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PRIORITIZATION OF HUMAN RESOURCES TRAINING IN PUBLIC ADMINISTRATION BY COMPOSITION OF PROBABILISTIC PREFERENCES

PRIORIZAÇÃO DO TREINAMENTO DE RECURSOS HUMANOS NA ADMINISTRAÇÃO PÚBLICA POR COMPOSIÇÃO PROBABILÍSTICA DE PREFERÊNCIAS

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ABSTRACT

Purpose: prioritize cross-cutting training needs at the Mato Grosso State Secretariat for Public Security (SESP-MT).

Method/approach: the quantitative research collected data through a questionnaire from 627 public security employees of the SESP-MT. The responses were organized on a five-point Likert scale, where "1" represented the least importance of the activity and "5" the most importance. The frequencies of responses at each value on the Likert scale were submitted to the Probabilistic Composition of Preferences for the hierarchization of transversal competencies. The results were statistically compared with SESP-MT's previous priority.

Main findings: the priorities originally assigned by SESP-MT considered only the evaluations above the average value of the Likert scale (point "3") and were compared with the results of the CPP, which considers the entire spectrum of responses on the scale. The two rankings were subjected to Spearman's ordinal correlation, with a result of 93.3%. The literature and open data reinforced the results projected by the CPP.

Theoretical, practical/social contributions: the research contributes to the advancement of academic research on human resource management and improvement of the sector at SESP-MT, presenting a methodology that considers uncertainties in human evaluation and involves the entire spectrum of Likert scale points, giving greater robustness to the results and, ultimately, confirming or reorienting public service training.

Originality/relevance: the relevance of this study is to improve the processes carried out in the sector researched. The lack of studies regarding the use of methodologies for prioritizing human resources training in public administration.

Keywords: Public administration. Personnel training. Composition of Probabilistic Preferences. Likert scale.

RESUMO

Objetivo: priorizar as necessidades transversais (comuns a diferentes organizações subordinadas) de treinamento na Secretaria de Estado de Segurança Pública de Mato Grosso (SESP-MT).

Método/abordagem: a pesquisa quantitativa, com a coleta de dados por questionário de 627 servidores de segurança pública da SESP-MT. As respostas foram organizadas em uma escala Likert de cinco pontos, em que "1" representava a mínima importância da atividade e "5" a máxima importância. As frequencias de respostas em cada valor da escala Likert foram submetidas à Composição Probabilística de Preferências para a hierarquização das competências transversais. Os resultados foram comparados estatisticamente com a prioridade prévia da SESP-MT.

Principais Resultados: as prioridades originalmente atribuídas pela SESP-MT consideraram somente as avaliações acima do valor médio da escala Likert (ponto "3") e foram comparadas com os resultados do CPP, que considera todo o espectro de respostas da escala. Os dois rankings foram submetidos à correlação ordinal de Spearman, com resultado de 93,3%. A literatura e os dados abertos reforçaram os resultados projetados pela CPP.

Contribuições teóricas/práticas/sociais: a pesquisa contribui para o avanço de pesquisas acadêmicas sobre gestão de recursos humanos e aperfeiçoamento do setor na SESP-MT, apresentando uma metodologia que considera incertezas na avaliação humana e envolve todo o espectro de pontos da escala Likert, conferindo maior robustez aos resultados.

Originalidade/relevância: a relevância do estudo se justifica pela necessidade de melhorar os processos realizados no setor pesquisado e pela carência de estudos no que tange à utilização de metodologias de priorização do treinamento de recursos humanos na administração pública.

Palavras-chave: Administração pública. Treinamento de Pessoal. Composição Probabilística de Preferências. Escala Likert.

1 INTRODUCTION

Training professionals in any organization, whether public or private, contributes directly to achieving better results (Mello & Amancio Filho, 2010; Vieira & Nolasco, 2022). Specifically, within the realm of public administration, Article 39 of the Federal Constitution mandated that the Union, the States, and the Federal District establish government schools to train and provide professional development for public servants (Brasil, 1988). As a result of this institutional arrangement, administrative structures responsible for developing and training public servants, aligned with that premise, were both maintained and created.

More specifically, the Federal Government established the policy and guidelines for personnel development within the direct, autonomous, and foundational federal public administration through Decree No. 9.991/2019—amended by Decree No. 10.506/2020—which shapes the National Personnel Development Policy (PNDP) (Brasil, 2020). The objective, set forth in the first article of the administrative act, establishes a link between training in necessary competencies and the achievement of excellence in agency performance. Thus, based on development needs related to achieving institutional goals, agencies are required to prepare an annual Personnel Development Plan (PDP) for the subsequent fiscal year. Broadly speaking, it is evident that identifying training needs serves as the foundation for developing the PDP within the federal public administration, making it essential to both identify and prioritize these needs.

In Mato Grosso, the State Secretariat of Public Security (SESP-MT) is responsible for driving the training and professional development policies for its personnel (Brasil, 2014). Accordingly, in 2022, a decision was made to formulate a corporate training plan that encompassed and interconnected various affiliated organizational structures dedicated to corporate education. Through consultations with staff, several cross-cutting training needs—shared by organizations linked to SESP-MT—were identified using questionnaires and five-point Likert scales. With this data in hand, the challenge lies in prioritizing training needs for the Mato Grosso State Secretariat of Public Security.

