

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

Valentina Blandi | Department of Economics and Management, University of Trento

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Abstract

This paper discusses whether and how organizational efficiency is impacted by customer's uncertainty 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. Firstly, the study 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 etc.) thanks to developing capabilities about how to satisfy customers' complex needs. Secondly, the study proposes a blueprinting approach to service design and management, which allows front office/back office separation to improve management efficiency, also with a focus on long-term care services. Finally, it empirically applies the theoretical results to situations of long-term care with customer uncertainty.

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

1. Introduction

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 paper 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. The paper is organized in five sections. The second section – the literature review – explicates the background and research gaps in organizational studies and service management literature that allow the positioning of the paper. After having described the leading hypotheses in the third section, I show the main theoretical and empirical results. On the basis of the Modularity Theory of the Firm (Langlois and Robertson 1995; Langlois 2002, 2006; Baldwin and Clark, 2003; 2006), I propose a theoretical framework which allows identification of the most effective organizational type, service design and management to face customer's uncertainty. The focus here also is on the design and management of long term care (LTC) services. Then, 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. I investigate the link between organizational and production efficiency and verify the existence of a cause-effect relation between their different organizational governance and the level of unexpected production costs especially in terms of number of sick leave hours.

Summarizing results, the paper 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.

2. Literature Review

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). 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, needs to be helped by the organization to develop consumption capabilities.

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 considered as more efficient than the *modular* market in the management of non-standardized knowledge transfers and, thus, to reduce dynamic transaction costs related to the development of capabilities¹. However, the MTF does not specifically analyze customer uncertainty and the related problem of developing capabilities to help the customer to take consumption decisions. Consequently, the relationship between organization and production efficiency is not adequately investigated as well as the role of modularity in promoting an efficient relationship between the two types of efficiency.

Service management and marketing literature help to investigate what is the most efficient way to design and manage production processes in the presence of uncertain customer's needs, 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). In the light of such literature, production efficiency is a function of both *internal efficiency* (manufacturing based concept) and *external efficiency* (defined as customer's quality experience, Gronroos 2000). However, such studies do not consider external efficiency as a function of the capabilities developed thanks to the organizational form. Lacking an adequate definition of external efficiency, literature on service modularity - largely identifiable with the platform approach (Meyer and de Tore 2001; Meyer et al. 2007; Pekkarinen and Ulkuniemi 2008, Baldwin and Woodard, 2008) - does consider the modularity principle as instrumental to the development of an efficient relationship between internal and external efficiency in the production process, but only to the promotion of internal efficiency by offering mass-customized services. The customer's role is always limited to choose among standardized options even in case of complex needs, such as long term care (LTC). In this particular sector, modularity has been mainly applied to the purpose of creating 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) (Meyer et al., 2007; de Blok et al. 2009, 2010a; Vahatalo, 2016).

¹ DTC are "the costs of persuading, negotiating, coordinating, and teaching outside suppliers" They are also defined as [...]the costs of not having the capabilities you need when you need them" (Langlois and Robertson, 1995).

3. Research question and hypothesis

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 LTC services. The main hypothesis is that in case of complex needs, customer uncertainty produces production inefficiency, whose value depends on the modularity degree of governance, service design and management adopted. In particular, I hypothesize that:

1. 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.
2. Focusing on the service sector, a blueprinting approach to service design sustains an efficient service modularization by customizing front office activities and standardizing back office ones.
3. Since in presence of complex needs, front-office employees' effort in customization is unknown (asymmetric information problem), only a fair management that sustains employees' intrinsic motivations is able to promote coordination capabilities and, hence, production efficiency.

4. Main Theoretical and Empirical results

After having defined customer uncertainty (CU) and identified the linkage between production and organizational efficiency in presence of CU, I show how the modularity principle can be applied at governance, service design and management level to efficiently face such type of uncertainty.

