Using semantics to interpret learning needs by organizational climate surveys

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Abstract

Organizational climate survey is a typical tool used to understand and monitor individual, team and organizational features factors that distinguish the company climate.
Performing this activity in the final phase of a pandemic means collecting information about changes that remote working brought to the work processes and to the new each organizational dimension, highlighting present or future transformation paths. It is also an implicit survey of potential training needs. The construction of a new dimension of working spaces, which we can describe as an *organizational metaverse*, happens thanks to the real and deep understanding of changing needs and dynamics in the working processes. Organizational health in terms of identity, relationships, processes, and work results, also represents a starting point for the exploration of new learning needs of the organization. The transformation makes the organization be more and more dynamic, making it to function as a multiform organism, in which the multiple relational dimensions in real and the virtual world means an identity re-construction and new forms of sociality: it may increase sharing and comparison and rise new needs that the company must know. Combining the climate survey with NLP analysis tools to understand the expressed meanings in written open questions and a collaborative activity, represents a significant experimentation of the multiple dimensions connected between the individual and the organization that becomes not only a physical place, processes, and results, but an increasingly social dimension that must be fully understood. From the analysis of the post-pandemic climate, the organization must be able to understand new useful meanings and need to support its progressive improvement and the well-being and individual satisfaction.

Keywords

organizational climate analysis, semantics, collaborative learning, organizational learning needs

1. Introduction

Organizational climate became over the years an interesting subject of research, turning into a lens with which is possible to understand business and organizational environments from both structural and psychosocial points of view. The focus on these studies has been supported by the interest in discovering how to involve the human and social dimensions in organizational development. The climate survey, in these cases, becomes a fundamental tool to identify the areas of improvement and the strengths to work on and to start an effective changing process in the organization. Providing an unambiguous definition of "organizational climate" is not immediate, since research on this topic has seen this subject from different points of view. This led to the definition of several operational dimensions and as many theoretical approaches. In literature, from the first structural vision [1], linking the organizational climate exclusively to business data, there has been a gradual integration of perceptive [2], interactive [3,4] and cultural [5] dimensions, considering first the individual and then the group as active builders of the organizational climate. The currently shared theoretical models are part of the cultural approach, which assigns to the organizational culture a fundamental role in the construction of the organizational

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climate, together with the interaction between individuals. The chance of a constructive exchange, source of shared perceptions, becomes real thanks to the existence of the organizational culture, a set of meanings co-constructed and shared by the members, also guiding their thinking and behaviour [5]. The organizational climate is now intended as a *set of perceptions and meanings shared by the members of a company in relation to policies, ideologies, practices, and processes characterizing the daily work experience of each*. [3, 4, 6].

The project presented in this work is aimed to respond to the specific needs expressed by the company Piazza Copernico, a rapidly growing reality which is now facing the pandemic COVID-19 emergency through a restructuring plan of working practices and methods of communication. Its transformation was mainly linked to the "virtualization", more than a digitalization, of social relationships, mainly as a change in the communication forms and logics, but also as a progressive process of autonomy and responsibility at work for employees. Investigating these aspects is strategic for a major transformation of work processes, which has resulted first in a forced change to full *smartworking* (i.e. work from home), then a progressive rebalancing of the work experience in a hybrid model, first regulated and then spontaneous [7]. While this process undoubtedly has positive advantages for the company and for people, some aspects are highly critical in individualization vs isolation, in the creation of subcultures, and in the implications of zoom fatigue [8], stress and burn out.

The theme of the research was the desire to investigate the individual and organizational impacts of this transformation into what could be defined as the construction of a new dimension of working spaces, that we can define as *organizational metaverse*. A single individual represents a virtual working world connected to others, the work teams represent other dimensional space level, until to the company as a universe itself. Thus, the individual is simultaneously immersed and interconnected in multiple dimensions with different rules, logics, symbolism/meanings, and patterns of intervention, having to regulate his action in parallel in all these worlds.

From the organizational point of view, therefore, there is the important need to understand individuals' experiences, their opinions, but also the aspects of concern, to be able to act on the available leverages to improve working well-being, promoting a conscious use of available tools, and working on soft strategic skills. The climate survey represents therefore a fundamental moment also to investigate the latent formative needs, also in relation to the adaptive and transformative ability of the people and to the current changes in companies. The climate survey is currently recognized as one of the action strategies, described [9] as participatory and shared actions implemented within the company. Specifically, action research [10], action science [11], action Inquiry [12] and action learning [13, 14] are recognized as processes that involve intervention within organizations with the dual purpose of bringing practical transformations in response to customer needs and allowing an advancement of knowledge in the theoretical field. In this work is referred to action research (AR), in which the subject and the object of investigation coincide, and the search process becomes the engine of change itself.