The problem and its dataset align with the characteristics of multicriteria decision-aid models, as training needs and evaluation criteria constitute finite sets of alternatives to be prioritized, and their performance levels have been quantified (Almeida, 2013; Sant'Anna,

2015). In 2023, SESP-MT prioritized training needs based on the highest percentage scores on the Likert scale (4—very important and 5—extremely important). Although simple, this technique disregarded lower ratings, which sometimes account for a significant proportion of respondents.

Another very common approach to analyzing Likert scale results is to reduce the responses to a mean and standard deviation. Recently, Gavião et al. (2023) proposed an alternative approach to this type of problem—Composition of Probabilistic Preferences (CPP)—for prioritizing data measured on Likert scales. In addition to considering the full range of evaluations across the Likert scale spectrum, the proposed solution allows for the resolution of ties—which frequently occur when using means or only a subset of responses, as was the case at SESP-MT. The research serving as the theoretical framework details the statistical distortions and controversies arising from the use of means and standard deviations with Likert scale numerical values, demonstrating the advantages of using CPP in case studies (Gavião, Sant'Anna, et al., 2023).

Comparing the original results with those from the new CPP-based approach may reveal differences in the ranking of training needs, indicating new priorities for personnel training departments to consider when making decisions.

2 REVIEW OF TRAINING NEEDS

The search for empirical applications was conducted using the SciELO platform with the Boolean operators "OR" and "AND" employing the terms "training needs assessment" and "capacity-building needs assessment" (in Portuguese). After filtering, only three articles conducted research on training needs assessment: one in the call center sector, one regarding self-assessments, and another concerning Brazilian junior enterprises. Due to the scarcity of retrieved articles, the temporal cutoff was set at the year 2000. Additional articles were selected based on citations, resulting in a total of seven empirical studies, as shown in Table 1.

Table 1

Organizations surveyed and research objectives

Authors	Scope	Organizations / Institutions
Campos et al. (2015)	Environment	Junior enterprises – private law.
	Objective	Analyze the training needs of Brazilian junior entrepreneurs and identify the challenges and changes faced by junior enterprises that may generate future demands for training.
Matte & Coronel (2014)	Environment	Federal University of Santa Maria (PROGEP/UFSM) – public law.
	Objective	Identify the guiding criteria for the training courses offered by the Pro-Rectorate for People Management at the Federal University of Santa Maria (PROGEP/UFSM).
Carvalho & Mourão (2014)	Environment	Call center company – private sector.
	Objective	Identify the perceived training needs of call center supervisors. Personal variables include age, education level, length of service, time spent as a supervisor, and motivation to learn.
Silva et al. (2009)	Environment	Mario Covas State Hospital (Social Health Organization) – private law.
	Objective	Identify the needs of nursing teams working in different Intensive Care Units (ICUs).
Castro & Borges-Andrade (2004)	Environment	University of Brasília – public law.
	Objective	Diagnose training needs to be based on the competencies expected for the role and innovation by seeking to address both the organization's overarching demands and specific or localized requirements.
	Environment	Public enterprise, Caixa Econômica Federal de Goiás – private law.

Magalhães & Borges-Andrade (2001)	Objective	Develop a training needs assessment methodology that included attitudes; to study the relationship between self-assessment and assessment by others, aiming to evaluate knowledge, skills, and attitudes; and to evaluate the relationship between self-assessment and certain predictor variables (tenure in the organization and in the role, previous employment, gender, marital status, education level, and age).
Potter et al. (2000)	Environment	Forum of Public Health Agencies/Schools – public law.
	Objective	Prioritize subjects and competencies. Develop a relatively standardized training schedule.

These studies were conducted in various organizations and pursued different objectives. The settings studied included private and public companies, hospitals, and public-law universities.

The objectives to be achieved through training needs assessments do not follow a single pattern, which could give rise to various lines of inquiry within the same research agenda, namely: (i) identifying the perception of training needs; (ii) identifying current training needs; (iii) identifying future training needs; (iv) developing a training needs assessment methodology; (v) understanding the relationship between self-assessment and assessment by others; (vi) prioritizing training needs; (vii) creating a standardized training schedule; and (viii) establishing criteria for training courses.

Variations in methodological approach were observed in the case studies analyzed; however, in most instances, a qualitative phase is followed by a quantitative phase. Nevertheless, there are also exclusively qualitative training needs assessments, as described in Table 2.

