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Identification of the Profile of Vulnerable Population to Elaborate Efficient Employment Strategy: Proposition of a Quantitative-creative Approach

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ABSTRACT

Brazilian public managers have been structuring and updating policies to support workers' employment and income strategies. However, when the vulnerable individual has social, emotional, or technical limitations, success in this operation becomes uncertain. This research aim was to propose a methodology to identify profiles in vulnerable populations, viewing to promote the efficient elaboration of employment and income strategies. The unit of analysis was vulnerable population of waste pickers, in a large city from South Brazil, in the scope of a municipal program named "All of us are Porto Alegre". A literature review allowed the identification of tools from marketing, economy and design adequate to profile analysis. A workshop with social educators responsible for giving support to the individuals. Insights from workshop and the literature allowed the proposition of a methodology including cluster analysis and the creative tool named personas. The methodological approach suggests it is adequate in confirming the differences in profiles. The theoretical contribution lies in the use of quantitative-creativity tools to support policymaking. The practical contribution is to provide consistent information for governmental decision-making at the labor access market.

1. Introduction

According to [1] "The current estimated impact of COVID-19 pandemic on global GDP growth for 2020 is around -4%, with substantial downside risks of containment policies are prolonged. Output losses are larger for major economies. Expectations at the begging of 2020 were that the coronavirus pandemic's effects would be more

severe in public health and economic fronts of developing countries, like the BRICS. Nevertheless, concerning the economic field subject, developing economies have seen "massive capital outflows and large price declines for certain commodities, especially oil and nonprecious metals, but net capital outflows are in line with earlier commodity price shocks" [2].

The number of posted vacancies experiences a brutal and

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persistent decrease since the beginning of the COVID-19 crisis. With a contracting labor demand and an expanding pool of registered unemployed, one could expect that the most affected by pandemics would be the vulnerable populations. Despite the definition of vulnerability is broad in literature, including those subjected to natural disasters, poverty, health, housing problems, work, and gender^[3,4]. The Brazilian Ministry of Labor and Employment defines as vulnerable groups in the world of work people with:^[5] “a low level of education or training and professional qualification, the young and elderly, people with special needs, blacks, women, indigenous people, and other ethnic groups and, in some cases, national or international migrants”. More recently, the Economic Commission for Latin America and the Caribbean – ECLAC^[6] shows that indigenous peoples, blacks, and women are among the groups most vulnerable to the labor market and poverty.

The challenge for developing countries’ managers is to conciliate the losses provided by pandemics and former losses from globalization and the ever more technological and competitive markets, with social inequalities faced by the Brazilian population, for instance. Historically speaking such reconciliation only received greater attention and, consequently, efforts on the part of the government, from the 1990s onwards. It was during this decade that Brazil experienced a period of stagnation concerning the growth of formal employment, in which there was no accentuated growth in unemployment and no increase in the precariousness of living and working conditions. In this scenario of disruption of the labor market, employment policies were implemented^[7].

According to^[8] among the public employment, work and income policies (PEWIP) created to minimize the difficulties faced by workers in this period are the so-called passive and active employment policies. Passive policies include unemployment insurance and salary bonuses whose social relevance, even today, is indisputable and affects a significant portion of the country's population. On the other hand, active labor and employment policies are equally important for the scope and effectiveness of PEWIP, as is the case of professional qualification and labor intermediation. Both active and passive, specific policies for employment and income issues were designed and focused as mass strategies, especially at the federal and state levels. When it comes to solving problems for a specific population and at the municipal level, mass strategies do not always bring the expected results, as observed in the "All of us are Porto Alegre" program (TSPoA). The program, devoted to the vulnerable population of waste pickers, performed from 2013 to 2016 in Porto Alegre city. The large capital of Rio Grande do Sul state,

has revealed such a situation.

In the program report published^[9], at its very beginning, the program managers introduce the commitment to promote access to work and income alternatives for drivers of HTV (Human Traction Vehicles) and ATV (Animal Traction Vehicles) who circulated by the city's streets. Waste pickers worked in precarious and subhuman conditions, collecting waste for later sale in the recycling market, sometimes pulling large carts (HTV) or driving horse-drawn carts (ATV).

