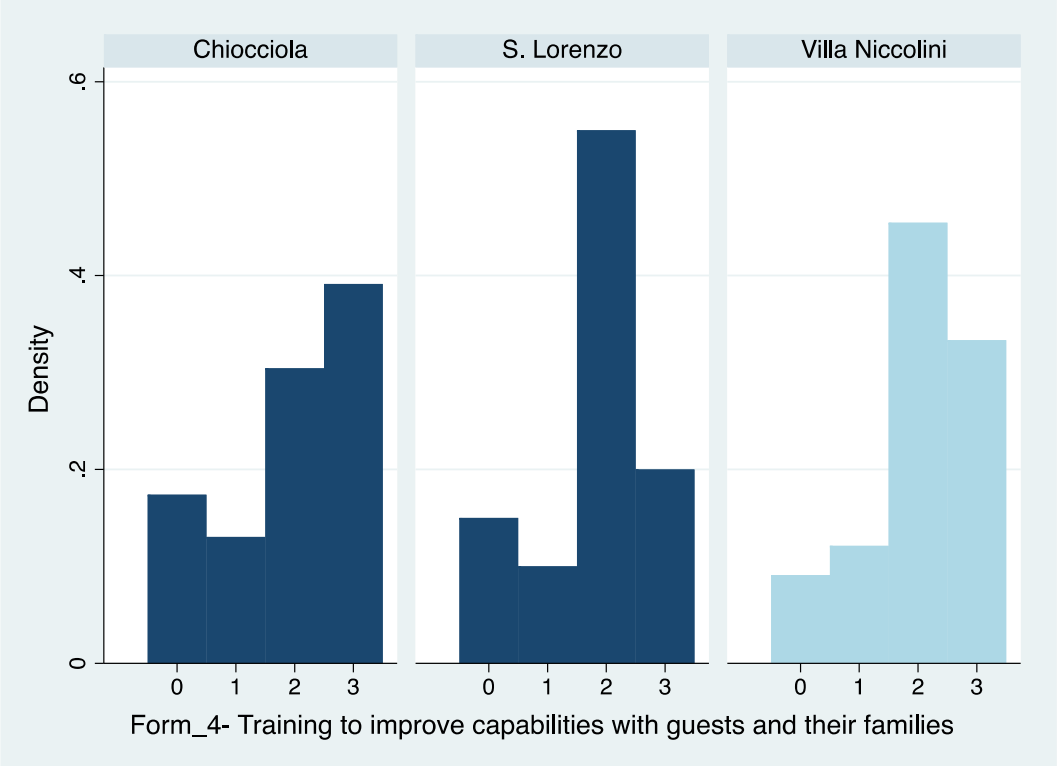


Figure 71 – Evaluation of training (form_4)



Concerning accreditation, the number of answers corresponds almost to the totality of the sample (see Table 67), showing hence that the majority of caregivers has been working in the organization for a long time and is aware of the existence of this procedure. Given the important role attributed to the fulfillment of formal tasks in this organization, positive values for accreditation are understandable. Despite the mean value of accr_5 – concerning the improved ability to relate with patients and their family – is lower in V.N. than in C. and S.L. (see Table 68), means are not statistically different. Accreditation is considered as a positive procedure that helps to better relate with patients and their families (45% has chosen level 6 and 7) and to put users at the center of the service more than in the past (55% has chosen level 6 and 7). However, attention to relationships – maybe due to the presence of coordination capabilities - has led most of workers (64%) to affirm that, because of accreditation, time for personal relationships with users has decreased.

Table 68 – Number of respondents knowing accreditation procedures

Tot. of respondents	33
Having worked ≥ 6 years	28 (85%)
Having worked ≥ 6 years and knowing the procedure	22(79%)

Source: Author's calc. based on survey's data

Table 69 – Evaluation of accreditation

Legend:

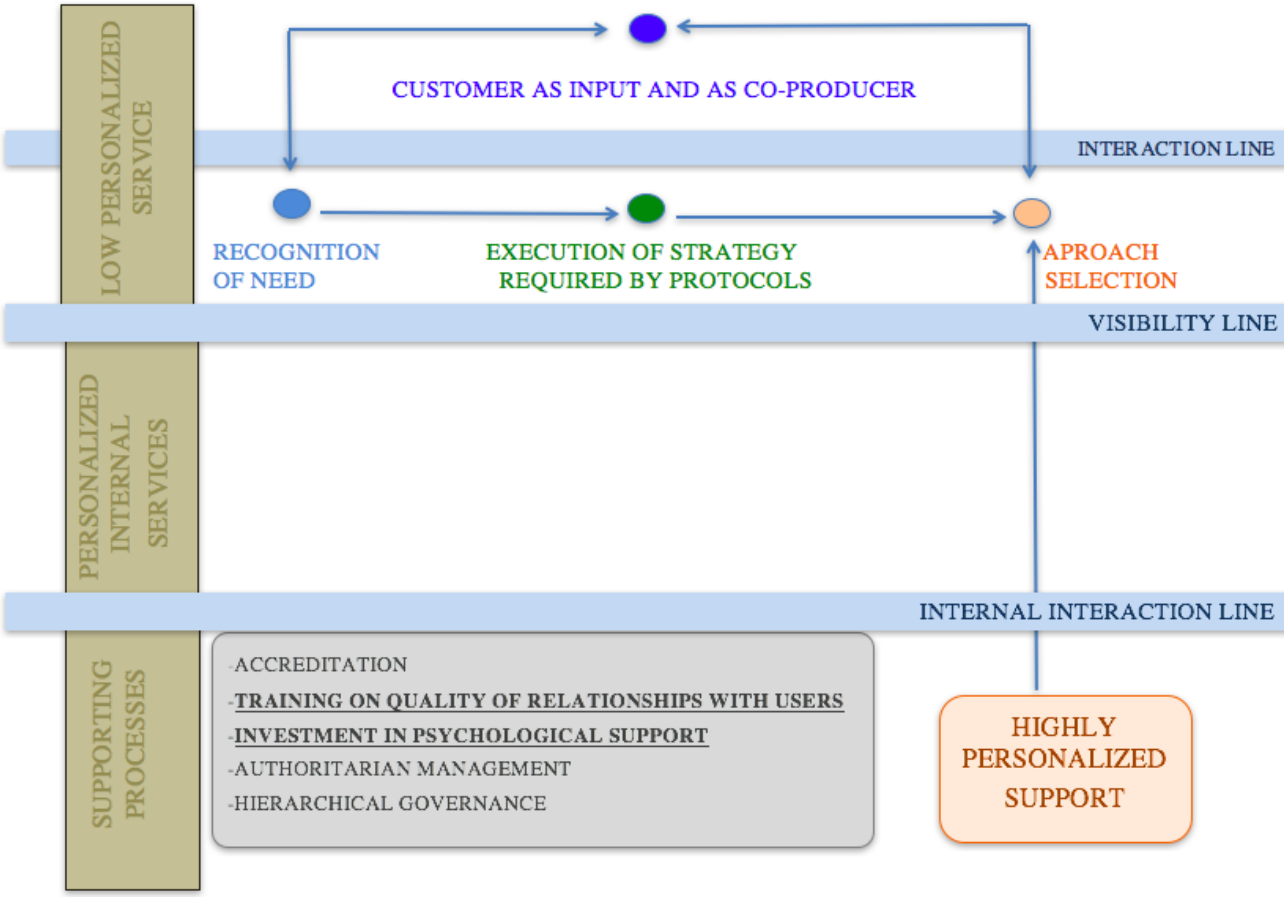
Accr_5 – You better relate with patients and their families
Accr_6 – User is more at the center of the service than in the past
Accr_7 – Time for personal relationships with users has decreased