Table 2

Organizations surveyed and research objectives

Authors	Methodology
Campos et al. (2015)	Qualitative phase – Study I: design of an ANT questionnaire with 43 items associated with 11-point scales for mastery and importance.
	Quantitative phase – Study II: 1. design of a semi-structured interview guide, 2. individual interviews with a sample of 21 professionals and faculty members, 3. group interviews with a sample of 34 junior entrepreneurs, and 4. data analysis to describe and categorize the challenges and changes.
Matte & Coronel 2014)	Qualitative phase – on-site observations.
	Quantitative phase – questionnaire comprising a Likert-type scale; model proposed by Moraes (2002), adapted.
Carvalho & Mourão (2014)	Qualitative phase – in-depth interview.
	Quantitative phase – semi-structured questionnaire, two 0–4 Likert scales (importance and proficiency). The model proposed by Borges-Andrade was used to calculate the training needs indicator.
Silva et al. (2009)	Qualitative phase – 2 questionnaires: one multiple-choice and one open-ended.
	Quantitative phase – Quantitative analysis using absolute and relative frequencies.
Castro & Borges-Andrade (2004)	Qualitative phase – Study II: 1. design of a semi-structured interview guide, 2. individual interviews with a sample of 21 professionals and faculty members, 3. group interviews with a sample of 34 junior entrepreneurs, and 4. data analysis to describe and categorize the challenges and changes.
	Quantitative phase – Study I: 1. design of a TNA questionnaire with 43 items linked to 11-point scales for proficiency and importance; 2. semantic validation; 3. administration to a sample of 447 junior entrepreneurs nationwide; and 4. data analysis to identify priority training needs.
	Qualitative phase – documentary research (job descriptions) and interviews.

Magalhães & Borges-Andrade (2001)	Quantitative phase – semi-structured questionnaire, two 0–4 Likert scales (importance and proficiency). Proprietary method; model developed by Borges-Andrade. Training needs indicator.
Potter et al. (2000)	Qualitative phase – in the first qualitative phase, universal competencies considered training priorities were selected.
	2nd Qualitative Phase – Two groups (a curriculum design group and the national advisory committee) reviewed the results of Phase 1 and recommended the competencies that should constitute a model training agenda (including four competencies for a seventh area).

3 METHODOLOGY

The quantitative analyses in this study employed the CPP, proposed by Sant'Anna & Sant'Anna (2001) and subsequently extended by Sant'Anna (2015), using data collected via a five-point Likert scale.

In real-world decision problems, most associated information is, to some degree, uncertain or imprecise, and relevant information may sometimes even be missing (Lahdelma et al., 2000). The CPP explores a probabilistic approach to multicriteria decision problems, accounting for the uncertainty typically present in preference evaluations. CPP's probabilistic approach allows preference evaluations made on different scales to be compared and combined based on the multiple criteria selected for decision-making. Measurement uncertainty is explicitly represented through probability distributions (Sant'Anna, 2015).

Other decision-support techniques found in the literature also allow for the modeling of information under uncertainty through fuzzy set theory (Zadeh, 1965) and rough set theory (Pawlak, 1982). However, most multi-criteria decision-support methods apply a deterministic approach to the decision problem, assuming exact performance values for the alternatives across the various criteria. Few methods explore the issue of measurement uncertainty using probability distributions when modeling the problem; notable examples include CPP and SMAA (Stochastic Multi-Criteria Acceptability Analysis), proposed by (Lahdelma et al., 1998).

Each multi-criteria decision aid model requires an initial dataset organized specifically for application within the method's calculation algorithm, yielding results that enable the selection of satisfactory alternatives, the ranking of preferences, or even the grouping of data into common classes. In other words, the initial data must be collected in a standardized manner to suit the chosen method. In this study, the initial data had already been collected by SESP-MT through a formal consultation process involving 628 public servants, as detailed in Section 3.1. However, the analysts considered only a sample of the evaluations, using—for the purpose of analysis—only those results exceeding the midpoint of the Likert scale (point "3").

The challenge undertaken in this article was to use the same dataset, applying a methodology fully suited to it, to compare the original results with those obtained here. The CPP variant for Likert-scale data proposed by Gavião, Sant'Anna, et al. (2023) is precisely suited to the problem, as it was designed specifically to model the same type of data as the original SESP-MT dataset. The two rankings (the original SESP-MT ranking and the CPP-Likert ranking) were then subjected to Spearman's rank correlation, yielding a result of 93.3%; their differences and points of agreement were subsequently re-evaluated by the author, who had been part of the process at that Secretariat.

This same database brings limitations to the use of other multi-criteria decision support models available in literature. SMAA, for example, which also addresses the problem in a probabilistic way, is not only based on the assessment of preferences, but also on a utility

or value function whose form is consensually agreed upon by decision makers, which was not defined or collected in the original research (García-Cáceres, 2020). Other deterministic methods, such as TOPSIS or other techniques from the ELECTRE family, would require adaptations to the database through descriptive statistics, which undermines the main advantage of the CPP variant, proposed by Gavião et al. (2023), which avoids, for example, the use of arithmetic averages with data collected on Likert scales.

In this context, it is worth noting that Gavião et al. (2023) addressed the main controversies surrounding the use of descriptive statistics with Likert scales, given their nature as ordinal scales. A Likert scale captures an evaluator's perceptions, with values serving merely as indicators of the relative order of those perceptions. For instance, if the perception "not at all important" is assigned to the value "1" and "slightly important" the value "2," it is incorrect to infer that one rating represents double or half the level of perception of the other. Similarly, the arithmetic mean of "1.5" between these two scale points does not correspond to any specific perception held by the evaluator. On the other hand, scientific literature documents numerous similar approaches in highly respected journals, suggesting that the academic community endorses this type of methodology.