4.1. Modularity and Organizational Efficiency in presence of CU

In presence of complex needs (defined as needs involving not well defined cognitive, social and psychological components), the economic organization faces customer uncertainty, that is a *radical* form of uncertainty due to the customer's structural inability during transactions 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. CU is source of production inefficiency by determining *unexpected production costs* (UPC). These can be considered as the 'productive side' of dynamic transaction costs (Langlois and Robertson, 1995): unpredictable resource losses (mistakes, damages, etc.) due to the lack of coordination/production capabilities required for the

personalization of the production process. The main type of *unexpected production cost* (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 UPC_2 may emerge. These are due to the lack of capabilities in cooperating among providers that are necessary to promote customization. The theorization of UPC as expression of DTC 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 traditional production costs 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. Against UPC_1 and 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 non-standardized knowledge among colleagues, which, in turn, is necessary to improve customization of services (Frey, 1997; Osterloh, Frost and Frey 2002).

In absence of CU, production efficiency depends only on the reduction of PC and the market is the most efficient organizational form. Conversely, in presence of CU, production efficiency depends also on the reduction of UPC_1 and UPC_2 . In fact, a 'less explicit coordination' than that offered by the modular market is required, on the one hand, to create a shared language system with the customer and, thus, to reduce UPC_1 ; on the other hand, to support non-standardized knowledge transfers among professionals and, thus, to reduce UPC_2 . When only UPC_1 are involved in the production process, the most efficient organizational form among professionals is 1) the network (loosely coupled organization) characterized by enabling standards and incentives to both intrinsic and extrinsic motivations. When also UPC_2 are included, the firm (highly non-modular

organization) with an internal participative governance is the most efficient one because along with enabling standards, it supports professionals' intrinsic motivation to exchange non-standardized knowledge during the production process (see Appendix 1).

4.2. Modularity and Service Customization in presence of CU

At service design and management level, the modularity principle allows to efficiently involve the customer in the production process by separating the sources of *internal efficiency* (reducing PC and based on standardization) from the sources of *external efficiency*, here redefined as the service quality promoted by the organization's capabilities to customize services (reducing **UPC₁** and **UPC₂**). Since the platform approach promotes only internal efficiency, a new approach to modularity is here developed to promote both internal and external efficiency. The blueprinting technique (Shostack, 1982,1984,1987), - 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 are efficiently customized to promote external efficiency (as they address customer's complex needs), backstage activities require to be standardized (as they are supposed to satisfy customer's clearly defined needs) to sustain internal efficiency. In the onstage- and backstage-environments also the management styles need to 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 (see Appendix 2). The entire framework can be applied to the case of organizations addressing the customer's long-term care (LTC) complex need. On the basis of the need analysis, services are designed above or below the visibility line. While 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 (see Appendix 3).

4.3. Studying organizational efficiency in an empirical setting

The theoretical framework developed in the previous two sections is here further developed. By using the theory building from case study method (Eisenhardt, 1989, Yin 2003), the relationship between organizational and production efficiency (in particular, external efficiency) is investigated in five organizations providing residential LTC services. An interpretative model is developed 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. 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 caregivers of each organization. 251 surveys were submitted, 184 different answers were collected and 122 were kept for the analysis, representing the 64.25% of the total population studied. The 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 (here identified with caregivers' sick leave hours²), considered as index of external efficiency. In particular, the organizations with a participative governance, customized front-office services and supportive management support the existence of a virtuous cycle: they sustain caregivers' intrinsic motivations to cooperate with colleagues (especially by increasing their empowerment and avoiding burn-out problems), and, this way, promote a low level of caregivers' sick leave hours. Conversely, the other organizations highly focused on the fulfillment of strict quality standards support the hypothesis about the existence of a vicious cycle, in which the level of intrinsic motivation is not supported and sick leave hours are high. Moreover, the case studies have allowed to understand that coordination capabilities can be developed better in the investor-owned enterprise than in the two cooperatives under study, and that these capabilities can have a different content. Three are the coordination capabilities types identified:

- 1) Spontaneous coordination capabilities emerging in case of friendships and thanks to a stock of caregivers' personal knowledge about how to relate with others;
- 2) Capabilities on the approach, namely 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, which 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).

The regression analysis on survey data (see Appendix 5) allows to establish that a negative relationship exists between caregivers' satisfaction level and the organizational form among the five emblematic organizations, providing an additional important support to the hypothesized

² To build an index of UPC_2 I used the annual sick leave hours² for each caregiver with a permanent contract over the period 2011-2015 and the relative annual worked hours (with the exclusion of overtime)

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 directly responsible for external efficiency, an efficiency component so far neglected by organizational and management studies, but able to weight on real organizations' balance sheet.