The origins of the AR are attributed to Lewin's work [10], according to which social research had to address both the study of general laws, and the diagnosis of specific situations. Currently, different approaches of AR have been developed and used in the organizational field, but all are based on the purpose of combining action and reflection, theory, and practice, through interaction and exchange with others, with the aim of identifying practical solutions to real problems and seeing people, communities and organizations grow and improve [15].

The analysis of the organizational climate, therefore, constitutes a first trigger for corporate change: from the moment in which each member of the organization is invited to focus and explain their experiences, a process of change that cannot be stopped [16] which also represents a signal of great importance on the company's willingness to pay due attention and to give due importance to all the components of the organization. The AR is therefore a moment of understanding, improvement, and review [17]. In line with these theoretical references, the internal R&D team started a research project that involved the design of a multi-tool survey system for the detection of organizational climate, a data collection session, and its analysis. One of the innovative aspects proposed by this project is the use of semantic analysis to enrich interpretation of the collected data.

The opportunity to integrate this aspect was guaranteed using the internal software named SemantiCase, developed by the team and using semantic analysis and sentiment analysis models. In the case of the organizational climate survey conducted, the use of SemantiCase has made immediately

usable the information contained in the open written texts, which have enriched the climate definition of the company, with greater detail the areas of improvement and its strengths.

2. Climate survey phases: the research in Piazza Copernico

The organizational climate survey project rose from a need born from Piazza Copernico, a consulting company operating in the field of Digital Learning.
The main aim of the company was to observe the direct consequences of the changes due to the pandemic emergency from COVID-19, which has affected our country in recent years. Since year 2020, like many other Italian and worldwide companies, Piazza Copernico has started the construction of a new balance on the remote working to maintain productivity and ensuring a high level of safety for all employees. During the last two years, the gravity of the world situation, and the consequent Italian regulations on health & safety, required the partial maintenance of the remote work, pushing the company towards a rebuilding of working practices and communication methods. On a structural level, this change seems to have been positively absorbed by the company, which has integrated the tools needed by each member of staff to carry out their work in the best possible way and has seen a significant increase in productivity. The future management intent, in fact, is oriented towards the opportunity of a mix of remote working and work in the office. The company demand was, therefore, to investigate the fundamental dimensions underlying the organizational climate, to obtain a descriptive picture of the employees' new global perceptions; the required objective is to highlight both the strengths and the areas of improvement on which to operate for the future development of the organization, with a particular focus on perceptions related to the new hybrid working mode.
In response to this need, the internal Research and Development team started a research project that involved the design of an investigation tool built ad hoc to adapt to the specific requests of the client, subsequent data collection and analysis. As will be discussed in detail in the following paragraphs, the innovative aspect of the tool conceived and proposed with this work is represented by the integration of structural data with a collection of short written texts. The subsequent textual analysis was realized with SemantiCase software, a tool developed by the company's research team that integrates semantic analysis and sentiment analysis models.

2.1. Preliminary Demand analysis

First, it was necessary to analyse in detail the client's request. The goal was to find a meeting point between the interest, needs and expectations of the company and the point of view of researchers, based on theoretical models and previous studies, basing on the rich literature on the subject. In this step of the project the company management was actively involved, as client of the investigation, both to share a common knowledge on organizational climate investigation and to identify the most interesting dimensions to be included in the survey tool. First meetings brought the client's attention to the dimensions of the organizational climate that literature indicates as fundamental; this mediation work also aimed at identifying a compromise between business expectations and the needs of the research work for the construction of a valid tool. The first confrontation with the company's managing director revealed the need to investigate different domains of the business climate, from the three main organizational perspectives: the company, the team, and the individual. The identification of research dimensions has been realized through a work of active exchange with the management. In this way, it was possible to clarify the goals of the investigation and to plan its procedure and timeframes. In the first meeting it was then possible to identify the survey domains for the survey, which were briefly summarized in the following table (Table 1) and grouped according to the specific collective unit to be considered (Organization, Team, or Person).

Table 1
Selected survey domains

Organization	*Team*	*Person*
• Transparecy • Values system and goals • Innovation • Flexibility and adaptation • Processes and tools • Environmental comfort	• Comunication • Collaboration • Efficacy • Autonomy • Support	• Autonomy and responsability • Job role • Training and personal development • Work satisfaction • Self-efficacy

In summary, the domains related to the research areas concern the structural elements, as well as factors related to the psychological experience of the people who are part of it. One of the latent goals is also to explore the level of knowledge and understanding of employees about the company, the inner processes and the value system and the objectives that represent the basis for the pursuit of the company's mission. From a knowledge management perspective, the climate survey also aims at enhancing the perceptions and evaluations expressed by the staff, who thus begins to assume – and is recognized in – an active role in the development of the organization. The chosen topics are the ones considered as the most relevant by the client: perceived corporate image by employees, perception of the remote working, individual contribution assessment to potential business change and company values perception.