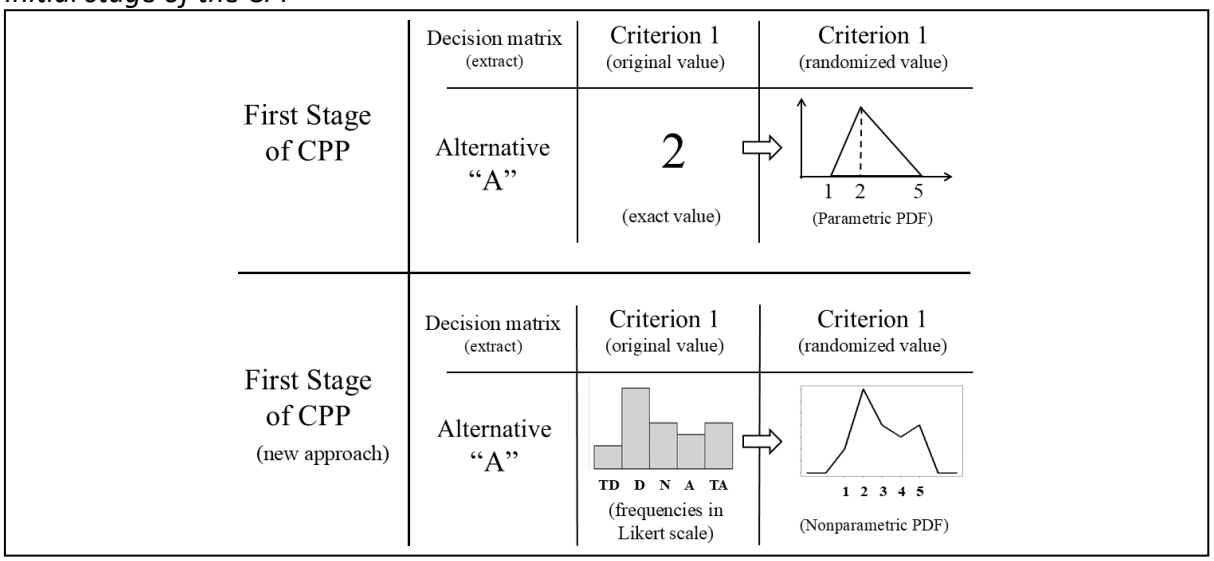
The CPP approach neither advocates nor relies on adopting a specific position in this debate; it can minimize the cited limitations without assuming values not present on the Likert scale, while accounting for the full spectrum of evaluations across the scale's various points. Figure 1 illustrates the traditional approach used in Stage 1 of the CPP, where a probability distribution (a triangular distribution in this example) emulates an expert's preferences. The exact value corresponding to the expert's assessment becomes the mode of a preference distribution that ranges between the extreme evaluation points for the criterion. In this example, the exact value "2" assigned to Alternative "A" and the "1" to "5" range of Criterion 1 are converted into a triangular distribution with parameters (1, 2, 5), representing the minimum value "1," the mode "2," and the maximum value "5."

The lower portion of Figure 1 proposes a non-parametric procedure for this 1st Stage of the CPP, for cases in which respondents' original assessments are based on a Likert scale. Thus, instead of considering each respondent's preference for conversion to a parametric distribution, the histogram of the data set is transformed into a non-parametric distribution. This conversion of the histogram into a non-parametric distribution is found in the literature, but its adaptation to the CPP is unprecedented (Chalabi et al., 2010; Jiang & Li, 2015; Wandresen et al., 2019; Zhou et al., 2023).

This approach offers certain advantages for the use of CPP. Opting for a non-parametric distribution avoids the distortions caused by using descriptive statistics, specifically point estimates, to derive parameters from the dataset. Furthermore, the new model simplifies CPP calculations for problems involving many respondents. For instance, hundreds of evaluations of a specific alternative against a criterion can be generalized into a single histogram, thereby avoiding hundreds or thousands of individual calculations or the need to rely on a measure of central tendency to represent that large volume of evaluations.

Figure 1

Initial stage of the CPP



Note. TD (strongly disagree), D (disagree), N (neutral), A (agree), TA (strongly agree). Adapted from Gavião et al. (2023).