The Municipal Secretariat for Local Governance (SMGL) of Porto Alegre developed an active and mass strategy that consisted of understanding the individual needs of collectors, via interviews performed by Social Educators. Once professional aspirations had been identified, the waste picker should undergo technical qualification in their area of interest and referral to job vacancies, abandoning the activity of collecting waste. However, the population of more than 1000 individuals was not uniform in terms of being successful in carrying out training and reintegration into the labor market. Therefore, the active and mass strategy could be useful for a portion of this population, but not for all individuals. This arouses the hypothesis of existence of sub-profiles in the population. These individuals not only did not adhere to the program but some of them declared the desire to remain in the waste collection activity, to the surprise of all the program team involved. The policymakers’ premise that the vulnerable individuals wanted to leave the activity of waste pickers was false and “put the program strategy in check”. This entire context raised the following research question: “how to identify the existing profiles inside a social vulnerable population to develop specific work and income policies?”

Therefore, this research aim was to propose a methodology to identify profiles in vulnerable populations, viewing to promote the efficient elaboration of employment and income strategies. The unit of analysis was the "All of us are Porto Alegre" program. The theoretical contribution of this research is the application of tools used in product design and marketing to solve a public sector problem. The contribution to practice is to improve techniques devoted to the definition of strategies aimed at vulnerable populations, which leads to their greater adherence to public programs and policies.

2. Theoretical Background

Despite the context behind this research is the public policy of income and labor the focus is the proposition of tools that support a more assertive definition of public policies in the area. Therefore, we start this section with the

conceptualization of public policies for work and income existing in Brazil. Next subsection presents methods used for reaching a target audience. Analyzes are carried out in three areas: marketing, economics and design. Finally, the concept of personas and their applications are presented.

2.1 Public Employment and Income Policies in Brazil

The Institute for Applied Economic Research - IPEA ^[10] introduces the discussion about the history of Brazilian employment policies stating that, “unlike the more developed economies that at the end of World War II started a long path towards structuring their public systems of Brazil only began its experience in the 60’s”. In the second half of the 20th century, both the emergence and consolidation of Brazilian employment policies occur ^[11]. It was, therefore, a discontinuous process, which began in the 50’s and was stabilized only decades later, in the period of the 80’s and 90’s, when there was the creation and regulation of the Unemployment Insurance Program, the main institutional foundation of the policies of Brazilian employment.

Concerning the classification of employment and income policies in Brazil, they are split in two focus of action: the passive and active strategies. Passive policies use the level of employment or unemployment as information. Their purpose is to provide financial support to the unemployed worker or to balance the demand for labor supply. The most popular tools of these policies are unemployment insurance and/or indemnity for workers dismissed, as well as early retirement, marginalisation of the population and reduction of working hours ^[12]. With regard to the main active policies of the Unemployment Insurance Program, ^[11] classifies them as labor intermediation and professional qualification. Active policies’ objective is to improve the unemployed person's access to the labor market ^[13]. Generally, these policies are intended to improve the quality of labor supply, generate demand for work and thus more efficiently mediate the meeting between job providers and job seekers.

An important historical moment at policies formulation comes right after the structural reforms at the end of the last century. Brazil in this period enjoyed considerable economic development, but faced its consequences between 2006 and 2007, highlighting the shortage of skilled labor in the country ^[14]. In view of the current deficit, it fell to the government of President Dilma Rousseff (2011-2014) to dynamize the expansion of the offer of professional courses. Beyond the expansion of the federal network of professional education, it was reactive tools to unite different parts of the society via the partnership system, resulting in the Program for Access

to the Technical Education and Employment System (Pronatec), whose bases were launched right at the beginning of its first term ^[15]. Pronatec’s main investment was the professionals’ qualification. Therefore it is considered as an active strategy for income and labor.

It is important to point out that the effort made during this period gave rise to a new approach in Brazilian employment policies. The objective at that time was to serve groups previously marginalized and discriminated at the labor market. The Pronatec purpose was not restricted only to target the public served, but also extending to the development of differentiated qualification methods ^[10]. Due to this fact and because it was offered abundant labor vacancies at the time, Pronatec was the initial strategy and gateway for many beneficiaries of “All of us are Porto Alegre” Program. Pronatec was a structuring policy for professional and technological education in the country ^[16]. Among the great challenges faced by managers of Pronatec, the main ones were guaranteeing the quality of courses throughout the country. The change in the logic of the offer of professional education, which should be based on the demand of the labor market, but has always been defined by educational institutions capabilities, was among Pronatec’s challenges also.