2.2. Preliminary context analysis

It is necessary to rely on descriptive data to have a clear picture of the current company scenario and to set the organizational climate data collection and interpretation of. For this reason, researchers collected information from: the company's structural data; a semi-structured interview about the perception of the company by the management point of view. Collected data are synthetized in the table below (Table 2):

Table 2
Data about Piazza Copernico

Date of establishment	2007
Revenue	in constant growth, with significant investments
People	45 between partners, employees, and collaborators
Areas (or teams)	9
People number per area	Direction and Strategy: 1 Staff: • Administration: 2 + 1 team leader • Marketing: 1 + 1 team leader • IT: 1 • Public tenders and financed projects: 2 • Sales: 4 Operations • Learning Design and production: 9 + 1 team leader • LMS e Services: 12 + 1 team leader • Conformity: 3 + 1 team leader • Research and development: 4 + 1 team leader
Work setting	Hybrid (remote work/smart working to be integrated with 6 days per month in office). Deployed since June 2020.

It was also considered essential to gather the point of view of the management, involved in the first phase of the investigation definition. The proposed goal is to collect client's perceptions and expectations, to guide both the tool design and the interpretation of the results. For this purpose, a semi-structured interview was conducted: the structural data and the perception of the domains selected in the previous phase where integrated and organized in relation to the corporate organizational level (Table 3).

Table 3
Semi-structured interview answers

Communication	Values system and goals	Organizational goals	Training	Rewarding
• An improvement has been perceived in recent years. It is perceived as linked to the new needs arising from the reorganization of working methods. In this regard, it is specifically reported the introduction of a bi-monthly newsletter, to share information and updates of all operational areas, and WeShare remote meeting, that involve all people in organisation.	• Perceived values and goals are mainly focused on the worker wellbeing that is guaranteed through the worktime flexibility and a functional life-work balance.	• The growth of company revenue and the harmonious development between the acquisition of new customers and the creation of new jobs are identified as the main goals. The management assesses a medium-high level of the staff's effectiveness in achieving these goals, with a significant margin of improvement.	• The company is responsible of providing training courses and records a high level of partecipation. In addition, a high demand for specific external training is reported, in particular from the technical area and the SML area.	• The rewarding mechanism chosen by the management, has been shared exclusively with the Managers area, to not influence the working methods of the members to whom it is directed.

Finally, from a free description of the working environment, as perceived by the management, emerged a strong perception of autonomy, a good component of mediation that provides for or resolves the rare internal conflicts, and in general a strong collaborative and supportive bond within all working teams.

2.3. Research inquiry system

The detection of the organizational is a particularly complex activity, due to the multi-dimensional nature of the survey process. Analysis models available in literature have many dimensions under observation because they are based on theoretical approaches that focus attention on as many aspects of business life or address them from different points of view. From the theories and practices given by studies reported in literature, it is possible to recognize the questionnaire as a primary tool for an analysis about organizational climate. It measures attitudes opinions and individual perceptions about the organizational fundamental dimensions.

To satisfy the need to explore and investigate the areas of improvement and strengths, the survey designer intended to integrate data collection based on usual Likert-scale items with the collection of written texts on specific stimuli related to the areas of greatest interest to the company. The survey design was set up to have a multi-level verification and control model of the information and to progressively facilitate the respondent's spontaneous response, to highlight the real meanings of work experience. The questionnaire design has, therefore, provided a scheme in which structured questions and open questions were alternated, and was concluded with an anonymous collaborative activity. In fact, a second way for collecting open texts has been prepared, providing for the implementation of a short focus group to be conducted in digital mode, using an online platform that can ensure the anonymity of participants.

2.3.1.Survey

The tool proposed below has been designed to respond to the specific needs expressed by the client and to overcome the limits that emerged from the tools in the literature.

In compliance with the current safety regulations for the COVID-19 pandemic in progress during data collection, and to adapt to the working mode currently adopted by the company, the questionnaire has been implemented using the Microsoft Form tool, allowing in this way the remote participation of all the members of the company at the same time.

Moreover, it provides an innovative aspect linked to the integration of the classic evaluation items with open text items. In the AR perspective, the production of short texts takes up the principle of action and reflection: while it enhances the process of reflexivity in the individual participants, it also allows a more detailed study of the issues investigated and also the potential collection of issues spontaneously emerging. Three types of items have been integrated into the questionnaire (Image 1):

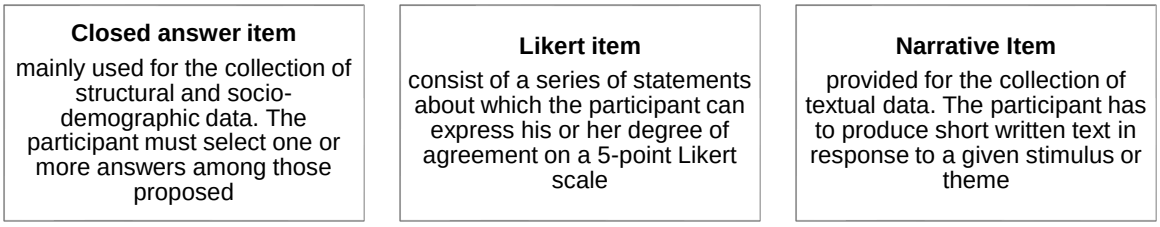

Image 1: Types of items in the questionnaire

The tool items are organized in 10 thematic sections (Table 4); each section presents a brief introduction to guide the participant in understanding the specific reference area and how to answer the questions. In total, the tool has 28 items, but the third section, composed of 4 items, is addressed exclusively to collaborators who play the role of Area Manager or Team Leader.