The non-parametric distribution selected for this approach is an empirical distribution, in which each point on the Likert scale is associated with a probability calculated from the questionnaire responses. The R software offers various tools for fitting data to probability functions; here, the empirical distributions were fitted using the "mc2d" package (Pouillot & Delignette-Muller, 2010). This transformation of the Likert-scale dataset (histograms) into an empirical probability distribution was defined by the "dempiricalC" function, as shown in Equation (1), where "x" represents the scale values and "p" denotes their occurrence probabilities based on their frequencies. The "p" values are normalized so that the distribution has a total area of one. The "dempiricalC" (PDF) and "pempiricalC" (CDF) functions were used to calculate PMax and PMin, following R code developed by the authors and made available via open access on the Zenodo.org platform (Gavião, Sant´Anna, et al., 2023).

$$f(x) = p_i + \left(\frac{x - x_i}{x_{i+1} - x_i} \right) (p_{i+1} - p_i), \quad x_i < x < x_{i+1} \tag{1}$$

The second stage of the CPP followed the approach originally proposed by Sant'Anna (2015). In this stage, preferences are maximized and/or minimized by calculating the probabilities of each alternative "i" under each criterion "j" being superior (PMax) or inferior (PMin) to the others, in accordance with Equations (2) and (3), respectively. In the present study, the preference assessment regarding the 35 listed training needs implies a positive relationship: the higher the value selected by the evaluator on the Likert scale, the greater the preference for the training. Thus, for this second stage of the CPP, only the PMax calculation was relevant to the problem. Regarding mathematical notation, the Cumulative Distribution Function (CDF) is represented by Fx, the Probability Density Function (PDF) by fx, and the domain of the random variable X by DX. Table 3 presents an example of the PMax calculation process, based on a subset of the original data collected by SESP-MT regarding the first four training programs on the list (the complete list appears in Section 3.1).

$$PMax_{ij} = \int_{D_{X_i}} \left[\prod F_{X_{-i}}(x_{-i}) \right] f_{X_i}(x_i) dx_i \quad (2)$$

$$PMin_{ij} = \int_{D_{X_i}} \left[\prod \left(1 - F_{X_{-i}}(x_{-i})\right) \right] f_{X_i}(x_i) dx_i \quad (3)$$

In Stage 3 of the CPP, the PMax and PMin probabilities are aggregated to determine the order of preference—whether individual or by class.

Table 3

PMax calculation extract (in the R programming language)

Criterion	Original data					PDF (f_x) CDF (F_x)	PMax R code
Training needs	Likert scale (5-point): 1-Not at all important; 2-Slightly important; 3-Moderately important; 4-Very important; 5-Extremely important.					Functions in R Package "mc2d" f_x: dempiricalC (x,min,max,values,probs) F_x: pempiricalC (x,min,max,values,probs) Where "min", "max", and "values" refer to the Likert scale values, and "probs" refers to the probabilities of the frequencies associated with each Likert scale value.	Integration of the training PDF is weighed by the product of the CDFs of the other training courses (Equation 2)
	1	2	3	4	5		
Capac. 1 – Knowledge of standards and procedures in the field of practice	8	42	64	173	331	PDF "Capac.1"= dempiricalC(x,1,5,values=c(1:5),probs=c(8,42,64,173,331)) CDF "Capac.1"= pempiricalC(x,1,5,values=c(1:5),probs=c(8,42,64,173,331))	PMax Capac. 1 = integrate (PDF Capac.1* CDF Capac.2* CDF Capac.3* CDF Capac.4,1,5)$ value
Capac. 2- Fundamentals of Administrative Law	25	73	147	180	168	PDF "Capac.2"= dempiricalC(x,1,5,values=c(1:5),probs=c(25,73,147,180,168)) CDF "Capac.2"= pempiricalC(x,1,5,values=c(1:5),probs=c(25,73,147,180,168))	PMax Capac. 2 = integrate (PDF Capac.2* CDF Capac.1* CDF Capac.3* CDF Capac.4,1,5)$ value
Capac. 3- Personal Data Protection Law (LGPD) – Law No. 13.709/2018	25	69	130	187	195	PDF "Capac.3"= dempiricalC(x,1,5,values=c(1:5),probs=c(25,69,130,187,195)) CDF "Capac.3"= pempiricalC(x,1,5,values=c(1:5),probs=c(25,69,130,187,195))	PMax Capac. 3 = integrate (PDF Capac.3* CDF Capac.1* CDF Capac.2* CDF Capac.4,1,5)$ value
Capac. 4- Overview of the Access to Information Law (LAI) - Law No. 12.527/2011	25	68	153	184	171	PDF "Capac.4"= dempiricalC(x,1,5,values=c(1:5),probs=c(25,68,153,184,171)) CDF "Capac.4"= pempiricalC(x,1,5,values=c(1:5),probs=c(25,68,153,184,171))	PMax Capac. 4 = integrate (PDF Capac.4* CDF Capac.1* CDF Capac.2* CDF Capac.3,1,5)$value

These aggregation methods range from simple approaches, such as a weighted sum, to more complex ones, like aggregation using Choquet integrals. It is worth noting that automation of the complete CPP procedure is available via open access in the “CPP” package for the R language (Gavião et al., 2026).

In this study, the original data from SESP-MT included evaluations based on a single criterion regarding preferences for the 35 training programs identified. Therefore, there is no need to aggregate criteria; the PMax results alone suffice to establish the order of preference.