2.2 Search for Standards in Economics, Marketing and Design

The origin of the concept of standardization that is as old as the history of civilization ^[17]. The Second World War triggered the need for standardization, when the United States, due to the Japanese attack on Pearl Harbour, needed to adapt its industries, especially mechanical and metallurgy. To optimize time, production activities were divided among the various companies that had the greatest affinity for each item. The parts started to be produced in distant places and then centralized in a place where the assembly was carried out. The standardization of measurements and tolerances so that the pieces fit together was what provided the success of the operation.

Currently, the standardization concept, already rooted in several process improvement methodologies, is important in all links of society. Any and all initiatives, whether public - such as policies for access to employment and income - or private - such as the launch of a new product - requires a prior analysis, that is, a diagnosis that investigates and brings consistent information about the population that will be reached. For the economy and marketing fields, “target audience is the segment of the population that one intends to reach with a sales strategy”. The marketing, economics and design areas have developed ways of segmenting and describing the profile of the target audiences

they intend to reach. Subsequent items describe tools and practices proposed by these knowledge areas.

In the marketing area, the main issues that generate reflection and search for effective methods of analysis and deepening of the context of the market and consumer society are: market segmentation, choice of target audience and positioning. In Brazil, market segmentation is not used as a central theme of research, the application of this method is mainly intended to analyze the profile of those surveyed and there are few managerial implications outlined. In addition, there are no reference authors in Brazil on the subject, which is a topic treated by many researchers in a discontinuous way^[18]. Nevertheless Multivariate statistics are broadly used to study marketing segmentation^[19-21]. Multivariate tools will be described in section 2.3.1.

When it comes to economics, one of the relevant issues that generate studies is the behavior of the so-called Economically Active Population (PEA). The PEA involves what the Brazilian Institute of Geography and Statistics (IBGE) classifies as an employed population. It is a population that is employed or has conditions to work and that makes some effort to do so.^[22] An analysis was performed of this group comparing, during the period from 2005 to 2015, the representation of men and women from six metropolitan regions in the market labor^[23]. To understand the behavior of each group, the institute applied several statistical techniques. For instance,^[24] was determined and assessed direct and indirect socioeconomic impacts of the population affected by the National Irrigation Policy in Minas Gerais state using Cluster Analysis.

Design has been disseminated since the beginning of the 80's and thanks to disclosures made by the Memphis Group's press. This area received its worldwide repercussion, which should continue to reproduce during this century and the next ones^[25]. There is unanimity among corporations and institutions worldwide that give credit due to the strategic value that design provides, so they continue to cultivate and improve it on a large scale. Among the many concepts arising from Design, User-Centered Design (UCD) search for user understanding, or also known as target audience. The UCD approach is used to develop solutions where the focus on building products is directly adapted to the characteristics and needs of users, aiming at ease of use and what they consider useful^[26].

The focus in this section was in three distinct knowledge areas that apply techniques with the purpose to describe a target audience profile. The techniques allow finding similarities among individuals with the aim of creating specific treatment for the identified segments. More information on statistical and design tools that have

been useful in building groups and describing profiles, as shown in next section.

2.3 Market Segmentation Tools and Individual Profile Analysis

The practices and tools presented in this topic will be classified into statistical (multivariate data analysis) and design (personas) tools.

2.3.1 Multivariate Data Analysis

Among the existing statistical techniques, multivariate analysis comes as an alternative to the simultaneous analysis of multiple measures regarding individuals or objects that are under investigation^[27]. These statistical tools are disseminated among different areas. In the research of^[28] multivariate statistical techniques were used to find the relationships between human capital and economic development. Another review sought to evaluate professional courses from the Free Software Education Program^[29], and also the investigation of^[30] made use of digital images to determine the pH of water, applying multivariate analysis methods as well. This demonstrates the range of possibilities that this set of tools provides, having no context limitations to be applied.

However, when the central question of the study is to describe the target audience, which is the case in this article, the most used tool is cluster analysis. For example,^[31] use of cluster analysis to the identification of important characteristics and parameters to guide the construction of a differentiation strategy in food retail, from the perspective of the consumers themselves. This specific case is in line^[32] who states that to determine market segmentation. The most referenced statistical tool is Cluster Analysis.

Cluster analysis is a multivariate classification technique that allows the researcher to separate or classify objects observed in a group or in a specific number of mutually exclusive subgroups or clusters, so that the formed subgroups have characteristics of great internal similarity and great external dissimilarity^[33]. Regarding the ease of application,^[34] state that cluster analysis is a simple method, standardized in distance calculations, but it does not require statistical knowledge for its application, unlike when using analysis of variance, regression or factorial. Cluster analysis does not require the use of a model as others do.