		Accr_5	Accr_6	Accr_7
	Obs	**22**	**22**	**22**
Villa Niccolini	**Mean**	**4.41**	**5.23**	**5.14**
	CV	**0.54**	**0.32**	**0.45**
	Obs	13	13	13
Chiocciola	Mean	5	4.61	4.38
	CV	0.49	0.52	0.47
	Obs	11	11	11
S. Lorenzo	Mean	5.27	5.72	5.27
	CV	0.29	0.22	0.34

Source: Author's calc. based on survey's data

The chart below (Figure 72) shows the type of service offered in V.N. as emerging from the above analysis. Service is personalized concerning the approach to follow when providing support to the elderly. This type of coordination capability is important. In fact, not always the patient may accept hydration, bathing, having meal and so on. In these cases, caregivers are able to find the personalized approach to motivate patients, thanks also to the personalized support received by the psychologist, by management and, to a lesser extent, also by colleagues. However, caregivers are called to implement tasks required by protocols, they are not incentivized to propose new strategies to motivate users. For this reason, the overall service is only partly personalized. Finally, the evidence on this organization – representing the second category – supports the hypothesis about the presence of a virtuous cycle able to promote, at least to some extent, intrinsic motivation to work and, hence, a low level of sick leave hours.

Figure 72 – Service Blueprinting in Villa Niccolini



Source: Author's contribution

3.4.5.7. Satisfaction analysis

In this section, I investigate whether the organizational characteristics affect the level of satisfaction across the organizations representing the four categories. This can be considered as the first step of a two-steps-analysis about the role of the organizations on the level of caregivers' sick leave hours, in which the second step – studying the role of satisfaction on sick leave hours – cannot be taken in this study because of the lack of sick leave hours data for each respondent. The regression analysis at individual level (122 respondents) shows that, despite the self-selection problem, some important variables reflecting the organizational structure affect the satisfaction level of caregivers, thus, providing a meaningful justification of the interpretative model. After having described the regression model adopted and the involved variables, I will show the results of the analysis.

In order to estimate the impact of organizational characteristics on satisfaction level across the five organizations, I adopt the following reduced form of the regression model:

$$Y = \beta_0 + \beta_1 cycle + \beta_2 hierarchy + \beta_3 participation + \beta_4 authoritarian + \beta_5 supportive + \beta_6 training + \beta_7 qualitystandards + \varepsilon_i$$

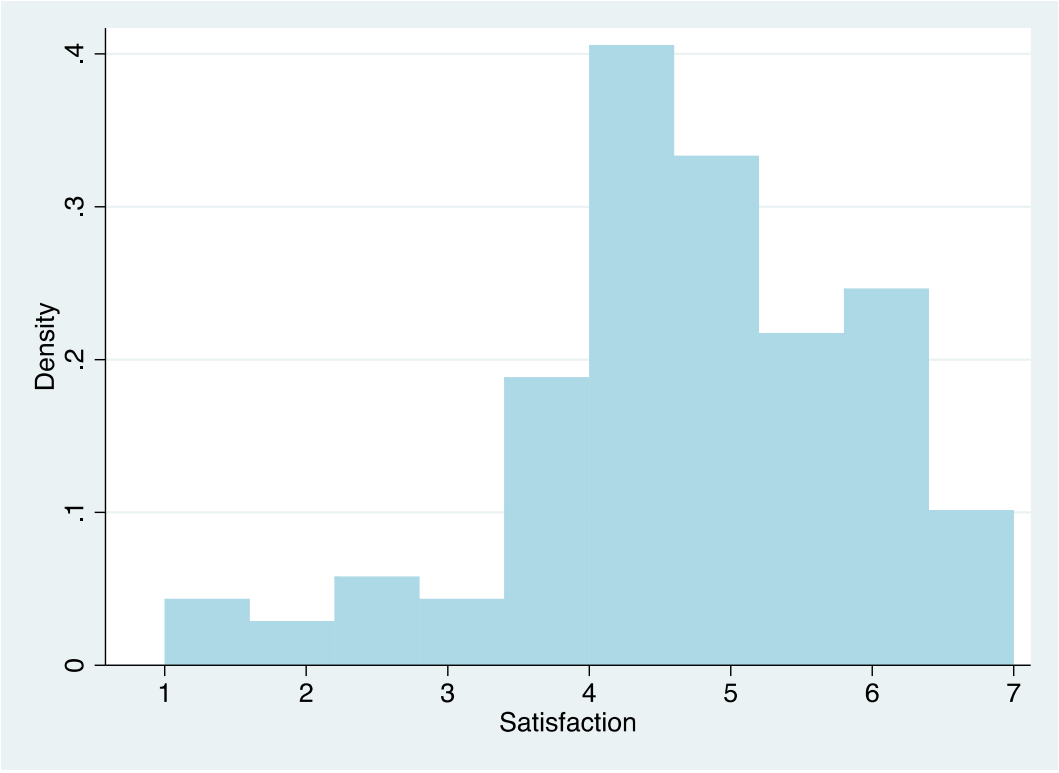
where the dependent variable (*Y)* is regressed on a set of independent variables which include:

- **Cycle** is a dummy variable considering the type of organization in which the individual works. Two are the macro-groups in which the organizations are included; one group involving the organizations of the first and second categories which should experience, according to the model, the virtuous cycle; and another group including the organizations of the third and fourth categories which are expected to experience the vicious cycle;
- **Organization** is a dummy variable alternatively used to the 'cycle' considering the five organizations (where the fifth is automatically implied in the regression).
- **Hierarchy** corresponding to the item *'Because of hierarchy, limit yourself to follow standardized procedures'* (gov_5) is a variable considering the hierarchical character of the governance;
- **Participative** corresponding to the item *'Workers, directly participating, reach better results than Union'* (gov_11) is a variable considering the participative character of the governance;
- **Authoritarian** corresponding to the item *'When at odds with you, the manager closes debate'* (man_3) displays the authoritarian character of the management;
- **Supportive** corresponding to the item *'Manager is able to incentivize team spirit'* (man_2) displays the supportive character of the management to the team;
- **Training** corresponding to the item '*You have received additional training to improve your competences in relationships with colleagues*' (Form_3) is a variable considering the role of training as supportive process in service design;
- **Qualitystandards** corresponding to the item *'Compiling forms takes up valuable time'* (gov_7) is a variable considering the role of quality standards as supportive process in service design.

Among controls, I include **age**, **worktime** and a **gender** dummy, which may provide rival explanations for the level of satisfaction. The variable 'worktime' includes values between 1 and 10, as the survey is focused on whether caregivers have been working for less than 'ten years and over'.

As dependent variable, I consider **satisfaction**, which is a variable obtained as sum of seven items[72] concerning satisfaction in the organization of labor and the internal relationships. Despite its categorical character, it has been used as dependent variable of a OLS regression model, as it involves more than 5 categories and its distribution - not showing picks on the tails - can be approximated to a normal one, as the figure below shows.

Figure 73 – Distribution of satisfaction variable



[72] The seven items correspond to the points n°3-5-8-9-13-14-15 of the question 13 of the survey in Appendix 1

Table 70 – Statistical description of the variables included in the regression model

	Mean	Coefficient of Variation	Median	Min	Max
Hierarchy	4.52	0.46	5	1	7
Participative	4.37	0.48	4	1	7
Authoritarian	1.53	0.74	2	0	3
Supportive	1.65	0.59	2	0	3
Training	1.96	0.5	2	0	3
Qualitystandards	4.45	0.51	5	1	7
Age	46.1	0.21	46	22	69
Worktime	8.25	0.32	10	1	10
Satisfaction	4.67	0.27	4.8	1	7

The table represents the extraction of the linear regression done with Stata[73]. It summarizes the influences the independent variables have on the dependent one, which is in line with our model.

Table 71 – Linear Regression

Linear regression

Number of obs. =88
F(8, 96) = 471.06
Prob > F = 0.000
R-squared = 0.976
Root MSE = .828

Satisfaction	Coeff.	Std. Err.	t	P>|t|	(95% Conf. Interval)	
categories						
0	3.30	.58	5.64	0.000	2.13	4.46
1	3.30	.59	5.52	0.000	2.11	4.49
Hierarchy	.04	.05	0.83	0.4	-.05	.12
Participative	.17	.05	3.27	0.00	.06	.26
Authoritarian	-.04	.09	-0.46	0.64	-.24	.15
Supportive	.43	.13	3.21	0.00	.16	.69
Training	.34	.11	3.15	0.01	.13	.56
Quality standards	-.01	.05	-0.16	0.87	-.1	.08
Age	.01	.01	0.67	0.51	-0.01	.02
Worktime	-.07	.04	-1.95	0.05	-.14	.00
Gender	-.21	.21	-1.00	0.32	-.64	.21

Source: Author's calculation based on survey's data

[73] The formula is '*reg satisfaction ibn.categories gov_5 gov_11 man_3 man_2 form_3 gov_7, noconst robust*'

Results show that among control variables, only worktime is significant and is negatively related to satisfaction. This is an important information, as it means that caregivers with a long experience are less satisfied and, hence, that they lose their motivational sources over time. This effect suggests that the working environment plays a fundamental role in the reduction of caregivers' satisfaction level as, indeed, it is confirmed by the following results. First, we can see that the dummy variable is highly significant at 99% level ($p<0.01$), which means that the type of organization matters in defining the level of caregivers' satisfaction about internal relationships. Moreover, Table 71 shows that among the organizations, Stella Montis is the company that is most able to support caregivers' satisfaction. How the organization intervenes on satisfaction is shown in the results about the following variables. The hierarchical character of governance and the authoritarian style of management are not significant. This may be partly explained by the fact that the high formalization of the type of service is common to all the organizations along with the responsibility of the service which is largely in the hand of the management, who in turn necessarily exerts his/her own authority. However, if we consider the participative character of the governance and the supportive style of the management, we can see that in case of the organizations Stella Montis and Villa Niccolini, greater effort has been exerted for the development of coordination capabilities, which are able to sustain caregivers' satisfaction. In fact, the two variables are both significant. Finally, as expected, not significant is the role of standards in service design, as the accreditation system was applied in all the organizations. However, the role of training to caregivers in order to improve coordination capabilities with colleagues is an important supporting process in Stella Montis and Villa Niccolini. Table 71 shows a different specification of the regression model, which adopts as dummy variable the organizations instead of their related cycles. The purpose is to investigate whether some organizations' characteristics are not explained by the first version of the model. Results do not reveal any additional information.

In conclusion, we can argue that the evidence collected about these organizations support the hypothesis about an important role of governance, management and service design on caregivers' satisfaction.

Table 72 – Linear Regression

Linear regression

Number of obs. =88
F(8, 96) = 411.94
Prob > F = 0.0000
R-squared = 0.9766
Root MSE = .83831

Satisfaction categories	Coeff.	Std. Err.	t	P>|t|	(95% Conf. Interval)	
Arsia	3.12	.59	5.25	0.000	1.93	4.31
Chiocciola	3.34	.60	5.54	0.000	2.14	4.55
S.Lorenzo	3.54	.65	5.45	0.000	2.24	4.83
Stella Montis	3.42	.61	5.59	0.000	2.20	4.64
Villa Niccolini	3.31	.61	5.44	0.000	2.10	4.53
Hierarchy	.03	.04	0.88	0.38	-.05	.12
Participative	.16	.05	3.19	0.00	.06	.27
Authoritarian	-.04	.10	-0.39	0.69	-.24	.16
Supportive	.42	.13	3.15	0.00	.15	.69
Training	.33	.12	2.67	0.00	.08	.59
Quality standards	-.00	.05	-0.11	0.91	-.10	.09
Age	.00	.01	0.7	0.48	-.01	.02
Worktime	-.08	.04	-2.13	0.03	-.15	-.01
Gender	-.20	.20	-1.02	0.31	-.60	.19