3.1 DATA COLLECTION

The empirical data used in this study were collected during the training needs assessment conducted to develop the SESP-MT Training Plan. To fulfill the objective set forth in the administrative act, a perception survey was designed for SESP-MT staff members to gauge the importance of a selected set of competencies in relation to the operations and tasks they perform in their respective sectors. The committee appointed by Ordinance No. 215/2022/GAB/SESP (and subsequent amendments) comprised representatives from all professional training teams linked to the SESP-MT organization. Table 4 presents the raw survey data and shows response frequencies for each point on the Likert scale. For example, of the 618 evaluations recorded by SESP-MT staff regarding the training topic "Knowledge of standards and procedures in the area of operation," 8 responses were marked as "1" on the Likert scale, 42 as "2," 64 as "3," 173 as "4," and 331 as "5."

Table 4

Collected data

Training needs	Likert scale (5-point): 1-Not at all important; 2-Slightly important; 3-Moderately important; 4-Very important; 5-Extremely important.					
	Total	1	2	3	4	5
Knowledge of the standards and procedures of the field of activity	618	8	42	64	173	331
Fundamentals of administrative law	593	25	73	147	180	168
Personal Data Protection Law (LGPD) – Law No. 13.709/2018	606	25	69	130	187	195
Overview of the Access to Information Law (LAI) - Law No. 12.527/ 2011	601	25	68	153	184	171
Optimization of work processes	605	13	44	97	226	225
Use of problem-solving tools	612	18	57	104	210	223
Process management	595	27	48	116	202	202
Use of prioritization tools	590	27	59	127	206	171
Information management	601	35	71	124	204	167
Routine management	599	28	69	135	191	176
Handling and administrative process flows	604	32	85	133	206	148
Creation of flowcharts	603	32	91	167	182	131
Techniques and tools for organizing and controlling budgets and finances	591	70	100	139	158	124
Systematic planning and monitoring organizational climate	598	77	108	156	147	110
Contract Oversight	600	95	111	147	121	126
Document preservation and cleaning	604	94	126	144	134	106
Training of trainers	593	58	74	118	159	184
Clarity of written communications	613	16	58	65	222	252
Consolidation of information from different spreadsheets	605	28	73	93	226	185
Digital Fluency	611	25	46	112	219	209
Digital repositories	593	71	96	137	175	114
Digital marketing	606	110	117	168	132	79
Risk management in the public sector	599	27	76	111	181	204
SIGADOC - document management system	610	12	58	91	169	280
Interpersonal relationships and communication	610	22	63	102	190	233

Training needs	Likert scale (5-point): 1-Not at all important; 2-Slightly important; 3-Moderately important; 4-Very important; 5-Extremely important.					
	Total	1	2	3	4	5
Media Relations	602	96	99	142	150	115
Nonviolent communication and empathetic listening	607	33	69	106	181	218
Conflict mediation among civil servants, managers, and work teams	617	24	80	119	168	226
Customer Service	616	38	88	107	170	213
Human Rights and Ethnic, Sexual, and Sociocultural Diversity	610	56	102	106	170	176
Communication with children and adolescents	602	100	91	130	136	145
Mental health in organizations	605	26	59	99	139	282
Emotional intelligence	604	30	53	104	181	236
Retirement education	603	58	104	131	157	153
Financial education	601	79	115	140	148	119

To develop the questionnaire, the Commission examined public documents, such as the internal regulations of affiliated institutions, to select the specific competencies to be included in the survey across three major areas: crosscutting, management, and core functions. Additionally, the questionnaire featured (i) nominal and (ii) interval scale questions to characterize the respondents' perspectives (without identifying them), as well as (iii) open-ended fields and (iv) a five-point Likert scale to assess the competencies.

The electronic form was thus designed, incorporating a branching strategy, and administered via Google Forms across the state between October 10, 2022, and November 17, 2022. This study analyzed only the data collected in the questionnaire section dedicated to the “Training Needs Assessment” regarding transversal competencies, shared by organizations linked to SESP.

3.2 RESPONDENT PROFILE

Respondents from the administrative structures of SESP-MT were included in the survey. Notable participation included 160 civil police officers—comprising police chiefs, clerks, and investigators—87 personnel from the Official Forensics and Technical Identification agency, 84 Military Police officers, 75 staff members from the Penitentiary Administration Secretariat, 62 from the Systemic Administration Secretariat, 39 from the Justice Secretariat, 35 Military Firefighters, 33 from the Public Security Secretariat, and 46 staff members from smaller units.

Responses were received from the fifteen Integrated Public Security Regions (RISP) within the state of Mato Grosso; Cuiabá, the state capital, accounted for the largest share of responses, with 360. Várzea Grande—which forms a continuous urban area with the capital and is the state's second most populous city—and Rondonópolis—the third most populous—contributed 32 and 51 responses, respectively. The remaining 12 cities accounted for a total of 182 responses.

Consistent with the profile of other surveys conducted at SESP-MT, many respondents hold a “lato sensu” postgraduate degree (368). In addition to these, ten respondents hold a doctorate, 35 hold a master's degree, 194 hold an undergraduate degree, and 18 have only a high school education.

