

Self-diagnosis tool for time management: Proposal and validation



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ABSTRACT

Innovation, the globalization of markets, changing living standards, and increasing average life expectancy are among the factors influencing work activity and impacting workers' performance. Within this context, the significance of time management (TM) is underscored as a critical means of rationalizing a limited and valuable resource, namely time. Effective time management is essential for achieving a balance between professional and family obligations while maintaining a high quality of life and achieving optimal outcomes. Although not a new phenomenon, the importance of time management has grown significantly in contemporary society. Motivated by the awareness of this issue, the present study aimed to validate a self-diagnostic tool for time management (TMST) that enables a quick assessment of an individual's time management skills and facilitates the development of personalized plans of action and improvement based on the identified profile. The results demonstrate a significant enhancement in all three sections of the TMST (time perspective, self-recognition, and time management) following the implementation of the recommended strategies. Furthermore, the conduction of interviews to evaluate and validate the TMST revealed that the tool adds value to time management, thereby contributing to both theoretical and practical advancements in this field.

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1. Introduction

Time management encompasses various theories and models with diverse applications, ranging from micro to large companies, where time holds significant monetary value. Therefore, efficient resource rationalization is essential, enabling managers and leaders to gain competitive advantages in an ever-evolving market by employing the most effective strategies. Practically, managers and leaders should diligently steer their organizations to enhance efficiency across all levels, including quality, customer communication, product innovation, and internal processes.

The concept of time management has been a topic of discussion since the 1950s and 1960s, with numerous authors offering different perspectives on the subject, such as Drucker (2019), Lakein (1974),

and Mackenzie and Nickerson (2009). It is evident from historical accounts that although not new, time management has assumed significant importance in contemporary society. This is reflected in the growing concern with time management evident in various theoretical and practical publications by Aeon and Aguinis (2017), Boniwell and Osin (2015), and Claessens et al. (2007). The existing literature highlights substantial advantages associated with effective time utilization. Claessens et al. (2004) demonstrated that time management behaviors have positive effects on perceived time control, job satisfaction, stress reduction, and work performance, although some findings may be contradictory. However, Aeon and Aguinis (2017) noted that previous research failed to consider organizational structures and time standards, leading to inconsistent conclusions regarding the impact of time management on work performance. Recent approaches have introduced new perspectives. Lévesque and Stephan (2020) proposed that time perspective (TP) and time management offer a fresh understanding of the well-being, mental health, and resilience of entrepreneurs, thereby conferring a competitive advantage.

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Regardless of theoretical approaches, the practical realm emphasizes the advantages of utilizing time efficiently and recognizes time management as the process of allocating limited time to achieve life goals and enhance results, efficiency, and effectiveness. It is worth noting that embracing scientific time management practices will undoubtedly have a significant and decisive impact on quality of life and goal attainment (Adams and Blair, 2019). Considering these aspects and the importance of time in creating personal and organizational value, this study aims to develop and validate a time management self-diagnostic tool (TMST). This tool will facilitate the characterization of each participant's time usage profile and suggest improvements in time management and personal and professional performance based on the analysis of their responses. Specifically, the study aims to develop the TMST based on the flexible time management model proposed by Sardinha et al. (2020) and subsequently validate it through its application and interviews with employees from various organizations.

The study is organized into sections, beginning with a presentation of the theoretical framework, followed by the methodology. Subsequently, the results and their discussion are presented. Finally, the study concludes with limitations and suggestions for future research.

2. Literature review

2.1. Flexible time management model

The speed of events forces organizations to optimize their operations (Rață et al., 2022). It is in this framework that the concerns with time management (TM) emerge, giving rise to different strategies and models of TM. According to Muste (2019), the proper use of time is essential in several areas, going beyond one's control, and contributing to the improvement of quality of life. Considering the most alluded TM models (e.g., Allen (2018), Barbosa (2018), Covey (2017), Cygler (2005), Drucker (2019), Hummel (1994), Lakein (1974), Macan (1994), and Seiwert and McGee-Cooper (2008)), it should be noted that there are certain theoretical gaps in the time perspective, on which this study has been reflecting. In this sense, according to Sardinha et al. (2020), a time management model should contemplate the uniqueness of each human being, and the current models start from the assumption that all individuals have the same characteristics and motivations for an activity-focused TM. On the other hand, these authors presented a time management model based on three pillars: Time perspective, self-recognition, and time management.

2.2. Time perspective

It is understood by TP as the process by which social and personal experiences are decomposed

into time frames that help to give order, coherence, and meanings to these events (Keough et al., 1999). TP allows individuals to organize their daily lives in a coherent, orderly, and meaningful way (Holman and Zimbardo, 2009).

In this domain, the Zimbardo Time Perspective Inventory (ZTPI) stands out (Peng et al., 2021). It is a structured inventory that includes motivational, emotional, cognitive, and social processes that determine TP (Zimbardo and Boyd, 2008). This instrument comprises five-time dimensions (subscales): Past Negative (PN)-negative and aversive view of the past; Past Positive (PP)-reflects a warm, pleasant, sentimental, and nostalgic attitude towards the past, with emphasis on maintaining the relationship with family and friends; Present Hedonistic (PH)-hedonistic attitude and taking risks in relation to time and life, with little concern for future consequences; Present Fatalistic (PF): Fatalistic attitude, powerless and hopeless in relation to life and the future; Future (Future perspective)-individuals focused on future goals and rewards. This model attaches great importance to the consequences, contingencies, and results of current decisions. The original version has 56 items (Zimbardo and Boyd, 2008), but its filling is time-consuming. According to Przepiorka et al. (2016), several shorter versions of this questionnaire have emerged due to its size and, consequently, its prolonged completion. The present study used the short version composed of 17 items of the ZTPI (Table 1) by Orosz et al. (2017), which was validated in terms of internal consistency (Cronbach's alpha coefficient values around or above 0.7), temporal stability, and convergent validity. It includes the 5 original dimensions, whose number of items is indicated in parentheses: PN (4 items), PH (3 items), PP (3 items), Future (4 items), and PF (3 items).