Source: Author's calculation based on survey's data

3.5. Conclusions

In this chapter, I have developed an interpretative model to analyze the mechanism through which the organizational structure (by varying the level of standards and the repartition of decision rights) affects external efficiency over time. The four case-studies provide a first support to the hypothesis about the existence of a vicious or virtuous cycle between each organization's structure and the related level of UPC_2, considered as index of external efficiency. In particular, the case-studies involving the organizations having invested in coordination capabilities (Stella Montis and Villa Niccolini), support the existence of a virtuous cycle, in which the level of intrinsic motivations is maintained high over time and sick leave hours are low. Conversely, the other case-studies including organizations highly focused on the fulfillment of quality standards display a high

level of absences and are consistent with the existence of a vicious cycle, in which the level of intrinsic motivation is not supported and sick leave hours are high. Moreover, the four case studies have allowed to understand that coordination capabilities can be developed in the IOE Villa Niccolini more than in the cooperative S. Lorenzo and Chiocciola, and that these capabilities can have a different content. Three are the coordination capabilities types identified:

1) Spontaneous one: In C., S.L. and in A. coordination capabilities have emerged not thanks to an organization's investment, but spontaneously mainly in case of friendships and thanks to a stock of caregivers' personal knowledge about how to relate with others;
2) Capabilities on the approach: in V.N. do not require a deep knowledge of team members as they are basically language strategies fundamental against the risk of burn-out but also able to sustain good personal relationships with users and colleagues.
3) Capabilities on the content and on the approach: in S.M. require a profound knowledge of team-mates as shared rules concern not only the way of interaction (the approach) but also the content of tasks (workers have to decide which tasks to perform in coordination with colleagues). Here, capabilities on the approach are instrumental to the full participation of workers to the governance and, through that, to a full personalization of services.

The study has also highlighted the crucial role of the management style on external efficiency. In case of hierarchical governance, it has been shown that a tolerant management can slow down the negative consequences of a vicious cycle. S. Lorenzo and Chiocciola, characterized by a management attentive to caregivers' personal problems, show a lower level of sick leave hours than in Arsia, which is characterized by authoritarian management. So, even if both types of organizations experience a vicious cycle, only Arsia seems to undergo a progressive worsening of its capabilities. Conversely, the bottom-up development of a participative governance needs to be nurtured by a supportive management. Despite in Villa Niccolini internal rules and training have supported the establishment of a virtuous cycle, its authoritarian management did not allow to adequately motivate caregivers to improve caregivers' coordination capabilities. Only Stella Montis, characterized by a supportive management, has been experiencing a progressive improvement of its capabilities and, thus, a very low level of sick leave hours.

In line with these results, the regression analysis has allowed to establish that a negative relationship exists between caregivers' satisfaction level and the organizational structure among the five emblematic organizations, providing an additional important support to the hypothesized

interpretative model. In conclusion, this study can be considered as a first attempt in support of a careful evaluation of the LTC companies' internal structure as this is direct responsible for external efficiency, an efficiency component so far neglected by organizational and management studies, but able to weight on real organizations' balance sheet.

CONCLUSIONS

This thesis has theorized that cooperative governance is the most effective in minimizing dynamic transaction costs and the related unexpected production costs due to the lack of capabilities about how to satisfy customers' complex needs.

The first subsection of this chapter summarizes the results and the answers to the research questions. The second and third subsections discuss the ways in which the results contribute to theory and practice. Finally, the last subsection presents the paths to future research.

1.1. SUMMARIZING RESULTS

The aim of this thesis was to analyse whether and how the complexity of customer's needs imposes to providers a specific organizational structure in order to address them in efficient and effective way. In addition, this problem was addressed in case of organizations meeting a specific complex need, long term care. The thesis answered three research questions, which are discussed thoroughly in this chapter.

I part

The first research question was:

1) *How does economic organizations efficiently face customer uncertainty in presence of complex needs?*

In the light of the Modularity Theory of the Firm (Langlois and Robertson, 1995; Teece and Pisano, 1994; Baldwin and Clark, 1997; Baldwin and Clark, 2003; Langlois, 2002; Langlois 2006), it has been shown that customer uncertainty is a form of environmental uncertainty that – by producing *unexpected production cost* in the production process - influences organizational efficiency. Customer uncertainty emerges when the customer is not able to take any consumption decision able to satisfy him/herself because of need complexity. In this case, the main type of *unexpected production cost* ($\boldsymbol{UPC_1}$) emerges in the productive relation between the provider and the customer due to the lack of providers' capabilities in customizing the services. However, when

customization requires other providers' non-standardized knowledge in the production process, also secondary $\boldsymbol{UPC_2}$ may emerge. These are due to the lack of capabilities in cooperating among each other which are necessary to promote customization. Against $\boldsymbol{UPC_1}$ and $\boldsymbol{UPC_2}$, the organization can develop production/coordination capabilities thanks to the standards and incentives expressed by its system of ownership rights (source of modularity), which may favor or may not non-standardized knowledge transfers. In particular, the main organizational means to face customer uncertainty are:

- *non-stringent standards* that enable non-standardized knowledge transfer with the customer and the exertion of professional judgement;
- *decentralized distribution of decision rights* that – in presence of an asymmetric information problem, sustains providers' intrinsic motivation to exchange no-standardized knowledge among colleagues, which, in turn, is necessary to improve customization of services.

The most efficient organizational form is 1) the network (loosely coupled organization) when only $\boldsymbol{UPC_1}$ are involved in the production process, and 2) the firm (highly non-modular organization) with an internal participative governance in case also $\boldsymbol{UPC_2}$ are included.