2.3.2 Personas

When it comes to trying to design mental models of users that are composed of their expectations and experiences, the proper way cannot be through common

sense, but through research ^[35]. Persona is a design tool that results in a typified representation of the user based on their behavior and goals, that is, it refers to the development of user patterns to represent a large population ^[36]. For new product development teams, initiatives focused on innovation and meeting the expectations of the target audience/customer, personas is a method to improve engagement and reality ^[37].

Regarding the contributions of using Personas in the development of technologies, ^[38] highlights some points: supporting the development team with regard to understanding the characteristics of a group of users, proposes solutions directly related to the main needs of users. Personas becomes a design classification tool, supporting design decisions, when the value perception serves as a communication reference.

3. Methodological Procedures

In this section, the steps of the method applied in the study will be detailed, starting with the description of the unit of analysis followed by the characterization of the research.

In Porto Alegre, capital of Rio Grande do Sul state – Brazil, since the application of Law n. 10,531, which prohibited the circulation of Human Traction Vehicles and Animal Traction Vehicles (HTV and), the City Government was committed to supporting the population that would be affected. A number of about 3,000 families lived off recycling through the collection, transport and sales of recyclable materials. This was the problem that the “All of us are Porto Alegre Program (TSPoA) was supposed to solve. This social initiative took place between 2013 and 2016, with the objective of improving the city's recycling system and positively impacting the lives of the people involved in recycling activities. The Program was divided into three projects. Project 1 - Productive Inclusion of beneficiaries in the labor market; Project 2 - Restructuring of the Recyclable Waste Units in the city, and Project 3 - Environmental Education of the city society. Project 1, is the object of study of this research. It was developed via the work of around 50 professional social educators, who approached, registered and monitored the beneficiaries in the process of reinsertion in the labor market, the so-called Active Search (AS) Educators’ teams. The Program offered scholarship payments so that beneficiaries could receive professional qualification in another profession and other support for entering the labor market. This action also involved support and articulation with the city's services to provide access to: health, education, documentation, among other issues.

3.1 Characterization of the Research Method

To answer the research question "how to identify the different profiles existing in a population in situation of social vulnerability to develop specific work and income strategies?" a descriptive research was outlined. It portrays facts of a certain reality, seeking to observe record, analyze and interpret them, without causing interference. Its focus is exclusively on describing the characteristics of a population or event, thus accurately obtaining the frequency of phenomena, interaction with others, and their idiosyncrasies ^[39]. The research carried out may also be characterized as qualitative and creative. A seminar held with the Active Search Educators’ teams resulted in insights for proposing an adequate methodology to answer the research question.

3.2 Characterization of the Work Method

The research was carried out in three stages: (i) literature survey; (ii) analysis of the Active Search Educators’ records and (ii) qualitative stage, related to a workshop. The literature survey was performed by searching in the Web of Science and Scopus databases using the keywords labor policy; vulnerable population; target public profile and marketing research. The other stages are described next.

3.2.1 Analysis of the Active Search Educators’ Records

The Active Search teams carried out their work in regions impacted by the ban on the circulation of HTV and ATV. The five regions were (i) Islands, (ii) Gloria/Cruzeiro/Crystal, (iii) South/South Center, (iv) Lomba/Partenon, (v) North/Northwest. The 50 professionals were from the areas of social work, psychology and sociology and had the task of carrying out the approach, registration and monitoring of beneficiaries. The monitoring record was carried out through charts that were qualitative reports on the beneficiary's profile, his family information and his main need. The information supported the Active Search Educators teams in deciding which strategies would be adopted for the beneficiary to enter the labor market. This material is available at the headquarters of the NGO Cejak (James Kulisz Cultural Center) which carried out the work of the Active Search. Through the content analysis of these records, respecting the confidentiality of information, it was possible to verify the difficulties faced by the teams in monitoring some beneficiaries, reports of health problems, housing problems and little educational training. While some beneficiaries joined the program, accepted to take part in professional qualification courses and accepted to be included in the job vacancies offered,

other beneficiaries did not stay in the program and all the effort was in vain. This analysis evidenced the existence of differences among beneficiaries in the studied population. A sample of 406 records were evaluated for socio-demographic description of the population.