The different time perspectives are associated with various behaviors, both healthy and risky. The time dimensions, expressed by the five dimensions of the ZTPI, demonstrate that individuals can differ from each other in terms of the degree to which they fall into a specific dimension. A balanced TP allows for the flexibility of switching between different time perspectives, depending on the situation, needs, and values. These authors present an ideal time profile, supported by different studies: High perspective "PP"; Moderate-high perspectives "F" and "PH"; Low "PN" and "PF" perspectives.

Several authors have analyzed the balance between time perspectives and time orientations, and some of these investigations suggest that individuals with balanced time perspectives have higher levels of subjective well-being compared to less balanced ones (e.g., Boniwell et al. (2010), Olivera-Figueroa et al. (2022), Stolarski et al. (2016), and Zhang et al. (2013)).

2.3. Time management

The unpredictability of the markets, the existence of heterogeneous teams with knowledgeable

workers, and the uniqueness of employees make it necessary to self-recognize the employee in favor of a better TM (Sardinha et al., 2020).

TM involves the process of determining needs, setting goals to be achieved, and setting priorities and planning activities to achieve objectives (Drucker, 2019). Eilam and Aharon (2003) suggested that TM is a way of monitoring and controlling time.

In the last two decades, recognition of the importance of TM has been increasing (Romero-Pérez and Sánchez-Lissen, 2022). In this context, several studies have identified the positive impact of TM (e.g., Adams and Blair (2019), Aeon and Aguinis (2017), and Golabli et al. (2013)). TM has been the object of study of several disciplines, not only management, which attests to the importance of the theme. To take one example, in sociology, researchers studied the effect of time constraints on people. Moreover, interest in psychology is an area in which researchers sought to study how family stability in childhood can influence TM in adulthood; or even how the tendency to procrastinate can influence TM. In medicine, TM leads to a decrease in diseases, eventually due to stress. On the whole, all disciplines report that TM translates into improved processes and consequently more money (Aeon and Aguinis, 2017; O'Connell, 2014; Eerde, 2003; Zimbardo and Boyd, 2008).

According to Sardinha et al. (2020), there is a set of variables related to TM present in the various models of TM: Planning (maximization of activities and results), greater efficiency, productivity, work-life balance, the paradigm of importance, awareness of time (Aeon and Aguinis, 2017; Boniwell and Osin, 2015; Claessens et al., 2007; Hawkins and Klas, 1997; Malkoc and Tonietto, 2019). Thus, these authors consider that, for effective and efficient TM, the following principles should be taken into account: i) Awareness of time (time perspectives); ii) Mission, vision, and personal goals; iii) Paradigm of importance; iv) Planning and prioritization (maximization and prioritization of activities, avoiding waste of time); (v) conscious decision-making; (vi) work-life balance; vii) Organizational culture (how to manage and look at the time)-Accountability of employees (proactive within the field of activity, choosing their best working time).

3. Method

The TMST was developed in line with the flexible time management model proposed by Sardinha et al. (2020) and with the results of the training program in TM (TPTM) presented by Sardinha et al. (2021a). One intended, through this TM self-diagnostic tool, to investigate and profile everyone who agreed to participate in this study, and learn about the use of their time, to help improve TM and, consequently, personal and professional performance. Depending on the answers obtained to the set of questions of the questionnaire, a report was prepared with the attribution of a score on the scale that evaluates TM (the third pillar of the flexible time management

model, corresponding to the third section of the TMST), as well as a set of suggestions of significant personal and professional usefulness, considering the current state of the art at the TM level.

The validation of the TMST was made through its administration to the participants in two-time moments (before and after the recommendations: test-retest) and through interviews with these participants. The results obtained with this procedure also made it possible to evaluate the effectiveness of the strategies proposed through the report made available to the participants. The interviews are qualitative and descriptive research (Gil, 2017; Prodanov and De Freitas, 2013). According to Prodanov and De Freitas (2013), the difference between the interview and the questionnaire is that "the first is always performed face to face (The interviewer and the interviewee); it may also or may not be carried out on the basis of a script of pre-established and even printed questions, while the latter necessarily has as a prerequisite the preparation of its own form with questions to be posed in the same sequence to all informants." These authors report that the interview admits the obtaining of information from an interviewee about a given subject or problem and can be standardized or structured (when the interviewer follows a pre-established script); non-standard, or unstructured or panel. In the present study, structured interviews were conducted, thus an interview script was prepared.

3.1. Instruments

3.1.1. TMST

The TMST was developed with a focus on the three pillars (TP, self-recognition, and TM) of the flexible time management model by Sardinha et al. (2020), consisting of 34 questions structured according to these pillars and grouped into 3 large groups (Table 1).