Table 5

Comparison of results (original versus CPP)

Category	Need for cross-training	Description	Original result - rank (SESP-MT)	Average ratings	Ranking of Likert scale means	CPP Likert (PMax)	CPP Likert Results - rank
Legislation	Knowledge of the standards and procedures of the field of activity	To be familiar with the general regulations and procedures of SESP-MT and the State of Mato Grosso, including the ability to apply them to specific cases.	1	4.257	1	0.05552	1
	Fundamentals of administrative law	Administrative law establishes the principles governing the conduct and validity of administrative acts. Accordingly, public servants are expected to be capable of acting in conformity with the legal framework.	21	3.663	20	0.02576	22
	Personal Data Protection Law (LGPD) – Law No. 13.709/2018	Personal data within the public security sector is subject to the LGPD. Public servants are expected to be capable of keeping third-party personal data secure, where applicable.	16	3.756	15	0.02981	15
	Overview of the Access to Information Law (LAI - 12.527/ 2011)	The Access to Information Law (LAI) regulates the constitutional right of access to public information, aiming to promote transparency regarding government information for the public. Consequently, public servants are expected to be capable of providing appropriate information when questioned, in accordance with the LAI.	20	3.679	19	0.0259	21
Basic techniques and tools	Optimization of work processes	It is expected that employees will be able to propose incremental innovation actions that generate productivity gains, increase efficiency, and reductions in costs, delivery times, among other things.	3	4.002	4	0.03542	7
	Use of problem-solving tools	Public servants are expected to have the ability to propose corrective actions that help solve problems, using tools such as brainstorming, Pareto diagrams (80/20 analysis), Ishikawa diagrams (cause-and-effect analysis), among others.	5	3.920	6	0.03452	8
	Process management	Process management complements work process optimization and is enhanced using process indicators that measure performance in terms of efficiency, efficacy, and effectiveness.	11	3.847	10	0.03204	13

Category	Need for cross-training	Description	Original result - rank (SESP-MT)	Average ratings	Ranking of Likert scale means	CPP Likert (PMax)	CPP Likert Results - rank
	Use of prioritization tools	It is expected that public servants will be able to prioritize resources rationally, through the use of the ABC matrix, which classifies critical tasks (A), important tasks (B) and less important tasks (C); the GUT matrix, useful for evaluating opportunities for improvement, based on criteria of severity (G), urgency (U) and trend (T); the Analytic Hierarchy Process (AHP) which breaks down a complex problem into smaller decisions for structured comparison, among others.	14	3.737	16	0.02681	20
	Information management	Information management ensures that employees carry out daily activities effectively through standardized operating procedures, assists in advising managers, and underpins the institutions' strategic decisions.	18	3.661	21	0.02571	23
	Routine management	Monitor daily, weekly, and monthly activities to ensure they are carried out efficiently and effectively, while establishing performance goals. Public servants are expected to set and meet performance goals, and for this to be reflected in the satisfaction of the public served.	19	3.698	18	0.02703	18
	Handling and administrative process flows	Public servants are expected to be able to correctly handle administrative process flows, both in digital media and on paper, opening new processes, forwarding them for processing, among other functions.	22	3.584	22	0.02236	26
	Creation of flowcharts	Flowcharts help map, understand, identify bottlenecks, and propose improvements to information, process, and task flows. Public servants are expected to be able to create flowchart illustrations.	25	3.479	25	0.01945	27
	Techniques and tools for organizing and controlling budgets and finances	Public servants are expected to have proficiency in simple and intermediate financial calculations using spreadsheets, which will aid in monitoring budgets and finances, both in the public and personal spheres.	28	3.281	27	0.01927	29

Category	Need for cross-training	Description	Original result - rank (SESP-MT)	Average ratings	Ranking of Likert scale means	CPP Likert (PMax)	CPP Likert Results - rank
	Systematic planning and monitoring organizational climate	It is expected that public servants understand this process and can offer suggestions and solutions that help in planning and monitoring the organizational climate, resulting in well-being.	32	3.176	31	0.01677	33
	Contract oversight	Law No. 14.133/2021 introduces innovations regarding the oversight of administrative contracts, clarifying the responsibilities of the contract supervisor and the requirement for their training. Public servants are expected to ensure effective compliance in the contracts they oversee.	33	3.120	33	0.01932	28
	Document preservation and cleaning	Public servants are expected to know how to preserve and sanitize the documents under their care.	34	3.053	34	0.01608	34
	Training of trainers	Public servants are expected to be able to transmit knowledge and practical experience in professional training environments, through teaching activities, the use of educational technologies, and learning assessment.	23	3.568	23	0.02934	16
	Clarity of written communications	It encompasses the use of simple and direct language, the logical flow of ideas, conciseness, and grammatical correctness. Public servants are expected to be able to draft documents clearly.	2	4.038	3	0.04007	4
	Consolidation of information from different spreadsheets	Public servants are expected to have intermediate and advanced skills in using spreadsheets, consolidating information from different spreadsheets, using macros, and other functions.	10	3.772	13	0.02865	17
Impact of technological innovation	Digital fluency	Public servants are expected to use the organization's information tools to participate in the digital transformation that reduces or eliminates the physical processing of documents.	6	3.885	9	0.03237	12
	Digital repositories	Public servants are expected to be familiar with the digital repositories most relevant to their professional performance, as well as to be able to collaborate on processes for building digital repositories.	27	3.278	28	0.01779	32
	Digital marketing	It is expected that public servants will understand the ethical limits of digital marketing in public service, the flow of information to the social communication sectors of institutions,	35	2.922	35	0.01209	35