5. Conclusions

The paper has shown that CU – by producing UPC – is a source of both production and organizational inefficiency. The modularity principle may allow an efficient management of CU at governance, service design and management levels by varying the types of standards (enabling/constraining) and level of redistribution of decision rights (promoting extrinsic/intrinsic motivations). Cooperative governance results as the most effective organization in minimizing dynamic transaction costs and the related unexpected production costs (damages, errors, waste of time, legal actions). Moreover, the service blueprinting of residential LTC services represents a first real attempt to put the patient at the center of the LTC service in an efficient way.

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Appendix 1

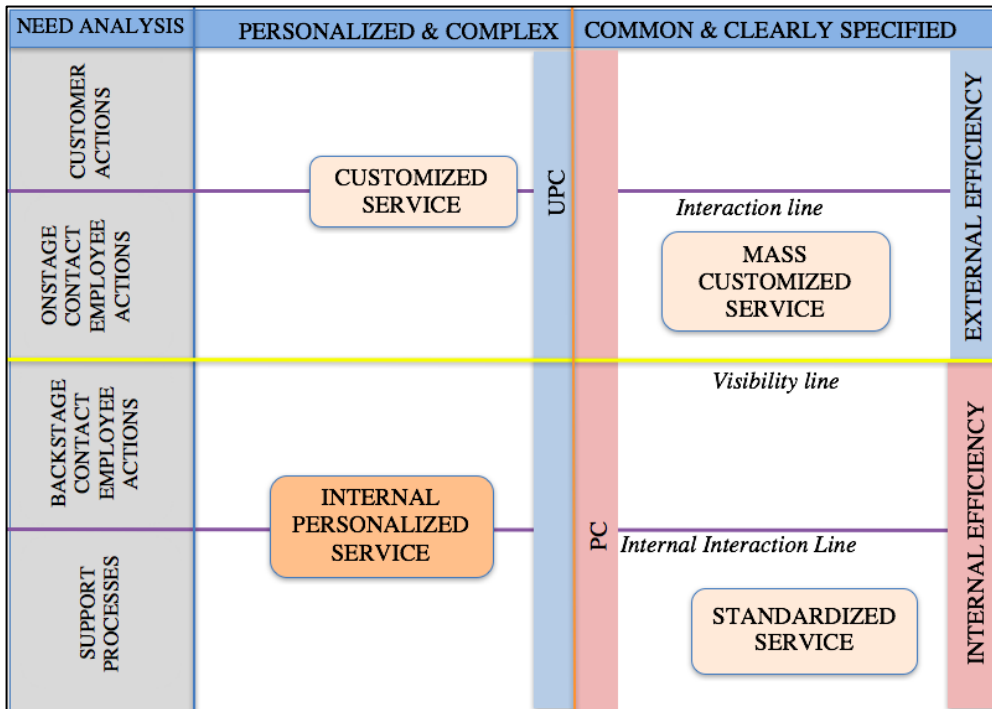
The role of modularity of production on the modularity of the organization depending on the type of need