The time perspective of the participants was evaluated using the short version of the ZTPI (Table 1) by Orosz et al. (2017). Items were measured on a scale from 1 (Never true) to 5 (Always true). As mentioned by Sardinha et al. (2021b), the original procedure, suggested by the authors of the ZTPI, refers to the calculation of an average score for each of the 5 dimensions. However, summary statistics calculated in the case of ordinal variables do not include either the mean or standard deviation, since these two measures should not be calculated in data of this nature (e.g., Jakobsson (2004) and Silva et al. (2020)). For this reason, the median scores attributed by the participants in this study to each of the items of the ZTPI dimensions were calculated. Self-recognition (5 questions) has as answer options "Yes" and "No" (Table 1). The third section of the TMST, composed of 12 items, allows participants to assess how they manage their time, through a scale, from 1 (Never true) to 5 (Always true).

Table 1: Description of TMST items

Time perspective	Section 1 items (short version of ZTPI (Orosz et al., 2017))	Dimension
	1 - My life path is controlled by forces over which I have no influence	PF
	2 - I complete projects on time, accomplishing them step by step	F
	3 - I take risks to feel the emotion in my life	PH
	4 - I can resist temptations when I know there's work that needs to be done	F
	5 - I think about the bad things that have happened to me in the past	PN
	6 - I often think of happy memories of good times	PP
	7 - I get nostalgic about my childhood	PP
	8 - It's hard for me to forget unpleasant images of my youth	PN
	9 - I see myself being carried away by the emotion of the moment	PH
	10 - The past brings me many bad memories, which I prefer not to think about	PN
	11 - Taking risks keeps my life from getting boring	PH
	12 - I can't make plans for the future because things change a lot	PF
	13 - I do my obligations to friends and institutions on time	F
	14 - I've had my share of abuse and rejection in the past	PN
	15 - I like stories about how things used to be in the "good old days"	PP
	16 - Meeting tomorrow's deadlines and doing other necessary work come before tonight's fun	F
	17 - It makes no sense to worry about the future since there's nothing I can do about it.	PF
Self-recognition	Section 2 Items	
	1 - Have you already defined your personal mission?	
	2 - Have you already defined your vision?	
	3 - Have you already defined your values?	
	4 - Have you spent some time considering your personality type?	
	5 - Do you consider that you possess the characteristics of a leader?	
Time management	Section 3 Items	Observations
	1 - I organize the tasks I must do according to their importance and urgency	Important vs. urgent paradigm
	2 - I spend a lot of time on unimportant tasks*	Important vs. urgent paradigm
	3 - I perform the most important tasks at the best time of the day	Planning and prioritization
	4 - At work, I keep everything in its proper place	Decision-making: Organization of space, activities to be carried out, and time
	5 - I divide large projects into smaller, separate parts	Planning and prioritization
	6 - I make a list of tasks/activities to be performed every day/week	Decision-making: Organization of space, activities to be carried out, and time
	7 - I avoid time thieves (e.g., distractions, interruptions, loss of focus, meetings without an agenda, etc.), by setting deadlines.	Planning and prioritization
	8 - I clearly set long-term goals for which I am working	Planning and prioritization
	9 - I continually try to find small ways to use my time more efficiently	Decision-making: Organization of space, activities to be carried out, and time
	10 - I don't procrastinate. I do today what needs to be done	Important vs. urgent paradigm
	11 - I schedule some time during the day for personal time (for planning, meditation, prayer, and exercise)	Important vs. urgent paradigm
	12 - I have the feeling of controlling my time	Important vs. urgent paradigm

*Item with a reversed score

Initially, the third section of the TMST contained all the items in Table 1, except item 7, with internal consistency (Cronbach's alpha=0.82) and the factorial structure of these items previously evaluated, the latter applying the Categorical Principal Components Analysis (CATPCA), using varimax rotation and Kaiser normalization, considering, in either case, a larger sample (n=114). The previous application of the CATPCA on the data matrix containing these 11 items allowed to retain 4 main components that, overall, explain about 73.4% of the total variance of the data, as shown in the results presented in Table 2. Table 3 contains the most important items for each of the retained main components, as well as the designations assigned to them, considering the descriptions of the most relevant items for these dimensions (Table 3). Later, due to the importance of item 7: "I avoid time thieves (e.g., distractions, interruptions, loss of focus, meetings without an agenda, etc.)," this was added to

the set of items that evaluate TM in the TMST, suggesting its allocation to the component "Planning and prioritization," due to its semantic content.

Table 2: Matrix of factor loadings after rotation

Items	Component			
	1	2	3	4
1	.694			
2	.733			
3		.765		
4			.624	
5		.821		
6			.682	
8		.551		
9			.802	
10	.773			
11				.847
12				.773
Cronbach's alpha coefficient	.783	.775	.635	.518
Eigenvalue	2.362	2.310	1.871	1.535
Percentage of variance explained	21.477	20.999	17.013	13.955

Variable Principal Normalization. Rotation Method: Varimax with Kaiser Normalization

Table 3: Most relevant items for each of the extracted components and assigned designations

Component	Most relevant items	Assignment
1	1, 2, and 10	Important versus urgent paradigm
2	3, 5, and 8	Planning and prioritization
3	4, 6, and 9	Decision-making: Organization of space, activities to be carried out, and time
4	11 and 12	Balance between personal and working life

Thus, with the set of 12 items that evaluate TM (Table 1), with a total score that can vary between 12 and 60 points, it is intended to measure the capacity of TM according to 4 assumptions: i) Important vs. urgent paradigm (3 items: 1, 2, and 10); ii) Planning and prioritization (4 items: 3, 5, 7 and 8); iii) Decision-making: Organization of space, activities to be performed and time (3 items: 4, 6 and 9); iv) Balance between personal life and work life (2 items: 11 and 12). The higher the total score obtained by an individual (the sum of the scores obtained in each of the items), the better the capacity of TM. It should be noted that item "I spend a lot of time on unimportant tasks" presents a reversed score because it is a negative item.