3.2.2 Qualitative Stage – Active Search Workshop

The starting point of the workshop with the Active Search Educators teams, aimed at understanding the characteristics of the beneficiaries to design specific adherence approaches to the program, to develop standardization of practices, to address main problems and develop consensus response for problems. Therefore, workshops were held with the 5 teams distributed in the regions where the Program was carried out: Islands, Glória/Cruzeiro/Cristal, South/South Center, Lomba/Partenon, North/Northwest. The program coordination team promoted the events that occurred periodically. The events allowed the reassessment of actions and replanning of strategies when necessary. Nevertheless, the workshop described in this research presented a specific objective: to identify different profiles among the beneficiaries, since the Active Search Educators had already mentioned differences.

The workshop dynamic was: (a) splitting of Active Search teams into their work groups; (b) appointment of a guiding question: “what are the characteristics and typologies of the monitored beneficiaries?”; (c) construction of posters with the classifications created by the teams; (d) analysis of the posters.

It was expected to identify differences among beneficiaries in the city regions that went beyond the type of vehicle they used to collect recyclable materials. Through this evaluation, it would be possible to assess more effectively whether the strategy adopted by the program was being adequate for the majority of beneficiaries, which strategies could be done for those who had complex professional and life circumstances. The posters created by the teams were used as evidence of discussion. The data from workshop discussions were written and recorded. Records were further transcribed. The material was analyzed via content analysis.

4. Results and Discussion

With the purpose of validating the hypothesis of the existence of different profiles among TSPOA program beneficiaries the results of the methodology are described next, supported by the perception of social educators.

The analysis of Active Search Educators’ records allowed performing a descriptive evaluation of a sample

of beneficiaries served by the “All of us are Porto Alegre” program. Table 1 presents the distribution of individuals in the population.

As shown in Table 1 women are the majority in all regions attended by the program. They comprise 59% of the sample, in some regions the proportion is even greater, such as in the Islands region, in which they add up to 77%. Out of these 241 women, 71% were responsible for supporting the family. In this case, they are the individuals to whom the program was designed for, the cart drivers. The others were the beneficiaries’ wives or daughters and were also entitled to be monitored by the Active Social Educators. This result of female predominance was already expected, because in the day-to-day of the teams, the female presence was noticed, being the majority in participating of professional qualification courses or referrals to job vacancies.

Regarding the origin of the public, most beneficiaries monitored were from Glória/Cruzeiro/Cristal region, as demonstrated in Table 2.

The Gloria/Cruzeiro/Cristal group represented 43% of the sample, and the group with fewer individuals being monitored were from the North/Northwest. They represented only 5% of the sample. It is evident the proportion of information collected according to the size of the region and the team that performed the work. With regard to education profile, Active Social Educators’ records also revealed that most of the sample in all regions presented low education levels. The educators mentioned that there was still expressive evidence of illiteracy and lack of information during beneficiaries monitoring. It is noteworthy that the teams reported that even some beneficiaries declared to have formal education; in practice, most of them did not have compatible capacity, demonstrating functional illiteracy, which hindered their insertion in the labor market.

The following results were approached regarding the Active Search Educators’ workshop. Taking the steps proposed in methodology section, each group presented the result of their assessments. The Active Search Educators responsible for monitoring the region named “Islands” reinforced the following limitations observed in beneficiaries:

(...) most are individual collectors, they do not have HTV (Human Traction Vehicles) and ATV (Animal Traction Vehicles) and they perform their work in their own home or in clandestine sheds. Many are illiterate, which hinders the referral to vacancies in courses offered by the program, which also makes adherence difficult, as they consider themselves not prepared to occupy a vacancy in the labor market and they feel excluded from