Table 4

Sections topics

	Items number	**Topic**	
Section 1	-	include privacy consent to the study with a brief description of the research project. There are information about expected objectives, timing and the anonymity of answers in the analysis.	*All partecipants*
Section 2	9 closed answers items	socio-demographic data (gender, age, educational qualification, working age); job role of the participant (type of contract, working area and responsibilities); work mode preference (from home, in the office or hybrid).	*All partecipants*
Section 3	3 closed answers items 1 Likert item	structural composition of the team (number of members, new members of the last year and processes managed); areas of communication, perceived effectiveness, autonomy, collaboration and transparency.	*Team managers*
Section 4	1 narrative item	the participant is asked to explain the work experience of the last year.	*All partecipants*
Section 5	2 closed answers items 1 Likert item	company value system: values and objectives; the individual adherence to the value system and the commitment of the company members to its dissemination.	*All partecipants*
Section 6	3 Likert items	organizational domains: flexibility and adaptation of the company during pandemic emergency; available tools and spaces and the commitment to ensure a good work-life balance; functionality of the communication tools used; transparency and communication processes.	*All partecipants*

Section 7	1 closed answer item 1 Likert item	collaboration, perceived effectiveness, autonomy, communication, group and team leader support and inter-team collaboration with other areas of the company.	*All partecipants*
Section 8	1 closed answer item 1 narrative item	*smartworking* characteristics and relevant aspects.	*All partecipants*
Section 9	2 Likert items	individual point of view: job role and work experience related to the last year; clarity and consistency of the job role, processes and working strategies, autonomy, involvement and expectations; individual work experience; self-efficacy; perceived growth; training opportunities; job satisfaction.	*All partecipants*
Section 10	1 narrative item	what members perceive to be their actual or potential contribution in the changing and development processes of the company.	*All partecipants*

All the items were the subject of preliminary analysis by the researchers and the management involved in the first phase of the project; the aim was to evaluate the usability of the tool as well as the understanding and adequacy of the proposed items. Although the feedback was generally positive, several changes were made to improve the tool and make it more functional for its purpose.

2.3.2. Focus group

The climate survey was planned with a second data collection activity, also involving the production of textual data and supporting the creation of exchange dynamics within the staff group. The choice of the used tool (https:///textdoc.co/channels) is based on the focus group activity, defined as "a detection technique for social research based on a discussion within a small group of people, in the presence of one or more moderators, focused on a topic that you want to investigate in depth" [18]. The activity therefore includes a kind of group interview, led by one or more moderators who propose incentives to start and guide the discussion. The group's response to these stimuli should give shape to the discussion: the strength of this technique is the interaction that is created between the participants, whose exchange has the potential to lead to ideas qualitatively and quantitatively greater than a single interview. The focus group can provide oral or written answers; while in the first case, the stimuli correspond to the oral answers of the participants, with the second method participants are asked to write their own answers, which will then be read and discussed with the group. The advantage of the written method is to overcome the individual and group dynamics that could influence the discussion by excluding some participants. In this study a digitalized version of the written focus group was conducted, using as a support tool an online platform that would ensure the partecipation in the discussion anonymously, without requiring registration by personal or business email [19]. The aim of this activity is to collect data in textual form, which are not polluted by desirability, and to collect the results of an active exchange between participants. The task involves first the choice of a nickname that ensures everyone to remain anonymous; after a first brief familiarization with the tool will then start the discussion. The moderator of the chat, belonging to the lead team of the survey, aims to guide the discussion on the central theme: company values, specifically proactivity and inclusion. Usually, the first focus group conducted in a research activity aims to collect an assessment of the validity of the interview grid and, in this specific case, also of the online platform used. It is essential to study the participants' point of view on the topics considered to be salient, as they will not necessarily coincide with those identified by the research team or the client [20].

3. Data analysis

3.1. Method and sample

The whole company's staff (44 members) was involved in the organisational climate survey, but there were only 41 participants in the questionnaire. The study was conducted on

14th February 2022 with a self-administrated questionnaire in synchronous online mode, using the Microsoft Form tool, to ensure compliance with the safety standards required by the pandemic and to remain consistent with the hybrid working mode carried out by the company. All the participants were informed about the methods of data collection and the guarantee of the right to anonymity, information that was then communicated through the first section of the questionnaire about the informed consent. Based on the socio-personal and structural data collected under the second section of the questionnaire, the sample is defined by the following characteristics (Table 5).