3.1.2. Interview Script

To conduct the interviews, the script was divided according to three themes, namely: The clarity and structure of the TMST; the report with the diagnosis and proposals for improvement in TM; and the applicability of the suggested proposals. The interviews were conducted with individuals who have already participated in time management training since they are already familiar with the subject.

1. Is the TMST clearly presented and structured?

a. Structure:

- Do you consider the structure of the instrument appropriate?
- Do you consider the questions appropriate (number of questions in the instrument)?
- Do you think the instrument is easy to fill?

b. Organization of the questions:

- Do you consider that the questions raised are well organized?

c. Clarity of the questions:

- What is your opinion on the clarity of the questions?

2. Is the report containing the diagnosis clearly presented and structured?

a. Structure:

- Do you consider the structure of the report appropriate?
- What is your opinion on the language used in the report (formal, informal)?

- What do you think could be improved in the received report?

3. Regarding the proposals for the improvement of TM, do you consider them feasible?

a. Relevance of the recommendations:

- Do you consider the recommendations relevant?
- As for the adequacy of the recommendations on your time management, what is your opinion?

b. Applicability of the recommendations:

- Do you think the recommendations are applicable?
- Are the recommendations presented beneficial?
- What benefits do you identify regarding the use of this time management self-diagnostic tool?

3.1.3. Participants-TMST and interviews

In this phase of the study, 15 individuals participated voluntarily, of which 10 (66.7%) were males and 5 (33.3%) were females. The majority (46.6%) are aged between 31 and 40 years old.

3.1.4. Procedure-Completion of the TMST and interview

The TMST was validated through its application to 15 volunteers, in two-time moments (before and after the preparation of the report with the attribution of scores and suggestions for improvement), with the answers in the two-time moments being paired, for comparative purposes, and later, through the interviews, which were applied to individuals who have already participated in the training in TM, already familiar with the subject. The interviews aim to guide the collection of data, on the perception of the completion of the TMST, in general, and on the structure and pertinence of the TMST, in particular.

After the interviews, the application of the TMST was repeated and the Time Management Behavior Questionnaire (TMBQ) of Macan et al. (1990) was administered jointly. The TMBQ is composed of 30 items, in order to verify whether or not a statistically significant positive correlation exists, among the scores related to the third pillar (Time Management), since both scales evaluate the same latent variable, TM (comparison with an alternative version of the scale that evaluates TM, in order to evaluate the convergent validity of the scale that integrates the third section of the TMST). In this context, due to the non-normality of the total scores obtained, according to the Shapiro-Wilk normality test (indicated for the case of small samples ($n < 30$)),

Spearman's correlation coefficient was used in detriment of Pearson's correlation coefficient. The procedure included the following phases: i) Administration of the self-diagnostic tool; ii) Analysis and presentation of a report/diagnosis, based on the responses to the TMST, with proposals for improvement in TM; iii) Structured individual interview; iv) Re-administration of the TMST in conjunction with the TMBQ.

After completing and submitting the questionnaires, the answers were automatically recorded in the database. The generated data were subsequently transferred to the IBM SPSS Statistics software, with a view to performing the statistical processing of the data. It should be noted that, after being provided with the information on the purpose of the study, and the anonymity and confidentiality of the data, the participants were asked for voluntary and informed consent in accordance with the General Data Protection Regulation.

It should also be mentioned that the theoretical validity of the set of questions of the TMST was analyzed, with special emphasis on the case of the convergent validity of the 12 items of the third section of this instrument, which allow evaluating the latent variable TM.

3.1.5. Data analysis method-TMST and interviews

The treatment of data related to the administration of the TMST was carried out using several statistical methods, with special emphasis on comparing the answers given in the two moments. Nonparametric tests were performed, due to the ordinal nature of the items that evaluate the latent variables TP and TM and the non-normality of the total scores obtained by the participants, regarding the sum of the scores obtained in the items that evaluate TM. The TP, in a general perspective, should

be analyzed by calculating the median of scores obtained by the participants in the sets of items that make up each of the 5 dimensions of the ZTPI, before and after the proposed strategies.