II part

In the second chapter, the main goal is to identify the conditions for production efficiency at the service design and management levels. In fact, standards and incentives provided by non-modular organizations, promote organizational efficiency by sustaining an efficient management of customer uncertainty in the production process. Thus, the second research question is:

2) *how does the service design and management contribute to efficiently manage customer uncertainty due to complex needs?*

In case of complex needs, the customer is involved in the production process both as input and as co-producer, so that production efficiency is a function of both *internal efficiency* (manufacturing based concept) and *external efficiency* (Gronroos, 2000), here redefined as the service quality promoted by the coordination/production capabilities developed by the organization to customize services. While customization sustains external efficiency (measured by UPC), standardization promotes internal efficiency (measured by traditional PC). Hence, different types of standards and

incentives are required or, in other words, a different modularity level. Since the platform approach to modularity identifies either a highly non-modular or highly modular customization strategy, a new approach to modularity is here developed based on the blueprinting technique (Shostack, 1982,1984,1987), which is reinterpreted in the light of Larsson and Bowen (1989) work about the participation of the uncertain customer in the service process. This technique - by using the visibility line to separate the front-office activities (centred on customer) from the back-office ones - lends itself to be used as a valuable modularization instrument in service design based on the customer's need analysis. While onstage activities should be mainly customized (as they address customer's complex needs), backstage activities should be oriented to standardization (as they are supposed to satisfy customer's clearly defined needs). In the onstage and backstage environments - characterized by different standards and incentives - also the management styles should be different: while a supportive style should be adopted for managing front-office activities, an authoritarian style is considered still efficient to manage back office activities. This framework is, then, applied to the case of organizations addressing the customer's LTC complex need. On the basis of the need analysis, services are designed above or below the visibility line. In particular, personal care services, nursing, animation and physiotherapy are daily activities to be placed above the line. Preparation of drugs and meals, user monitoring and cleaning are example of back office standardized services.

III part

The theoretical framework developed in the previous two chapter is further developed in the third chapter where – by using the theory building from case study method (Eisenhardt, 1989, Yin 2003) – I investigate the relationship between organizational and production efficiency (in particular, external efficiency) in LTC organizations. An interpretative model is here developed to analyze five Italian LTC organizations as emblematic cases of different approaches to the management of UPC, considered as index of external efficiency (the greater are sick leave hours, the more continuity of care is hindered along with the possibility to customize the service). This study is important because the mechanism through which the organizational structure (by varying the level of standards and the repartition of decision rights) affects external efficiency over time is still an open question. In particular, the third research question is:

3) *How LTC organizations – through governance, service design and management - promote external efficiency (low UPC_2) related to customer uncertainty in personal care service?*

Two are the main hypotheses. First, I hypothesize that the organizations investing in high levels of standards and low levels of coordination capabilities, experience a progressively lower level of external efficiency (vicious cycle). Conversely, the companies highly investing in capabilities experience a progressively higher level of external efficiency (virtuous cycle). In order to build the model, the five LTC companies have been organized in four categories that are analyzed in four case studies. The categories were chosen by taking into account the level of investment in standards (high and low) and in coordination capabilities (high and low). The first case study adopts *literal replication* logic (namely similar results are predicted) and involves two organizations belonging to the same category (high investment in standards and low investment in capabilities). This allows findings to be replicated (Yin, 2003). This case study provides a first support to the hypothesized sketched model. Then, the other three case studies, involving organizations belonging to the remaining categories, allow to enhance the generalizability of the model, by employing *theoretical replication* logic, namely contrasting results are expected for anticipatable reasons (Eisenhardt, 1989; Yin, 2003). As expected, data show that the most effective organization among those under study (namely those with the lowest level of sick leave hours) is Stella Montis, that is the organization with a participative governance, customized front-office services and supportive management. This organization, in fact, sustains caregivers' intrinsic motivations to cooperate with colleagues (especially by increasing their empowerment and avoiding burn-out problems), and, this way, promotes a low level of caregivers' sick leave hours. In line with the theoretical framework, what matters seems to be the internal organization of labour rather than the size and the legal form. On the one hand, the cooperative Stella Montis has the same size (60 bed spots) and legal form as Chiocciola and S. Lorenzo, characterized by a quite hierarchical internal governance. On the other hand, the example of Villa Niccolini, having developed a quite high level of cooperation capabilities, shows that an investor owned enterprise with 82 bed spots may be more efficient than other cooperatives with 60 bed spots. The evidences, thus, analyzed on the basis of the experimental model, generate considerations that are consistent with the interpretative model and legitimate the theoretical hypotheses developed in the previous chapters.

1.2. THEORETICAL CONTRIBUTIONS

This thesis contributes to three areas in the academic literature.

Firstly, it contributes to the study of the role of the customer in the organizational literature, by enlarging the MTF perspective to the study of customer uncertainty when the need to be satisfied is artificially or intrinsically complex. The studies so far conducted on the role of customer uncertainty for the organizational structure (Bowen and Jones, 1986; Larsson and Bowen 1989; Pitt and Foreman, 1999) adopt a static theoretical framework, which is unable to take into account the role of organizational capabilities to promote an efficient relationship with the customer and, through that, production efficiency. In order to provide an adequate dynamic framework to study such issue the MTF has been on the one hand supported by behavioral studies on extrinsic and intrinsic motivations that has allowed to identify the system of incentives the governance should offer in order to develop the capabilities necessary for an efficient management of CU. On the other hand, the MTF has been further developed towards a greater understanding of the relationship between organizational and production efficiency. To this regard, the research has led to consider the organizational capabilities to promote production efficiency as a problem of organizational efficiency. As a consequence, a new definition of production efficiency – no longer based on the concept of allocative efficiency – has been developed in order to include the lack of capabilities as source of - what I have defined as - *unexpected production costs* (waste of resources, legal claims etc.). In particular, these have been considered as the 'productive side' of the dynamic transaction costs and related to the lack of organizational capabilities required for the personalization of the production process. Based on this enlargement of the MTF framework, I have argued that different levels of organizational modularity, by providing different systems of standards and incentives, matter for the (in)efficient management of customer uncertainty, by supporting (limiting) the reduction of UPC. On the basis of the types of need and level of participation of providers– we have identified and 'predicted' three different efficient level of organization modularity; a modular organization in case of clearly specified needs, a loosely coupled organization in case of complex needs and participation to the production process of only one professional's non-standardized knowledge; a non-modular organization in case of complex need and participation to the production process of more than one professional's non-

standardized knowledge. As a consequence, this thesis increases the understanding of the role of modularity at organizational level to face customer uncertainty.