Table 5
Sample data

Gender	- 39% identifies with female gender - 61% identifies with male gender	
Age	- 15% below 30 years - 27% between 31 and 40 years - 32% between 41 and 50 years - 17% between 51 and 60 years - 9% above 60 years	
Degree	- 37% has a high school degree - 20% has a bachelor's degree (first level) - 37% has a bachelor's degree (second level) - il 6% has a PhD – Philosophy Doctor	
Seniority	- only 5% of people is employed since less of 1 year - 32% between 1 and 3 years - 29% between 4 and 7 years - 34% above 7 anni	
Team Leader	8 participants (20%) declare to be Team Leader	
Team	Direction and strategy: 1 Administration: 1 R&D: 4 Marketing: 2 IT:1	LMS and services :13 Conformity: 3 Learning design and production: 10 Public tenders and financed projects: 2 Sales: 3

Once the questionnaire had been administered, the second activity planned for the survey, the focus group in digital form, was introduced. An online platform was selected as a support tool to ensure that everyone could participate remotely and anonymously. The activity recorded a great participation (40 participants of 44) and expected a duration of 20 minutes. Due to the large number of participants, badly managed by the tool, technical problems arose; nevertheless, the discussion recorded 155 exchanges. The emerged data will be analysed in the following paragraphs. It is important to note that, in confirmation of the theories mentioned above, the start of the investigation process immediately triggered the process of reflexivity and the awareness of all members of the organization, that at the end of the two activities have defined themselves enthusiastic of the experience, also expressing the strong need to create a space of periodic exchange about the company.

3.2. Preliminary analysis of structural data

This paragraph aims to illustrate the results of a preliminary analysis of the data collected through closed items and items on a scale, within the domains on which greater attention had been required by the client: smart working, communication, team work, and individual work experience.

- **Smart working**. The first area of interest, central to the client's request, is the perception of smart working (i.e. work from home) and its characteristics. The first relevant information comes from the item related to the general evaluation of the smart working experience; on a scale from 1 to 10, 93% expressed votes considered medium-high (from 7 to 10), while the remaining percentage expressed its opinion through average values (5 and 6). As for Likert-scale items, the

company's level of adaptation and its flexibility was evaluated by 100% of participants with high degree of agreement (4 and 5); for positive statements in relation to tools, environmental comfort and life-work balancing were recorded percentages between 73% and 88% for high agreement values. Fundamental, in response to the specific company need, has been the analysis of the items relative to the preference in the workplace, to be able to evaluate the possibility of maintaining the currently active hybrid organization. In this case, as reported in the Diagram 3.1, it is possible to notice as a good percentage of the 78% prefers to maintain the current hybrid modality, with slight differences on the number of days in mandatory presence. It is pointed out that the participants who responded to the item indicating the preference "Always in the office", did not register critical issues in the items related to tools and environment; The variables potentially related to this choice should therefore be investigated in greater depth in future analyses.

Figure 3.1: Frequencies related to the item "Where do you prefer to do your job?"

- **Communication.** Results about the communication area, under business and team point of view, generally have a high degree of agreement (points 4 and 5 of the scale), with a percentage from 80% to 85%; we consider this result as freedom of expression towards the company and the team, the level of listening by the team and the functional exchanges to achieve the achieved objectives. The two items that need more attention, concern the ability to obtain information about the changes in the company and the teamwork: in this regard of the positive statements a high percentage of agreement is respectively recorded (4 and 5) only 66% and 61%.

- **Teamwork**. To confirm the company expressed expectations, the results show the high levels in perceived effectiveness and the team autonomy. In addition, positive perceptions in relation to intra-group collaboration and support are confirmed. The item that reveals a potential growth area is inter-group collaboration; its positive statement has a lower degree of agreement (points 1 and 2 of the scale) for 20% and average (point 3) for 29%.

- **Individual working experience**. Under the individual point of view, there are good results about the clarity and consistency of job role, with high agreement percentages (on points 4 and 5 of the scale) for 80-88%. On the other hand, one of the potential areas of concern seems to be the choice of the most appropriate strategies and work processes, with a medium-low agreement rate (from points 1 to 3) of 34% of the sample. Turning to the psychological aspects investigated under the individual point of view, a high job satisfaction was found, with 93% of the responses related to high agreement levels. Similarly, the items corresponding to self-efficacy and problem-solving report about 80% on high levels for these two dimensions. The dimension of the work pressure, although well balanced by the personal skills self-evaluation, requires attention as 66% of the participants indicated that they had worked in the last year at least one particularly stressful project.