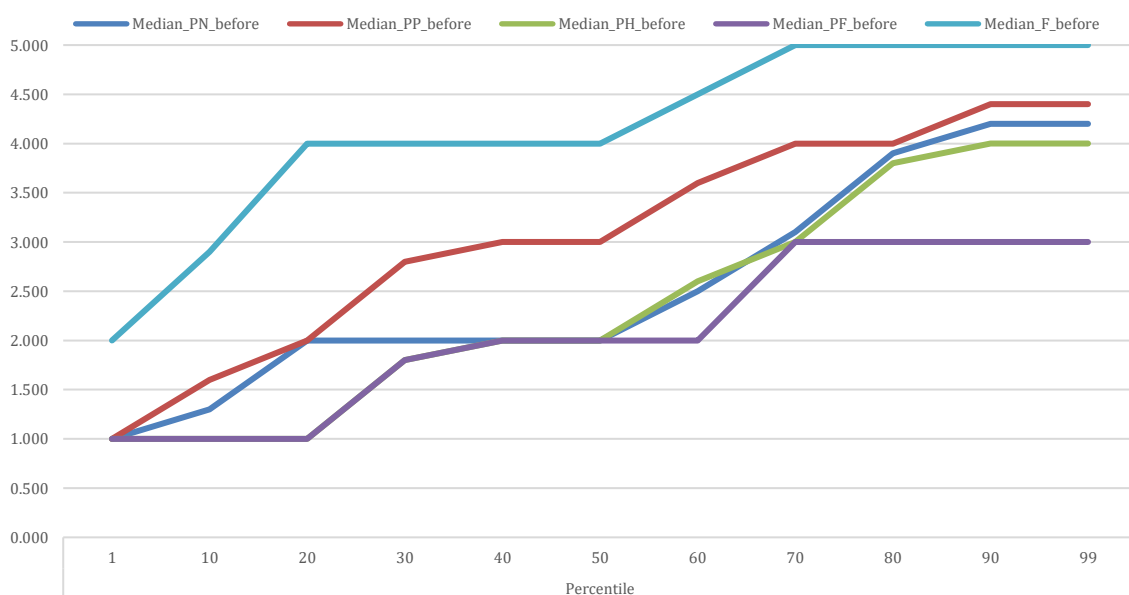
In relation to the TM, in an analysis of the total scores, some summary statistics were calculated (mean, standard deviation, minimum, maximum). In an item-by-item analysis, both TP and TM were analyzed by applying the Wilcoxon test, considering the data collected in both moments.

On the other hand, the treatment of data related to the interviews was done using qualitative data analysis methodologies.

Lastly, in order to evaluate the convergent validity of the TM scale that integrates the third section of the TMST, Spearman correlation coefficient values were calculated between the total scores obtained considering the 12 items of the third section of the TMST and the corresponding total scores obtained in the items of the TMBQ proposed by Macan et al. (1990).

4. Results

With TMST, through the short version of 17 items of ZTPI proposed by Orosz et al. (2017), one intends to assess whether the time perspectives present a balance, as suggested by Zimbardo and Boyd (2008) and, through a report, propose customized strategies, if necessary, to promote convergence to a balanced time perspective. For this purpose, the median values of the scores concerning the items of each of the subscales/dimensions of this instrument were calculated for each of the participants, as suggested by Sardinha et al. (2021b). Fig. 1 graphically shows the values of the percentiles P1, P10, P20, P30, P40, P50, P60, P70, P80, P90 and P99 regarding the values of these medians.



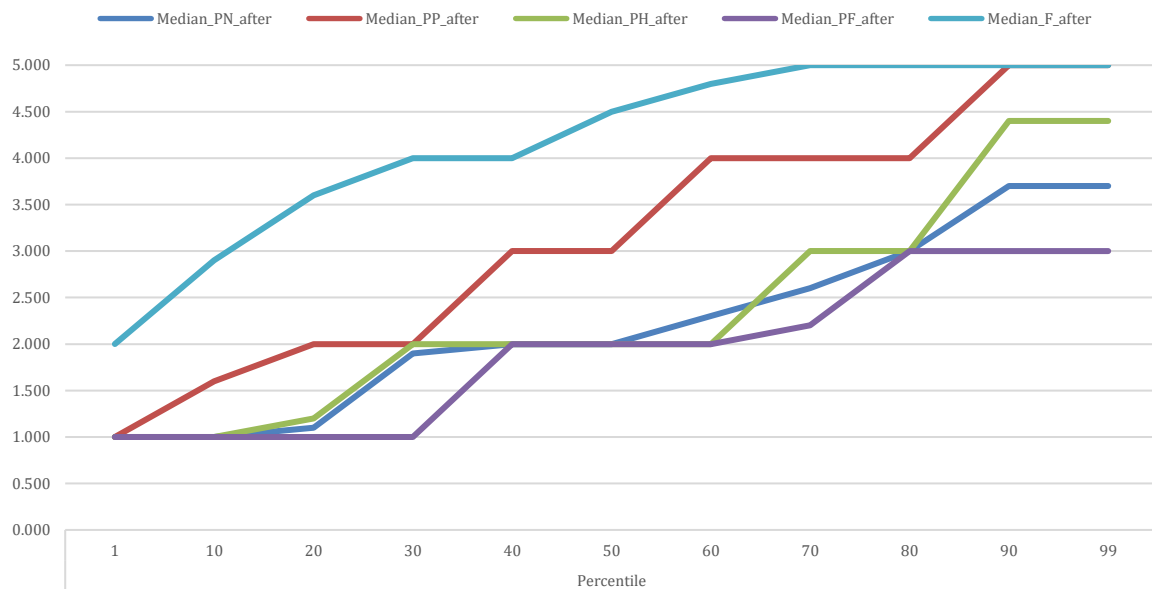


Fig. 1: Median values of the scores concerning the items of each of the subscales/dimensions of the TMST (section1), before and after the proposed strategies

In the sample analyzed, it was found that before the proposed strategies, the participants presented the following profile: High future perspective; negative past perspective, positive past and moderate or high present hedonistic; and moderate present fatalistic perspective. Following the recommendations proposed, there was a highly positive past perspective, together with the future perspective. In relation to the negative past perspective, there was a slight decrease. On the other hand, the PF remained unchanged (Fig. 1). It should be noted that after the recommendations, time perspectives came slightly closer to the

balanced TP described by [Zimbardo and Boyd \(1999\)](#).