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

Appendix 2

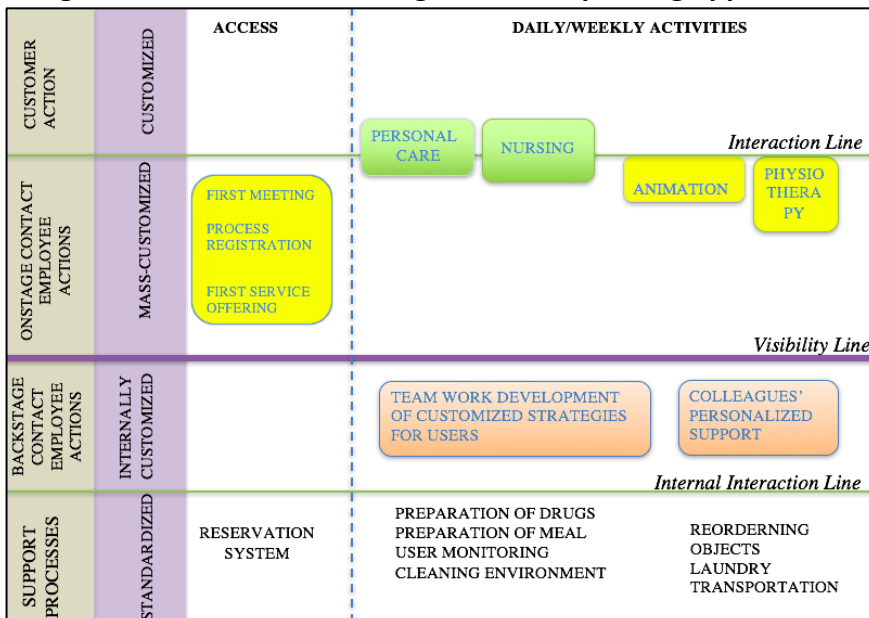
Blueprinting service design in case of complex needs



Source: Author's contribution

Appendix 3

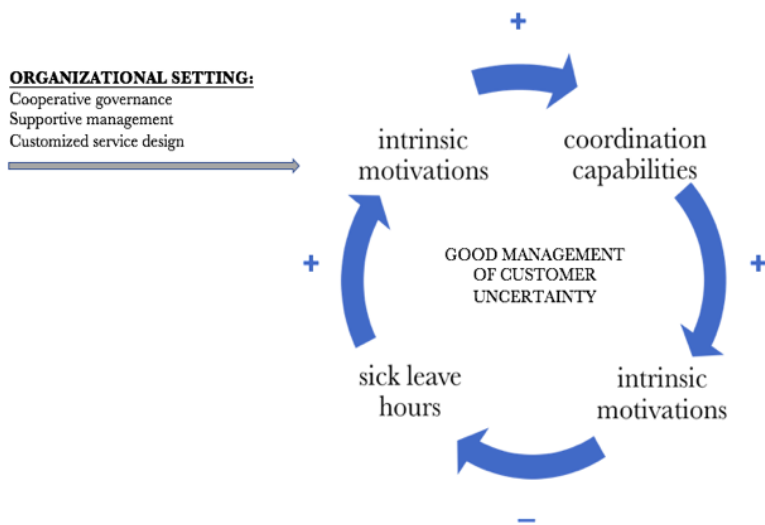
Design of LTC services according to the blueprinting approach



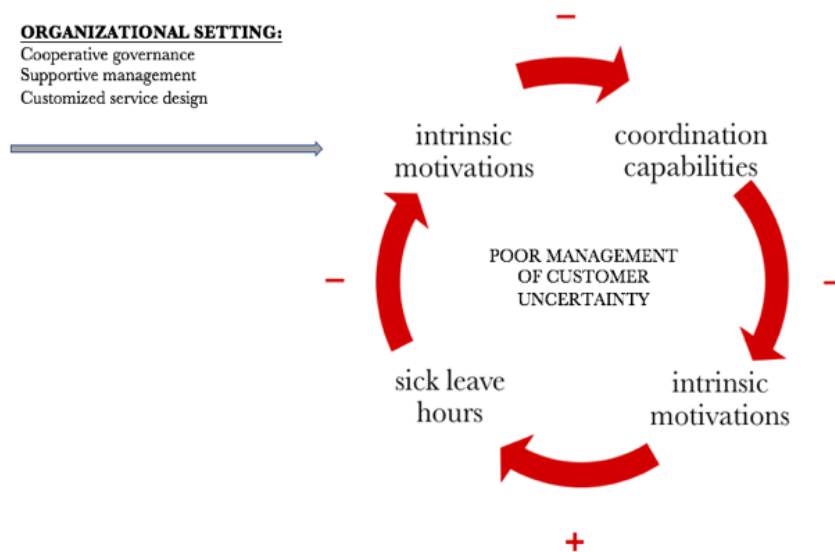
Source: Author's contribution

Appendix 4

Interpretative Model of Virtuous and Vicious Cycle



Source: Author's contribution



Source: Author's contribution

Appendix 5

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
Cooperative	.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	-.00	.05	-0.11	0.91	-.10	.09
standards						
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