Table 1. Sample profile

Feature	City region													
	Glória/ Cruzeiro/ Cristal		South/ South Center		East/Northeast/ Axle		Islands		North/ Northwest		Lomba/ Partenon		Grand total	
	n	%	N	%	n	%	n	%	n	%	n	%	n	%
Gender														
Female	95	54,3	35	61,4	34	56,7	27	77,1	14	63,6	36	63,2	241	59,4
Male	80	45,7	22	38,6	26	43,3	8	22,9	8	36,4	21	36,8	165	40,6
Scholarity														
1st a 4th grade	37	21,1	21	36,8	16	26,6	9	25,7	7	31,8	11	19,3	101	24,8
5th a 8th grade	60	34,3	25	43,8	22	36,6	19	54,3	11	50,0	24	42,1	161	39,6
Complete Elementary School	4	2,3	1	1,8	4	6,7	1	2,8	1	4,6	5	8,8	16	3,9
Incomplete High School	11	6,3	6	10,5	6	10,0	1	2,9	0	0,0	3	5,3	27	6,7
Complete High School	4	2,3	0	0,0	5	8,3	0	0,0	0	0,0	3	5,3	12	2,9
Complete University	0	0,0	1	1,7	0	0,00	0	0,0	0	0,0	0	0,0	1	0,3
Illiterate	18	10,3	1	1,8	4	6,7	3	8,6	2	9,1	1	1,8	29	7,1
No information	41	23,4	2	3,5	3	5,00	2	5,7	1	4,6	10	17,5	59	14,5
Time of participation in the Program														
Up to 3 months	0	0,0	0	0,0	0	0,0	0	0,0	0	0,00	0	0,0	0	0,0
From 3 to 9 months	26	14,8	5	8,7	9	15,0	0	0,0	8	36,4	5	8,7	53	13,0
From 10 to 14 months	54	30,9	29	50,9	12	20,0	20	57,1	4	18,9	3	5,3	122	30,1
Over 14 months	95	54,3	23	40,4	39	65,0	15	42,9	10	45,6	49	85,0	231	56,9
Total	175	100,00	57	100,00	60	100,00	35	100,00	22	100,00	57	100,00	406	100,00

Source: the authors

society (Leader of AC Educators from the Islands region declaration).

Table 2. Distribution of beneficiaries by Social Education Teams in city regions

Social Education team by city region	Number of beneficiaries monitored	%
South/ South Center	130	11%
Glória/Cruzeiro/Cristal	364	30%
Islands	153	12%
East/Northeast/Axle	224	18%
Lomba/Partenon	190	15%
North/Northwest	169	14%
TOTAL	1230	100%

Source: the authors

The North / Northwest team declared the lack of housing and basic sanitation on the part of the beneficiaries, some with symptoms of depression.

(...) it is a region with a predominance of drug trafficking in some places, with a high birth rate, but with a lack of day care centers, and a differential it is the existence of a necessary amount of elderly people who carry out the activity of collection (Leader of AC Educators from the North/Northwest region declaration).

The East /Axle and Northeast educators’ team declared

the existence of resistance on the part of some beneficiaries. The existence of beneficiaries with psychological illnesses and drug users. They also identified the existence of family sheds, predominance of young adults that are waste pickers in the region. The Lomba/Partenon team shared that there is a considerable number of elderly people among its beneficiaries, many also with more than two children. They also observed a predominance of functional illiterate people, drug and alcohol users.

(...) residents of precarious housing, are very hardworking, but they are afraid of prejudice therefore they do not seek new employment alternatives (Leader of AC Educators from the Lomba/Partenon region declaration)..

The South/Center South team declared the existence of beneficiaries with low education. They also pointed out the possibility of the existence of at least 3 profiles of beneficiaries.

(...) in our opinion there are at least 3 different profiles of beneficiaries in the program: (i) the situational scavenger, who picks waste only occasionally, when he/she has no other income activity; (ii) the classic/professional waste picker, who has years of experience, identifies himself/herself with the activity and performs

it in a professional and organized manner; (iii) and the carter, the one who transports loads of any type in the city driving his/her ATV, including waste. (Leader of AC Educators from the South/Central South region declaration) (see Table 3).

Table 3. Profiles types named by South/Central South Educators’ team

Situational picker	Classic/professional waste picker	Carter
This beneficiary is the most frequent. He/she picks waste only occasionally, when he/she has no other income activity	This is the moderate frequent beneficiary. He/she is a waste picker with years of experience, identifies himself/herself with the activity and performs it in a professional and organized manner	This is the less frequent beneficiary. He/she generally came from the country side to live in the city, reason why he/she owns a horse and a cart. He is proud of making the transportation of loads of every type in the city, including waste

Source: the authors

The other teams’ members agreed with this description, which was still intuitive and subjective. This classification was fruit of the perception of the South/Center South team as a way of classifying the different types of profiles that they have identified via their monitoring work.

Taking as a premise the existence of some typology in the waste picker population, resulting from the workshop, a new team was gathered during the execution of the Program, called the Planning and Analysis team, to formulate an in-depth research on the profiles identified in the seminar. Among the members of this team there was the researcher and author of this work, an Industrial Engineer, a researcher in the Production Engineering area, the Project 1 Coordinator, a Sociologist and a Psychologist, both members of Action Search teams.