In an item-by-item analysis, statistically significant differences were found between the answers given before and after the recommendations regarding the following items of the ZTPI (first section of the TMST): 1. My life path is controlled by forces over which I have no influence; 5. I think about the bad things that have happened to me in the past; 15. I like stories about how things used to be in the "good old days" (Table 4), with $p < 0.05$, $p < 0.05$, and $p < 0.1$ respectively.

Table 4: Wilcoxon test results comparison between the answers given, in both moments, concerning section 1 of the TMST (bilateral test)

Test statistics			
	1- My life path is controlled by forces over which I have no influence	5. I think about the bad things that have happened to me in the past	15. I like stories about how things used to be in the "good old days"
p	0.008	0.008	0.070

The changes verified, at the level of the total scores of the 5 dimensions of the ZTPI, allowing a slight approximation of the balanced TP described by [Zimbardo and Boyd \(1999\)](#), may be influenced mainly by the change in behavior verified in items 1, 5 and 15, referring, respectively, to the time perspectives Present fatalistic, Negative Past and

Positive Past. In this context, it should be noted that in the case of items 1 and 5, there was a decrease in the values of the mode and P50 (in the case of item 5 there was also a reduction in the value of P75), while in the case of item 15 there was an increase in the values of the mode, P50 and P75, as shown in [Table 5](#).

Table 5: Mode and quartile values of the scores obtained for items 1, 5, and 15 of Section 3 of the TMST

	1		5		15	
	Before	After	Before	After	Before	After
Mode	3	2	3	2	3	4
P25	2	2	2	2	2	2
P50	3	2	3	2	3	4
P75	3	3	4	3	3	4

Regarding the self-recognition pillar, the answers of the 15 participants, to whom the five questions related to the second section of the TMST were

asked, before and after the proposed recommendations, are summarized in [Table 6](#).

Table 6: McNemar test results (one-tailed test)

1. Have you already defined your personal mission?	2. Have you already defined your vision?	3. Have you already defined your values?																																				
<table border="1"> <thead> <tr> <th>After</th> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr> <td>Before</td> <td></td> <td></td> </tr> <tr> <td>Yes</td> <td>11</td> <td>0</td> </tr> <tr> <td>No</td> <td>2</td> <td>2</td> </tr> </tbody> </table> <p>p (one-tailed)= 0.250</p>	After	Yes	No	Before			Yes	11	0	No	2	2	<table border="1"> <thead> <tr> <th>After</th> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr> <td>Before</td> <td></td> <td></td> </tr> <tr> <td>Yes</td> <td>10</td> <td>0</td> </tr> <tr> <td>No</td> <td>4</td> <td>1</td> </tr> </tbody> </table> <p>p (one-tailed)= 0.063</p>	After	Yes	No	Before			Yes	10	0	No	4	1	<table border="1"> <thead> <tr> <th>After</th> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr> <td>Before</td> <td></td> <td></td> </tr> <tr> <td>Yes</td> <td>11</td> <td>0</td> </tr> <tr> <td>No</td> <td>3</td> <td>1</td> </tr> </tbody> </table> <p>p (one-tailed)= 0.125</p>	After	Yes	No	Before			Yes	11	0	No	3	1
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No	3	1																																				
4. Have you spent some time considering your personality type?	5. Do you consider that you possess the characteristics of a leader?	Observations: Changes from "No" to "Yes" at the level of the: -Definition of vision: 4; -Definition of values: 3; -Personality type: 4; -Possessing the characteristics of a leader: 1																																				
<table border="1"> <thead> <tr> <th>After</th> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr> <td>Before</td> <td></td> <td></td> </tr> <tr> <td>Yes</td> <td>11</td> <td>0</td> </tr> <tr> <td>No</td> <td>4</td> <td>0</td> </tr> </tbody> </table> <p>p (one-tailed)= 0.063</p>	After	Yes	No	Before			Yes	11	0	No	4	0	<table border="1"> <thead> <tr> <th>Before</th> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr> <td>Before</td> <td></td> <td></td> </tr> <tr> <td>Yes</td> <td>11</td> <td>0</td> </tr> <tr> <td>No</td> <td>1</td> <td>3</td> </tr> </tbody> </table> <p>p (one-tailed)= 0.500</p>	Before	Yes	No	Before			Yes	11	0	No	1	3													
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After the recommendations, there was an increase in the number of participants who invest in defining their mission, vision, and values. It should be noted that, regarding the definition of their vision, only 10 assumed that they had defined it before, whereas, after the recommendations, 14 assumed that they had defined it (i.e., 4 of the participants went from "No" to "Yes"). As for the time to reflect on their personality, after the recommendations, all the participants (n=15) stated that they had already reflected (before the recommendations, only 11 had reflected on their personality, i.e., 4 of the participants began to devote some time to considering their personality type). It should also be mentioned that 3 of the participants began to define their values and 1 of the participants considered that he/she has characteristics of a leader. However, using the McNemar test, significant changes in behavior were found from "No" to "Yes," considering a significance level of 0.1, only in the case of behaviors associated with questions 2 (Definition of vision) and 4 (reflection on personality type) of Section 2 of the TMST (Self-recognition). These results indicate that the recommendations contained in the report influenced the promotion of these two behaviors, as shown in the results presented in Table 6. Regarding TM, analyzing the summary statistics of the total scores obtained by the participants in the study, on the scale that evaluates TM, there was a slight increase in the mean value, indicating an improvement in the behavior of time management. However, there is still some room for improvement (Table 7). Analyzing the items that make up the scale, statistically significant differences ($p < 0.1$) were found between the answers given, before and after the recommendations, only in the case of item "8. I clearly set long-term objectives for which I am working" (Table 8), with an increase in the values of the P25 and P75 percentiles (Table 9).