Secondly, this thesis expands the extant discourse on service modularity to the problem of needs' analysis in order to understand whether the management of CU requires for each client a specific modularization in customized, mass-customized or standardized services. In this regard, the thesis provides a theoretical framework that lends itself to be especially used in the service design and management. In fact, the main approach to the application of modularity in service design- the platform one (Meyer and de Tore 2001; Meyer et al. 2007; Pekkarinen and Ulkuniemi 2008, Baldwin and Woodard, 2008) – conceptually derives from manufacturing sector and offers a limited power to modularity in the management of customer uncertainty; the customer role is either limited to a choice option or inefficiently highly empowered even in low value-added activities. Even if this approach has been developed mainly in sectors characterized by low level of need complexity (Pekkarinen and Ulkuniemi 2008; Lin et al.2010, Zhou et al. 2010; Bask et al. 2010; Bask et al. 2011), risks to be recklessly transferred to the service sectors in which customers express intrinsically highly complex needs, such as health and long-term care services. This thesis, along with highlighting such risk, proposes an alternative approach – the blueprinting one - to the application of modularity – by modularizing the service on the basis of the level of customer's need complexity, allows both to involve the customer in customized activities when this is required by need complexity and to partially or totally exclude him/her in mass-customized and standardized activities when needs are clearly specified. In this way, it is possible to efficiently manage customer uncertainty (reach effectiveness) in front office activities without renouncing to promote manufacturing based production efficiency in back office ones. Moreover, the logic background in the MTF allows to recognize the need of two different governance structures for the efficient management of front office and back office activities. While a participatory character of governance efficiently sustains the supportive management style of onstage services, hierarchy favors the authoritarian management style of backstage activities.

Finally, the thesis provides an important contribution to the studies on modularity applied to long term care services, because - by explicitly addressing CU problem – it proposes a model which represents a first real attempt to put the patient at the center of the service in an efficient way. After having shown that the platform approach -usually applied for improving coordination in the

care path (Meyer et al., 2007; de Blok et al. 2009, 2010a) - displays important risks for service effectiveness (De Block et al., 2013; Vahatalo 2016), I propose a first application of the blueprinting approach in residential care services. This approach allows modularizing services (customized, mass-customized and standardized) depending on the complexity of LTC needs for each patient. Some services such as reservation system and preparation of drugs and meals can be standardized in the back office environment. Conversely, personal care service needs to be customized, while animation and physiotherapy can be at least in part mass-customized. Finally, in the light of the enlarged MTF framework which establishes the existence of a relationship between organizational and production efficiency, the empirical analysis advances a first hypothesis - through a theory-building case study analysis – about the role of the organizational structure on production efficiency. This empirical study can be considered as a first attempt within a specific sector to understand the link among governance, service design and management levels for production efficiency in presence of customer uncertainty. These results could be fruitfully extended also to services different from long term care, namely other social and health care services such as children's home, specialist educational services (for instance for autism and specific learning disabilities), nursery, residential and daily care services for young people with mental illness. In all these cases, customer uncertainty can be source of unexpected production costs. For instance, in maternity hospital the uncertainty of mothers feeding babies (especially premature newborn) can be worsen by the conflicts among neonatologists and obstetricians about which care strategy to follow. While doctors pay attention to the respect of growth standards, the obstetricians focus on the mother-infant relationship. In absence of an organization that supports trust and reciprocal esteem among professionals, they can propose opposite care strategies. In this case, mother's uncertainty may become distress or depression with negative consequences on the relationship with the child and on child's growth.

1.3. MANAGERIAL CONTRIBUTIONS

With this thesis, I hope to provide some useful orientations to entrepreneurs, managers and policymakers engaged – from different perspective – in the organization of services aimed to satisfy intrinsically complex needs. First, this study, by showing that UPC and PC are driven by opposite levels of standardization, implicitly recognizes the possibility (and maybe also the necessity) of undertaking specific development strategies in case of customer uncertainty. UPC -

reduced by existing coordination/production capabilities in the front office customized activities - require a few and general standards and the efforts exerted towards their reduction support innovations at organizational level. Conversely PC -reduced by hard standardization in mass-customized and back office- activities - allow scale and specialization economies, which in turn push toward investment in automation. The recognition of these different paths of innovation is particularly important today as the attention of researchers, policy makers and entrepreneurs is largely focused on the benefits of Industry 4.0. Most of critics have highlighted the potential costs in terms unemployment, but not in terms of efficiency loss. This thesis represents a first attempt - to be supported by greater investigation- to show that automation not always may be an efficient solution and, more importantly, that automation is not the only potential efficient solution in some sectors. The purpose of reaching complete control of the production process and, thereby, reduce PC through an indiscriminate use of standards and the related automation, in some cases can lead to a large increase of UPC. In fact, when the production process is aimed at satisfying intrinsically complex needs, the perception of control is just illusory. As seen in the first chapter, the way customer uncertainty reveals itself continuously changes and requires an answer that only human beings can efficiently give on the basis of their professional judgement and their flexibility. In this case, the cost of having invested in mechanization and automation is not repaid by savings due to increased control over the production process as UPC reasonably increase. Nevertheless, someone could argue that orientation to the Industry 4.0 may be repaid by large reductions in labour costs and increased economies of scale. Indeed, at least theoretically we can suppose that '4.0 organizations' could be equally efficient (UPC + PC are sufficiently low) if they adopt a risk pooling strategy against UPC related to customer uncertainty. However, I would answer that they would lose the opportunity to really satisfy the customer's complex needs. Thus, it appears quite clear that when customer satisfaction concerns fundamental human needs such as health and LTC, a crucial role is played by the policy maker who can orient the investments towards one of the two directions. Moreover, public institutions-by defining a strict or loose level of quality standards - is highly responsible for organizational efficiency of LTC companies, as the empirical study on the accreditation system shows. There are many OECD countries, including Italy, which are still waiting for the reform of the LTC sector. This thesis, hence, hopes to represent also a new opportunity for policy makers to reflect about which direction to undertaken in the production of such reforms.

Finally, with this thesis and in particular, the empirical study, I hope to provide a first orientation for an efficient application of modularity in the organization, design and management of LTC services. Firstly, the thesis provides a criterion, the analysis of each customer's needs, to establish the efficient modularity level of each service provided. To this regard, it is important to establish and evaluate overtime to what extent patient's wellbeing can be promoted by standardized and mass-customized services (namely, some specific needs are clearly defined) or has to be sustained by personalized interactions (namely, some specific needs- since they are crucial for the patient's health promotion, should be considered as complex). Moreover, in order to promote both productivity sources, external and internal efficiency, the standardized services should be organized in back-office, namely in coordination with but separately from mass-customized and customized services, which are front-office. The mass-customized services should be activated whenever and insofar as the patient's need is not complex (namely, it is clearly specified and not crucial for patient's health promotion). Second, the thesis suggests, as a strategy, to encourage good supportive processes for the management of customers' complex needs, through training activities, psychological support to caregivers and by experimenting practises of participation of workers to the organization of labour. Moreover, the separation provided by the visibility line that allow to promote the different sources of efficiency can provide some orientation toward different innovation paths in this sector. While back office standardized services can be directed toward automation solutions, robotics, ICT systems in drug and meal preparation, cleaning activities etc.; mass-customized and customized services can be and should be innovated in combination in order to identify more effective and efficient strategies to promote patient's wellbeing. This may mean on the one hand, promoting the development of capabilities not only in the design and provision of customized services but also in identifying new paths for mass-customized solutions. On the other hand, it may signify to establish new mass-customized solutions which provides indicators able to alert about the patients' need for a different and customized solution. In other words, this empirical study supports, in a historical period of great uncertainty about the future sustainability of the LTC system, a new horizon of development that is really patient-centred and promoting efficiency.