Taking as reference the literature discussed in section 2.3 of this paper, “Market segmentation tools and individual profile analysis” a creative brainstorming was performed by this group. The result pointed to the combination of cluster analysis technique and personas as a way of defining profiles inside the waste picker’s population (Table 4). The intention was to use formal techniques to reveal in a systematically way if the profiles observed by Action Search Educators were confirmed (via cluster analysis) and to document graphically these profiles using personas.

Table 4. Segmentation techniques proposed to confirm beneficiaries’ profiles

Characteristics	Cluster analysis	Personas
Description	It is a multivariate classification technique that allows the researcher to separate or classify objects observed in a group	Tool that results in a typified representation of the user based on their behavior and goals

Characteristics	Cluster analysis	Personas
Nature	Quantitative	Qualitative
Purpose	It separate specific number of mutually exclusive subgroups or clusters, so that the formed subgroups have characteristics of great internal similarity and great external dissimilarity	It refers to the development of user patterns to represent a large population
Requirements	It is necessary to develop an instrument for data collection	Demands criteria definition and descriptive information to support profile design
Origin	Statistics	Design

Source: the authors

As the Planning and Analysis team decided then to define criteria for classification of the beneficiaries of the “All of us are Porto Alegre” program. The criteria were developed taking into consideration information from the workshop with educators and the theoretical framework [11,12,16]. These criteria would be the basis for development of the data collection instrument for further cluster analysis (Table 3, 4 and 5).

The instrument is divided in 3 blocks. The first is for descriptive analysis (name, gender, education, etc.). The second block is criteria relative the beneficiary relationship with the waste picker activity. The workshop has revealed to exist different interest and relationship among beneficiaries. Therefore, it was considered an important profile discriminant. The third block concerned their income and psychosocial characteristics, including, health, housing, salary information. Later, the Active Search educators validated the instrument blocks and questions (Table 5).

Considering the low education level of beneficiaries Planning and Analysis team decided to develop an instrument that would be filled out by the Active Search educators, pointing out the perception they had of the beneficiaries. An assessment scale was also developed by the planning and analysis team and validated by the Active Search educators.

The scale considered values from 1 to 7 and started with items corresponding to the General Information, as shown in Table 6. The scale chosen for the evaluation of the Dimensions I and II was the Likert (Table 7), as it contemplates the objective of the study to check the level of acceptance of an individual regarding a proposition.

This can convey something favorable or unfavorable in relation to some psychological and/or behavioral issue [40]. The instrument was submitted to the Social Educators’ assessment and adjusted according to suggestions and limitation mentioned by them. Since the number of beneficiaries involved was greater than 1000 people and considering the resulting operational limitations, the

Table 5. Description of the instrument proposed for cluster analysis data collection

BENEFICIARY GENERAL INFORMATION	
ID number	
Name	
Gender	
Social Educator responsible for monitoring the beneficiary	
Beneficiary's education degree	
General information	
Time of participation in the Program (months)	
DIMENSION I - CRITERIA LINKED TO THE BENEFICIARY'S WORK	
Questions	Description
(A) How structured is the beneficiary's work	The beneficiary maintains an established working routine, has a network of clients.
(B) How much does the beneficiary is identified with the waste collection work	The beneficiary likes what he/she does and would like to continue in the area
(C) How much does the beneficiary perceive the tangible (financial) value of the work	The main value perceived by the beneficiary is that the waste collection action generates revenue and sustains him/her.
(D) How much the beneficiary perceives the intangible value of waste collection work (eg Environmental)	The beneficiary realizes that in addition to generating income, the work helps to improve the environment, for example, or other intangible values and he/she is proud of it.
(E) How much the work represents for the beneficiary values other than financial/environmental (family, cultural, transgenerational)	The beneficiary has been carrying out the activity for a long time, his family already had a cart and he/she is proud of the work he does. He feels fulfilled; he owns an asset that generates income (the horse and the cart). Possibly the children will be able to continue the business.
(F) How much has the beneficiary already sought to improve the waste picking work they do throughout his/her history	Over time, he sought to specialize in doing it, seeking new strategies and resources.
(G) How much does the beneficiary want to change jobs	The beneficiary has no commitment with the waste picking work and is eager to change activities.
(H) How much does the beneficiary have adherence to the All of us are Porto Alegre program purposes	The beneficiary understands the purposes of the program, he/she promptly adheres to the proposed activities and perseveres in them. Accepts referrals, fulfills his/her responsibilities and generates results for his/her life; he/she accesses the program team frequently for building purposes.
DIMENSION II - OTHER INFORMATION ABOUT THE BENEFICIARY	
(I) Chemical dependency/alcoholism/others	The beneficiary has a chemical dependency.
(J) Mental health condition	The beneficiary has some kind of problem regarding his mental health.
(K) Physical health status	The beneficiary has some kind of problem regarding his physical health.
(L) Housing situation	The beneficiary has some type of problem regarding their housing.
(M) Income status	The beneficiary has some kind of problem regarding his income.