Table 7: Summary statistics of the total scores obtained on the scale that evaluates TM, before and after the proposed strategies

	Mean	Standard deviation
Total score - after	43.67	6.883
Total score - before	45.07	8.146

Regarding the third section (TM) of the TMST, the value of Spearman's correlation coefficient was calculated between the scores obtained in the third

section of the TMST and in the TMBQ of Macan et al. (1990), with a positive and statistically significant correlation ($r_s = 0.730$; $p = 0.002$) among these scores, which points to the convergent validity of the scale.

Table 8: Wilcoxon test results comparison between the answers given in the two moments: Items of the third section of the TMST (two-tailed test)

8. I clearly set long-term goals for which I am working	p
	0.063

Table 9: Values of mode and quartiles of the scores obtained in the case of item 8 of Section 3 of the TMST (Item 8)

	Before	After
Mode	4	4
P25	3	4
P50	4	4
P75	4	5

4.1. Analysis of the interviews

An attempt was made to validate the TMST in terms of the structure, the report generated and the improvement proposals presented. The answers obtained were enlightening and allowed one to verify the feasibility of the TMST.

4.2. TMST structure

Regarding the structure, the answers converged in a positive sense, as the questions were considered clear, well-structured, and easy to fill in. In terms of organization, the participants considered that the questions were well organized. When clear, they considered that the TMST is quite adequate (Fig. 2).

"Short and objective," "Quite clear," "I think the questions are easy to interpret," "They are easy to interpret," "They are pertinent and perceptible," "The questions are completely clear and leave no doubt as to what is intended to be answered," "Excellent, easy to understand," "They reveal their scientific character in order to obtain a specific result and that will be, a posteriori, object of study by the researcher," "They are accurate," "Satisfactory," "They are relevant, clear, and objective, as should all questionnaires be. Giving no room for assumptions, or doubts. They are also easy and quick to answer," "Easy to understand," "The questions asked are clear and objective for the purpose that this study intends. Answering the questions leads me to self-

knowledge," "I think the questions were clearly asked, it took me 10 minutes to take the questionnaire without even having to read any

supporting document," and "They are well structured."



Fig. 2: Opinion about the TMST structure

4.3. Diagnostic report

Regarding the report, the participants provided their opinion on the structure, and language and presented suggestions for improvement. All respondents considered that the structure of the report was adequate. As for the language, opinions diverged, noting that some of the participants considered that the language was informal and others formal. However, they considered it appropriate to the nature of the information. Regarding the suggestions for improvement, some of the participants abstained, and those who presented suggestions asked for more conciseness.

"I consider the language to be appropriate to the approach that should be done in this type of study," "A formal language, but incisive (in a positive way) in the way its meaning becomes clear," "A language of easy understanding," "It is a formal language, but comprehensive to the general audience," "I think it is succinct, gives us good feedback on our characteristics from the time perspective, guides us in improving our self-recognition, and enlightens us in improving time management practices," "Perhaps a little more succinct [the report]," "I have no suggestions for improvement because the report manages to interconnect the various responses of the respondent so that, in short, suggestions for better time management and a work-life balance can be made," "In general, the report designed corresponds to the perspectives of the participant, and I therefore classify as "Excellent" without suggestions for improvement at the present time," "In general I consider the report quite well carried out, apart from the point set out in point 1, I wouldn't add anything else."

4.4. Improvement proposals

In this topic, participants were questioned about the relevance of the recommendations and their applicability. Regarding their relevance, all the

respondents considered the recommendations relevant, and the opinions, although positive, were different. As for the applicability of the recommendations, all considered them positive. Regarding the benefits experienced, the answers were varied.

"I try to manage priorities in the most appropriate way and define them well," "Appropriate to the needs shown," "They are appropriate taking into account my responses to the previous questionnaires," "The recommendations presented will allow me to develop best practices in time management," "They are clear," "I consider them to be objective and relevant recommendations so that there are significant changes in the lifestyle of the respondent," "Great," "It is an asset and will certainly be followed so that time management becomes even more effective and efficient," "They are well prepared," "I agree that I must change some behaviors to better manage my time," "They were appropriate, to the extent that they really show my time management. There are always aspects to improve," "Very thorough recommendations, focusing on the various aspects of professional and personal life," "I agree and accept the recommendations. Prioritizing tasks and not procrastinating are actions that will allow you to have more time management," "They are appropriate," "Very realistic and accessible," "Several, both personally and at work," "Evolving in quality of life, personal and professional relationships. Increased productivity and efficiency. Attitude becomes more positive and focused," "Greater perception of the way we manage our time, which leads us to adjust in order to become more efficient and, consequently, makes us feel like we really want to spend our time," "It is a scale of easy interpretation/use," "Managing life in a better way, to be able to have time to do everything that is supposed to be done," "Often it is necessary that there is a "maybe" as an answer and the scale used allows to identify the intensity of the statement," "It

helps to be more efficient in the use of this resource," "It avoids the waste of time, the exaggerated time spent in simple tasks, and improves fundamental aspects in the context of time management," "It contributes to my personal strategy," "Personally I think I'm fine, but analyzing through this time management scale I should improve some tasks to minimize the time for completion," "Reflecting on the importance of time. What we consider important or not. What's urgent or not. Sometimes we "waste time" doing tasks that could be done later... and when we realize, it is already afternoon," "The identification of positive and negative points about the way of thinking and managing time, in order to reflect and implement new future attitudes," "I will have greater control of my day allowing me to perform my tasks in a timely manner," "Planning and prioritizing, I think it will be the most important point for me and even where I have more room for improvement," "To achieve timely planning and thus minimize errors, and make the most of our time."