Training opportunities and job growth, while presenting a distribution oriented to the highest values of agreement, are given as to be paid attention, because about 30% of participants do not recognize such opportunities. Partly confirming this are the results of the item relating to individual skills not recognized by the company: 72% of the members feel they still have a lot to give to the company.

3.3. Semantic analysis of narrative questions

3.3.1. Analysis tools

The innovative aspect of the survey on organizational climate described in this work is represented by the possibility of collecting textual data and conducting a semantic analysis on them. This allows to enrich the traditional methodology, making it possible to use qualitative information that generally risk to be excluded from the survey tools present in the literature. The opportunity to integrate written answers in the questionnaire allows participants to express themselves more freely and in a wider way, transmitting further meanings through an authentic communication. Semantic analysis was carried out in an immediate and accessible way by the tool SemantiCase, a software developed in Piazza Copernico's Research and Development team. The mission of the software is to offer a user-friendly system to the operators, although it integrates in its back-end complex semantic representation models. SemantiCase has made it possible to analyse the information contained in the open texts, which may contribute to the definition of the company's climate, defining in a more accurate way the areas of improvement and the strengths.

Specifically, in the course of this work, the analysis used:

- the semantic algorithm based on the Structural Topic Model.
- the Sentiment analysis algorithm.

Using the Structural Topic Model (STM) [21], a dataset of documents can be synthesized into a predetermined number of topics. The topic is a distribution on a vocabulary, as well as a document is a distribution on different topics. The main task of this model is to infer the latent variables of the topic distribution within a document and the terms of distribution of each of them. The use of this model allowed to identify the structure of the most representative contents on a probabilistic basis. The subsequent interpretation of the emerged data, conducted by the research team, has made possible the identification of the most shared themes that have been further explained through the labelling process. Subsequently, thanks to the analysis of the Sentiment made for each single text, it was possible to obtain the positive or negative polarity of the topics emerged from the previous analyses.

The results of the 3 narrative items in the questionnaire and the focus group activity will be reported in more detail below, examining in particular:

- *Topic proportion table*: data relating to the distribution of the probability of the topics and the number of representative records of each.
- *Topic Sentiment*: average sentiment value associated with the single topic (with its minimum and maximum that describe the confidence interval).

In the data interpretation and labelling, reference was also made to:

- *FREX*: the list of the most significant and exclusive words of the topic.
- *Wordcloud*: display the most significant topic words.

Prior to the analysis, a verification of the correlations between the co-variates of the structured part was carried out. The aim was to identify which covariates were significant to effectively segment the results. A correlation analysis was performed with a Pearson's Chi-squared test. The results have led to the exclusion of related variables in the analysis of the results. Moreover, the small number of the sample led us to choose only some co-variates for the semantic analysis of narrative questions, such as the Seniority and the Area Manager Role.

3.3.2.Results

Narrative item 1: perceived company image. The first narrative item included in the questionnaire was intended to collect short texts describing in general terms the work experience in the last year. Through semantic analysis, 12 different topics were detected; the subsequent interpretation of the data,

which took place through the analysis of the FREX lists and in some cases of the individual texts collected, led to the need to create macro-topic, semantically combining topics under a single reference label. In the following table (Table 6) it is possible to observe in detail the characteristics emerged from the analysis. It is important to underline that the topic with the highest proportion refers to smart working, although the item in question did not explicitly refer to this mode of work. From the more in-depth analysis of the macro-topic in question emerged the consideration of smart working as an effective response of the company to the pandemic situation, which all members have adapted flexibly in a short time. The two following macro-topics, in order of proportion, describe the work experience itself, leaving several aspects to emerge. As described by the average Sentiment, the comments related to the work communicate very positive opinions, confirmed by the description with terms about satisfaction and gratification. These aspects seem to be in line with the findings of the scale items in the questionnaire in relation to the job satisfaction of the participants.

Table 6

Topic proportion and sentiment analysis of narrative item 1*

Topic	Proportion	Label (macro-topic)	Total Proportion	Sentiment (mean)	Sentiment (min)
11	22%	Smart working	31%	0.22	-0.15
2	9%			0.33	-0.26
6	9%	Intense but satisfactory work on various levels	26%	0.91	0.34
1	5%			0.71	-0.09
3	3%			0.08	-0.88
7	9%			0.1	-0.49
8	3%	Dynamic, flexible, and rewarding work	18%	0.93	-0.04
4	12%			0.49	-0.01
12	3%			1.35	0.36
5	12%	Colleagues support	12%	0.24	-0.26
10	3%	Team coordination	3%	0.22	-0.76
9	3%	Individual responsibility	3%	0.32	-0.65

**Some topics weren't significant and they are not included in the table.*

Narrative item 2: smart working evaluation. Second item focus is on remote working. Specifically, the item required participants to produce short texts referring to the relevant aspects, both positive and negative, related to the work experience through this specific modality. As for the previous narrative item, through the interpretation and labelling, the creation of macro-topics (composing several semantically related topics) has been deployed. In total, the semantic analysis identified 12 topics than synthesized in 5 macro-topics. In the table (Table 7) the salient elements are reported in detail. As shown in the table below, the macro-topic with a greater global proportion, formed by the union of 4 topics, refers to the aspects of optimization of time and effectiveness of work experienced by participants during the period of smart working. This topic seems to confirm the data emerged from the questionnaire that report an average positive evaluation of the experience under examination. Special attention should also be paid to the second macro-topic, which instead highlights the achievement of a functional work-life balance suited to personal needs.