Source: the authors

Active Search Educators who had been monitoring each beneficiary since 2014/2 were considered suitable to perform the beneficiary analysis and instrument fulfilment.

Table 6. Evaluation Criteria: General Information

Gender	Scholarity
Female = 1	1st a 4th grade = 1
	5th a 8th grade = 2
	Complete Elementary School = 3
Male = 2	Incomplete High School = 4
	Complete High School = 5
	Complete University = 6
	Illiterate = 7

Source: the authors

Table 7. Evaluation Criteria: Dimensions 1 and 2

Dimension Scale 1	Dimension Scale 2
99= Impossible to evaluate criteria for this beneficiary	99= Impossible to evaluate criteria for this beneficiary
0= The criteria has no relation to this beneficiary	1 = No dependency
1 = The criteria has a weak relation to this beneficiary	3 = Weak dependency
3 = The criteria has moderate relation to this beneficiary	6 = Moderate dependency
9 = The criteria has a strong relation to this beneficiary	9 = Strong dependency

Source: the authors

5. Practical Implications

It was observed in this investigation that women were the majority in all regions and responsible for sustaining their families. With regard to education, most of the sample in all regions showed low education and still expressive results of illiteracy and lack of information. It is noteworthy that the teams at the time reported that even with some declared education; in practice, most beneficiaries did not have compatible capacity, even with many cases of functional illiteracy, which hindered their insertion in the labor market.

The reality faced by the “All of us are Porto Alegre” program faithfully portrays the country at the time and which is perpetuated today. Approximately 635,000 Brazilian workers are considered difficult to relocate to the labor market, due to their low level of education, in addition to other limitations such as doing math and expressing themselves. This situation brings the need for the companies themselves to offer courses and training, which is not feasible in all cases ^[41]. The scenario of

recent years, illustrated by the public of “All of us are Porto Alegre” program, only reinforces the need for public employment and income policies that understand the reality of vulnerable populations, through the implementation of personalized strategies.

6. Final Considerations

The constant change in the dynamics of the labor market, the lack of qualification of the population and consequently the increase in informality brings challenges to the private sector, but mainly to the public authorities. Almost three decades ago, Brazil consolidated its employment and income policies, which aim to support workers for the labour creating conditions to remain qualified to meet the demands of the market. However, in some cases, these mass strategies are not adapted to the complex reality of vulnerable populations. This problem took place in Porto Alegre capital during the program that sought to support the productive reinsertion of former waste pickers and carters in labor market. The situation raised the suspicion that there were differences among the interests of the population monitored by social educators. Aiming to identify these dissimilarities in a structured way, literature techniques like cluster analysis and personas, were combined.

The cluster analysis and the persona is a quantitative-creative approach proposed in this research for identification of the profile of vulnerable population to elaborate efficient employment strategies. The combination of the statistical and design tools was not mentioned in literature investigated in this research. Literature mentions the use of multivariate statistical tools, with emphasis on the analysis of clusters that segregate into groups that have characteristics in common, and also the use of design methods, with reference to the construction of personas for marketing purposes.

Between the years of 2015 and 2016, the technical team of the program investigated in this research structured a data collection instrument that contemplated key issues for the grouping and differentiation of the monitored population. The fact that the Active Search teams must fulfill the questionnaire and not the beneficiaries themselves makes it important to discuss the way social educators performed the monitoring of each beneficiary and how they maintain the reported of their characteristics. The differences on monitoring and report may, ultimately, influence the questionnaires accomplishment and affect the clusters definition.

The application of the data collection instrument for cluster analysis of the waste pickers population and profile

design via personas is a suggestion for future studies. It is also understood as future work the structuring of a monitoring methodology focused on supporting the insertion into the labor market of vulnerable populations, with the premise of carrying out a diagnosis, which may be like the one applied in this article, which identifies the different profiles and complexities.

For the success of this methodology, it is necessary to build qualification programs that consider market demand and regional social aspects, such as access to education, health, safety and housing. Given the above, it is important to emphasize that when it comes to policies in developing countries like Brazil, it is necessary to have as a premise the reality of social and economic inequality of the population.

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