1.4. LIMITS OF THE THESIS AND SUGGESTIONS FOR FUTURE RESEARCH

This final subsection briefly discusses the limits of the thesis and ideas for future studies that have appeared along this dissertation process.

The main limit of my research is its theoretical character that, hence, requires confirmation or disconfirmation on empirical grounds not only in the LTC organizations. Econometric studies in different sectors could provide a fundamental contribution in the identification of a cause-effect relationship among the organizational structure, providers' intrinsic motivations and the level of upc indices over time such as absenteeism, customer claims etc. Indeed, it is fundamental to establish whether the organizational structure affects the amount and frequency of mistakes and loss of resources experienced over the production process and, hence, whether the UPC really exist.

Second, the research is limited to the LTC sector. Given the increased importance of customer's needs (not only intrinsically but also artificially complex) and the related customer uncertainty for the development of a good business model, it would be interesting to enlarge this analysis to the study of other sectors and evaluating whether this theoretical framework can be usefully applied in different contexts.

Finally, since the empirical study is focused on LTC residential care services and does not take into account the service quality perceived by users and their families, it would be important to orient future research in this sector toward the development and testing of the blueprinting model in home care services (which today have been receiving increasing attention) with also a focus on patients' service quality perception.

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APPENDIX I

QUESTIONARIO

I. INFORMAZIONI ANAGRAFICHE

1. Età

2. Sesso

- Maschio
- Femmina

3. Qual è la tua tipologia di contratto?

- Tempo indeterminato
- Tempo determinato
- Full-time
- Part-time

4. Qual è la tua posizione all'interno della Cooperativa?

- Socio dipendente
- Dipendente

5. Da quanti anni lavori nella Residenza?

1	2	3	4	5	6	7	8	9	10 e oltre

6. Titolo di studio

- Senza titolo di studio/scuola elementare
- Scuola media inferiore
- Qualifica professionale/media superiore
- Diploma universitario/laurea triennale/quadriennale/specialistica

II. MOTIVAZIONE

7. Quali tra i seguenti aspetti ritieni che siano importanti per essere soddisfatto professionalmente? *Per ogni aspetto di seguito riportato barra una sola casella della scala crescente: considera 1= per nulla importante e 7= importantissimo.*

1. Aiutare gli anziani a migliorare la propria qualità di vita	1	2	3	4	5	6	7
2. Poter conciliare il lavoro con la vita privata (ferie, permessi, cambi turno, part-time, aspettative)	1	2	3	4	5	6	7

3. Essere in grado di incidere sull'organizzazione del proprio lavoro per meglio rispondere alle esigenze degli ospiti	1	2	3	4	5	6	7
4. Le condizioni contrattuali ed il trattamento economico	1	2	3	4	5	6	7
5. Vedere riconosciuto e valorizzato il proprio impegno	1	2	3	4	5	6	7
6. Avere un buon rapporto con gli ospiti	1	2	3	4	5	6	7
7. Partecipare ad attività sociali e di animazione con gli ospiti	1	2	3	4	5	6	7
8. Vivere un clima di solidarietà e collaborazione con i colleghi	1	2	3	4	5	6	7
9. Partecipare a momenti di socializzazione tra colleghi (cene, gite, feste, ecc.)	1	2	3	4	5	6	7
10. Poter crescere professionalmente ed imparare cose nuove	1	2	3	4	5	6	7
11. Avere le informazioni necessarie per fare il proprio lavoro	1	2	3	4	5	6	7
12. Contribuire al raggiungimento degli obiettivi dell'organizzazione	1	2	3	4	5	6	7
13. Avere fiducia nei colleghi	1	2	3	4	5	6	7
14. Avere fiducia nel coordinatore	1	2	3	4	5	6	7
15. Essere trattato in modo equo e trasparente	1	2	3	4	5	6	7
16. Entrare in sintonia con l'utente e i suoi bisogni	1	2	3	4	5	6	7

III. GOVERNANCE

8. Come giudichi l'organizzazione del tuo lavoro in RSA? *Per ogni aspetto di seguito riportato barra una sola casella considerando: 1= per nulla d'accordo; 7= completamente d'accordo.*

1. Lavori in gruppo e sei in grado di cooperare con i colleghi	1	2	3	4	5	6	7
2. Conosci il tuo ruolo e i tuoi compiti	1	2	3	4	5	6	7
3. Lavoreresti meglio in un altro gruppo di lavoro	1	2	3	4	5	6	7
4. Pensi che avresti problemi a cambiare gruppo di lavoro	1	2	3	4	5	6	7
5. Vi è una gerarchia di ruoli, perciò ti limiti ad eseguire le procedure standard e gli ordini che ricevi	1	2	3	4	5	6	7
6. Conosci i compiti di lavoro dei tuoi colleghi	1	2	3	4	5	6	7
7. La compilazione delle schede sottrae tempo prezioso alla tua capacità di risolvere i problemi che insorgono nel rapporto con gli utenti e nella gestione delle altre operazioni	1	2	3	4	5	6	7
8. Partecipi all'organizzazione del piano di lavoro	1	2	3	4	5	6	7
9. Esistono chiare figure di riferimento a cui rivolgersi	1	2	3	4	5	6	7
10. Il sindacato è importante per creare rapporti giusti ed equi	1	2	3	4	5	6	7
11. I lavoratori, partecipando direttamente, raggiungono risultati migliori del sindacato	1	2	3	4	5	6	7

9. Secondo te com'è il clima all'interno dell'organizzazione?
Per ogni punto indica la tua valutazione barrando una sola casella.