Table 7
Topic proportion and sentiment analysis of narrative item 2

Topic	Proportion	Label (macro-topic)	Total Proportion	Sentiment (mean)	Sentiment (min)
11	31%	Optimized times and effective work	55%	0.26	-0.03
7	13%			0.1	-0.35
2	3%			0.2	-0.75
8	8%			0.26	-0.32
3	5%	Improved work-life balance	26%	0.48	-0.24
10	10%			0.29	-0.21
9	3%				
4	8%			0.25	-0.32
12	3%	Difficult communication	8%	0.22	-0.78
6	5%			0.39	-0.32
1	7%	Intrusive communication	7%	0.09	-0.5
5	4%	Autonomy and flexibility	4%	0.22	-0.59

Narrative item 3: effective or potential personal contribution to company change. Semantic analysis carried out on the third narrative item led to the identification of 14 different topics. The item required participants to present in a short text the contribution, potential or actual, that each felt able to offer to actively participate in the company growth process and improvement. Also, in this case an interpretation been carried out that has led to the identification of 8 macro-topics, whose details are presented in the table below (Table 8). Three macro-topics with greater proportion bring attention to the same improvement areas that emerged from the preliminary analysis on structured items, explained in the previous paragraph. The first macro-topic highlights the high level of involvement of individuals towards the company and their own team, and the emerging need for professional development through training paths. The second macro-topic reflects the ideal of innovation that is strongly present in the company; then there are all contributions that refer to the innovation of projects (in processes, approaches, and technologies) as a driver of change and business growth. The third macro-topic emphasizes the perceived need for an improvement in both internal and external communication.

Table 8
Topic proportion and sentiment analysis of narrative item 3

Topic	Proportion	Label (macro-topic)	Total Proportion	Sentiment (mean)	Sentiment (min)
13	17%	Personal development in and for team	24%	0.29	-0.11
9	6%			-0.02	-0.7
10	9%	Process, project, approach, and technology innovation	17%	0.21	-0.36
12	6%			0.57	-0.13
4	2%			0.98	-0.03

1	8%	Improvement of internal and external communication	14%	0.5	-0.09
2	6%			0.4	-0.3
3	11%	Personal contribution	11%	0.33	-0.17
7	6%	Increase market knowledge and improve product targeting	12%	1	0.3
11	6%			0.15	-0.55
5	9%	Keep actual conditions	9%	0.14	-0.43
6	6%	Develop new areas and company business	8%	0.31	-0.47
14	2%			0.42	-0.64
8	5%	Increase company branding on web	5%	0.31	-0.47

Focus group activity. The last semantic analysis was carried out in reference to the textual data collected through the experimental activity of online focus groups. The activity provided an exchange of messages between all participants, in a completely anonymous form, on an online chat platform. The discussion was constantly moderated through stimulus-questions regarding the area of corporate values. After the first phase of familiarization with the tool and the choice of a username that would guarantee anonymity to all, the first stimulus question was asked. With this first intervention, participants were asked to focus on three specific organizational values (proactivity, inclusion, and innovation) with the request to indicate which of those proposed was the least clear. In this first phase the focus was mainly on two of the three values listed: proactivity and inclusion. The second question-stimulus required confident participants to master a good understanding of the two concepts, to clearly explain their definitions. The focus of most of the participants in the exchange has been on the concept of proactivity; for this reason, the two subsequent stimulus-questions have required to contextualize the value within the company life and in the contact with customers. Although the tool used to conduct the focus group presented technical problems that made it difficult to use, the group showed a very strong collaborative response that led to the identification of creative solutions to overcome difficulties and proceed with the activity. Semantic analysis conducted has extrapolated, from the entire history of the messages exchanged during the activity, a total of 25 topics. In this case, during the interpretation of the data, it was considered appropriate to group the topics mainly according to the topics suggested by the stimulus-questions.

In the table (Table 9) are shown the labels of the single topics that suggest the aspects highlighted in reference to the topics suggested by the moderator. The greater proportion was recorded on the macro-topic related to the theme of proactivity, declined to the specific corporate context of Piazza Copernico, both in the performance of internal activities and in contact with customers. The labels selected for the 10 topics lead back to the aspects highlighted in the messages written on the theme. An interesting observation is to highlight on the last two macro-topics reported in the table. The label "Out of theme" groups together all the exchanges that have taken place to report the difficulties encountered in using the tool used to carry out the focus group. The next macro-topic, "Acting proactivity", includes all the messages aimed at finding a solution to solve the difficulties emerged and reported. In this way, the group seems to have carried out a brief and effective practical demonstration of its ability to take an active, collaborative, and proactive role in solving an unexpected problem.