5. Discussion/conclusion

In the work and business context, there are several impacting factors, of which this study highlights the unpredictability of the current situation, technological innovation, and the digital transition. Employees must, through a previous self-recognition, establish a balance between personal, social, and work life, motivation, the notion of TP and the uniqueness of each individual, and other unpredictable factors.

Time has been a topic of interest to professionals from different scientific areas. TP is one of the most significant influences that affect all aspects of human behavior, such as educational performance, or even sleep patterns, affecting our quality of life. Even though there are problems associated with excessive orientation in relation to any perspective, a balanced time perspective was presented as an ideal model (Boniwell and Osin, 2015). People with a balanced TP can act in a time frame appropriate to the situation in which they are. The recommendations presented on the time perspective converge in an attempt to guide participants towards a balanced time perspective according to [Zimbardo and Boyd \(2008\)](#). In the present study, the results referring to the first section of the TMST tended to approach slightly those referring to a balanced time perspective.

Regarding self-recognition, participants were asked about their mission, vision, and values, as well as their personality and the recognition of the characteristics of a leader. After the recommendations were presented, there was, in general, a change in behavior, considered by the authors to be positive, to the extent that the participants reported that they devoted more time to defining their vision and reflecting on their personality.

As [Sardinha et al. \(2020\)](#) mentioned, the uniqueness of the human being translates into

countless ways of being and thinking. An individual should seek, through self-recognition, to establish a mission, vision, and values, allowing an adequate adaptation to the different work contexts and the optimization of activities, before the other sociological contexts ([Covey, 2017](#); [Drucker, 2019](#)).

Finally, time management (the third section of the TMST) was evaluated by considering 4 assumptions ([Table 1](#)). The higher the total score (sum of the scores obtained in each of the items) obtained by an individual in this set of items of the TMST, the better his or her capacity to TM. There was an improvement in the TM of the participants after the presentation of the strategies considered appropriate. Furthermore, in the retest, the participants were asked to fill out the TMBQ proposed by [Macan et al. \(1990\)](#), which evaluates the same latent variable: Time management. The positive correlation between the total scores obtained in these two scales indicates the convergent validity of the items that make up the third section of the TMST, and the internal consistency and factorial structure of the items of the third section of the TMST were previously validated using a larger sample.

The interviews sought to evaluate the TMST, from the perspective of those who fill it out. Thus, the participants were asked about the clarity and structure of the TMST; the report with the diagnosis and proposals for improvement in TM; and, the applicability of the suggested proposals. The answers were motivating and positive, and it was important to highlight the clarity of the instrument and the ease of its completion. As for the report containing the recommendations, overall, the participants consider that it presents formal language and that its content has contributed to a reflection and possible change in the behaviors of TM.

The TMST was based on the flexible time management model suggested by [Sardinha et al. \(2020\)](#). This model, through a holistic perspective, aims to promote a set of good practices on TM and allows the self-recognition of individuals regarding the definition of their mission, vision, and values, and the reflection on their personality type and whether they have characteristics of a leader. However, it should be noted that "TM cannot be taught but can be learned. It is necessary a predisposition of the individual for the assimilation and application of good practices in TM" ([Sardinha et al., 2020](#)).

6. Limitations and future research

The first limitation is related to the fact that the sample is not random, so the results are indicative only and it is not possible to guarantee its generalization to the population. Nevertheless, some nonparametric hypothesis tests were applied to verify possible evidence of the results achieved. Another limitation is related to the use of the short version of the ZTPI. If, on the one hand, as reported by [Worthington and Whittaker \(2006\)](#), short

tests/questionnaires are recommended when using a battery of different questionnaires and are less stressful for participants, on the other hand, a smaller number of questions may refer only to a smaller section of the original psychological constructs (Orosz et al., 2017). Košťál et al. (2016) assumed that, in various cultural contexts, shorter versions of the ZTPI, containing only several key items for each scale, could provide a more valid and practical tool. Orkibi (2015) stated that a shorter version can be used in therapy or counseling to assess an individual's profile and guide interventions. Another limitation is the study based on self-report. The biggest problem with self-report measures is that they are susceptible to intentional distortion or counterfeiting (Hough and Johnson, 2013). Further research may address this limitation by administering the questionnaire to other samples, including from other populations. This theme requires further exploration. Hence, some guidelines for future research are presented. It is suggested a deepening of the study and validation of the TMST through its application in new studies, preferably involving random samples. One recommends researchers build a set of outcome indicators and monitor the effects of recommendation strategies over time. The model can serve as a reference, not only in an academic but also in a business context. Efforts are being made to develop individual monitoring software in technological terminals, which allows the administration of the TMST and the generation of the diagnostic report, with the corresponding recommendations, in real-time. It is also suggested the application of the TMST in several situations in the work context, such as the recruitment of new employees (job interviews), depending on the activity to be performed, career progression, or assignment of new responsibilities.

Regarding the items of the third section of the TMST, in terms of future work developments, it is also worth noting the analysis of the discriminating and practical validity of these items, the latter in the sense of predicting the professional performance of the employees of an organization.

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Compliance with ethical standards

Conflict of interest

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