1	Molto Freddo	Freddo	Caldo	Molto caldo

2	Molto Accogliente	Accogliente	Poco accogliente	Non accogliente
3	Molto Istituzionale	Istituzionale	Familiare	Molto familiare
4	Molto Sereno	Sereno	Teso	Molto teso
5	Molto Pesante	Pesante	Leggero	Molto leggero
6	Molto Vitale	Vitale	Apatico	Molto apatico
7	Molto Professionale	Professionale	Poco professionale	Non professionale

10. Come consideri la formazione ricevuta dall'organizzazione? *Per ogni aspetto di seguito riportato barra <u>una sola casella</u> considerando: 0= non sono d'accordo; 1= sono poco d'accordo; 2= sono d'accordo; 3= sono molto d'accordo.*

	GRADO DI ACCORDO			
	0	1	2	3
1. Hai ricevuto una formazione iniziale ed un orientamento adeguati				
2. Hai ricevuto la formazione richiesta dalla normativa				
3. Hai ricevuto formazione aggiuntiva per migliorare le tue competenze nelle relazioni con i colleghi				
4. Hai ricevuto formazione aggiuntiva per migliorare le tue competenze nelle relazioni con gli ospiti e le loro famiglie				

11. Secondo te, a cosa principalmente sono dovute le tensioni e i problemi di coordinamento tra i colleghi? *Per ogni aspetto di seguito riportato barra una sola casella considerando: 0= non sono d'accordo; 1= sono poco d'accordo; 2= sono d'accordo; 3= sono molto d'accordo.*

	GRADO DI ACCORDO			
	0	1	2	3
1. Originano in particolari momenti della giornata				
2. Assenza di una chiara figura di riferimento				
3. Situazioni particolarmente difficili con alcuni residenti				
4. Cattive relazioni interpersonali con alcuni colleghi				

12. Com'è la relazione con il coordinatore? *Per ogni aspetto di seguito riportato barra <u>una sola casella</u> considerando: 0= non sono d'accordo; 1= sono poco d'accordo; 2= sono d'accordo; 3= sono molto d'accordo.*

	GRADO DI ACCORDO			
	0	1	2	3
1. Il coordinatore tratta i lavoratori in modo equo				
2. Il coordinatore riesce ad incentivare lo spirito di squadra				
3. In caso di disaccordo, il coordinatore chiude la discussione ricorrendo alla sua autorità				
4. Il coordinatore ti coinvolge nelle decisioni che hanno ricadute dirette sul tuo lavoro				

5. Il coordinatore dà importanza ai problemi personali dei lavoratori e li sostiene nei momenti di difficoltà					

IV. SODDISFAZIONE

13. Qual è il tuo livello di soddisfazione professionale rispetto alle seguenti dimensioni? *Per ogni aspetto di seguito riportato barra <u>una sola casella</u>: considera 1= per nulla soddisfatto e 7= soddisfattissimo.*

	Livello di soddisfazione						
1. Supporto agli anziani nel migliorare la loro qualità di vita nel modo in cui vorresti	1	2	3	4	5	6	7
2. Conciliazione del lavoro con la vita privata (ferie, permessi, cambi turno, part-time, aspettative)	1	2	3	4	5	6	7
3. Impatto sull'organizzazione del tuo lavoro per meglio rispondere alle esigenze degli ospiti	1	2	3	4	5	6	7
4. Condizioni contrattuali e trattamento economico adeguati	1	2	3	4	5	6	7
5. Riconoscimento e valorizzazione del tuo impegno	1	2	3	4	5	6	7
6. Rapporto con gli ospiti	1	2	3	4	5	6	7
7. Positivita' delle attività sociali e di animazione con gli ospiti	1	2	3	4	5	6	7
8. Clima di solidarietà e collaborazione con i colleghi	1	2	3	4	5	6	7
9. Partecipazione a momenti di socializzazione tra colleghi (cene, gite, feste, ecc.)	1	2	3	4	5	6	7
10. Crescita personale ed apprendimento	1	2	3	4	5	6	7
11. Crescita professionale	1	2	3	4	5	6	7
12. Circolazione delle informazioni necessarie per fare il tuo lavoro	1	2	3	4	5	6	7
13. Riesci ad aiutare l'organizzazione a raggiungere i suoi obiettivi	1	2	3	4	5	6	7
14. Fiducia nei colleghi	1	2	3	4	5	6	7
15. Fiducia nel coordinatore	1	2	3	4	5	6	7
16. Trattamento equo e trasparente	1	2	3	4	5	6	7
17. Trattamento economico equo	1	2	3	4	5	6	7
18. Sintonia con l'utente e i suoi bisogni	1	2	3	4	5	6	7

V. ***<u>PARTE RISERVATA A CHI LAVORA DA ALMENO 6 ANNI IN RSA</u>***

14. Sai cos'è la procedura di accreditamento?

- o Si
- o No

15. A tuo avviso, com'è cambiato il lavoro in RSA da quando è entrato in funzione l'accreditamento? *Per ogni aspetto di seguito riportato barra <u>una sola casella</u> considerando: 1= per nulla d'accordo; 7= completamente d'accordo.*

ORGANIZZAZIONE DEL LAVORO							
1. Il lavoro in gruppo e' migliore che in passato e la capacità di cooperare con i	1	2	3	4	5	6	7

colleghi è maggiore							
2. Conosci meglio il tuo ruolo e i tuoi compiti	1	2	3	4	5	6	7
3. Rispetto al passato hai maggiore autonomia decisionale riguardo al tuo lavoro	1	2	3	4	5	6	7
4. Rispetto al passato hai minore autonomia decisionale riguardo al tuo lavoro.	1	2	3	4	5	6	7
5. Rispetto al passato ti relazioni meglio con gli ospiti e le loro famiglie	1	2	3	4	5	6	7
6. Rispetto al passato l'ospite è maggiormente al centro del servizio	1	2	3	4	5	6	7
7. Rispetto al passato è diminuito il tempo per la relazione personale con l'ospite a causa del numero di procedure da seguire	1	2	3	4	5	6	7
8. Rispetto al passato il sindacato è più importante per creare rapporti giusti ed equi	1	2	3	4	5	6	7
9. Rispetto al passato i lavoratori, partecipando direttamente, raggiungono risultati migliori del sindacato	1	2	3	4	5	6	7
10. Rispetto al passato il ruolo del sindacato è invariato	1	2	3	4	5	6	7

APPENDIX II

INTERVISTA PRELIMINARE AL COORDINATORE DI STRUTTURA

- Da quanti anni lavora in struttura?
- Come sono i rapporti tra colleghi?
- Com'è organizzato il piano di lavoro giornaliero per gli OSS, OSA?
- Che tipo di formazione è stato e viene dato ai lavoratori?
- Quale supporto viene dato loro contro il rischio di burn-out?