Table 9

Topic proportion e labelling of focus group activity

Topic	Proportion	Label (topic)	Label (macro-topic)	Total Proportion
21	5%	Engagement	Proactivity in Piazza Copernico	45%
5	4%	Growth		
6	2%	Efficiency		
18	4%	Efficiency#2		
8	1%	Everyone's commitment		
14	21%	Context grounding		
17	3%	proactivity		
19	1%	Positivity		
20	3%	Communication		
25	1%	Mentor question		
1	6%	Capability of intervention	Proactivity general meaning	23%
4	4%	Proactivity		
11	6%	Predict		
16	1%	Predict#2		
24	4%	Predict#3		
12	2%	Autonomy and responsibility		
3	10%	Comparison and inclusion	Inclusion	15%
9	3%	Mutual understanding		
10	2%	Diversity variety		
2	7%	awareness	adherence to the values	7%
13	3%	Tool difficulties	Off-topic	6%
23	3%	Tool difficulties#2		
15	1%	“To be proactive” fear	Acting proactivity	4%
7	2%	unity		
22	1%	“To be proactive” invitation		

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5. Conclusions

This project regarded the internal climate survey for Piazza Copernico, using an innovative tool (created ad hoc) thanks to the collaboration of the internal team of Research and Development. The main purpose of the investigation, as requested by the client, was to explore people perceptions about organizational structural changes that the company faced due to the pandemic emergency from COVID-19 since 2020. Collected data on this theme through the classic structured items (e.g., multiple choice or assessments scales) were supplemented by the semantic analysis of short written texts. Using the SemantiCase internal software it was possible to extrapolate, in a functional and fast way, qualitative information that generally risk being excluded from the survey tools because of their processing complexity.

On a preliminary analysis, the perception of the hybrid work (remote work combined with at least 6 days in office) seems to be generally preferred. This survey was supplemented by more detailed observations taken from the written texts; the most frequently mentioned positive aspects of smart working are connected to concentration, autonomy, and cost savings; otherwise, the negative aspects refer mainly to the loss of social interaction and less defined working times.

Another aspect that was particularly significant was individuals: if the structured items revealed the perception that not all the skills are fully recognized or exploited by the company, semantic analysis on written texts has made it possible to identify a strong desire to put oneself at the forefront of the company's evolutionary process, with the intention of get involved for individual and team professional development, through specific training paths or the integration of the unknows skills in the organization.

The proposed interpretation has allowed the company not only to recognize strengths and areas improvement issues, but also to gather suggestions on possible future solutions that will guide the evolution of business and the organization of working methods.

The next step for organizational climate survey is to use the collected information to establish the useful actions to define a change process. In the organizations, besides the changes that regard processes and working modalities, it is very important to consider upskilling needs. If the pandemic has accelerated the development of digital skills, providing the organization with an observatory on the real needs in connection to the real work processes means a great and immediate understanding and identification of the areas of development.

The climate survey therefore represents a first analysis of the training needs, in reference to digital skills, soft, organizational and development paths to be proposed in the future. For example, in Piazza Copernico the survey contributed to different organizational decisions such as:

- Accelerated adoption of sharing tools (teams).
- Support for individual development through training courses.
- Promotion of autonomy and collaboration between different groups (activation of some integrated projects between groups).
- Annual scheduling of internal climate analysis.

For future developments, it will also be important to validate the data collection process and tool, including by expanding the database of collected responses, to increase the statistical analysis quality to be cross-referenced with the analysis of meanings. Moreover, during the validation phase it is also important to identify possible correlations between the data collected through the different types of items, to confirm the validity of the tool and the actual role played by the textual data in defining the dimensions of the organizational climate. In addition, after this first pilot study, it may be necessary to support the conduct of a wider data collection, involving different companies to collect comparable and usable data to validate the survey tool proposed in this work.

Further considerations can be made about:

- Evaluation of the impact of structured items on open items, to reduce any effects of mutual influence.
- Managing the items integration and rethinking survey administration to promote the maximum expression of perceptions.

Conducting periodic follow-up studies to identify new training needs.

Integration with other company variables, such as turnover rate, productivity per area, company results, risk-stress prevention, salary levels, to provide a more detailed picture of working in the company.

Semantic analysis models are a promising opportunity to foster the collection of perceptions in the organizations, that is less conditioned by the response styles involved in classic evaluation items. Continuing studies in this field offers the possibility of collecting more data with a qualitative depth and the absence of any bias that allow to bring out the deep meaning expressed by individuals.

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