Category	Need for cross-training	Description	Original result - rank (SESP-MT)	Average ratings	Ranking of Likert scale means	CPP Likert (PMax)	CPP Likert Results - rank
		and the permissions and restrictions on opening accounts for public sectors on social networks.					
Process innovation	Risk management in the public sector	Public servants are expected to understand the risk policy of SESP-MT and be able to put it into practice.	13	3.766	14	0.03189	14
	SIGADOC - document management system	The document management system was adopted in MT to store, route, manage, and retrieve documents such as official communications, forms, and case files. Public servants are expected to be able to perform searches, locate documents, and capture documents, among other basic functions.	4	4.061	2	0.04523	3
Institutional and interpersonal relations	Interpersonal relationships and communication	It is expected that public servants will be more collaborative and build a work environment with fewer conflicts, demonstrating consideration and respect for colleagues, and promoting the integration of all.	8	3.900	7	0.03646	6
	Media Relations	It is expected that public servants will be able to improve their ability to interact with the press.	31	3.148	32	0.01779	31
	Nonviolent communication and empathetic listening	Public servants are expected to be able to prevent, minimize, or resolve conflicts in a consistent manner.	12	3.794	12	0.03415	10
	Conflict mediation among civil servants, managers, and work teams	Public servants are expected to develop the ability to mediate conflicts, converging towards the construction of a healthy work environment, ensuring conditions for team productivity.	15	3.797	11	0.03443	9
Service quality	Customer Service	Public servants are expected to be familiar with and skilled in applying the public service standards prescribed by the agency.	17	3.701	17	0.03262	11
	Human Rights and Ethnic, Sexual, and Sociocultural Diversity	Public servants are expected to promote equality and dignity for the public when serving them, without prejudice based on origin, race, sex, color, age, or any other form of discrimination.	24	3.505	24	0.02695	19
	Communication with children and adolescents	Public servants are expected to establish communication based on language appropriate to the developmental level, respect, and active listening, in order to support primary and secondary crime prevention projects targeting children and adolescents.	29	3.224	29	0.02273	25

Category	Need for cross-training	Description	Original result - rank (SESP-MT)	Average ratings	Ranking of Likert scale means	CPP Likert (PMax)	CPP Likert Results - rank
Professional Recognition	Mental health in organizations	Public servants are expected to be familiar with the mental health in the workplace policies adopted by the agency and to know the channels and options for assistance to refer cases.	7	3.979	5	0.04652	2
	Emotional intelligence	It is expected that public servants will be able to better understand their emotions and act more effectively in certain situations.	9	3.894	8	0.03774	5
	Retirement education	It is expected that public servants will be able to plan a smoother and safer transition from active life to retirement.	26	3.403	26	0.02328	24
	Financial education	Public employees are expected to avoid excessive debt and achieve a balance between their personal income and expenses.	30	3.188	30	0.01814	30

4 ANALYSES OF RESULTS

Table 5 presents the quantitative results of the survey on cross-functional training, analyzed using three methods: (1) the original order, based on the frequencies of the two highest importance ratings on the Likert scale (values “4” and “5”); (2) the calculation of weighted averages of Likert scale preferences, with weights corresponding to the frequency of each scale point; and (3) the probabilistic order, obtained via CPP using R software (Gavião et al., 2026). The PMax results, regarding training needs, are presented in the last column.

A cutoff point was set at the 12th training need to evaluate the set of topics that received the highest preference ratings. The set obtained through the application of the CPP is as follows: 1) Knowledge of standards and procedures in the field of activity; 2) Mental health in organizations; 3) SIGADOC - document management system; 4) Clarity of written communication; 5) Emotional intelligence; 6) Interpersonal relationships and communication; 7) Optimization of work processes; 8) Use of problem-solving tools; 9) Conflict mediation among staff, managers, and work teams; 10) Nonviolent communication and empathetic listening; 11) Customer service; 12) Digital fluency.

The set originally obtained, based on the frequencies of Likert scale ratings of “4” and “5,” is as follows: 1) Knowledge of standards and procedures in the field of activity; 2) Clarity of written communication; 3) Optimization of work processes; 4) SIGADOC - document management system; 5) Use of problem-solving tools; 6) Digital fluency; 7) Mental health in organizations; 8) Interpersonal relationships and communication; 9) Emotional intelligence; 10) Consolidation of information from different spreadsheets; 11) Process management; 12) Nonviolent communication and empathetic listening.

There is a coincidence in ranking for 10 of the top 12 training needs in each subset. The items excluded from this intersection are: (i) in the set ranked by CPP, conflict mediation among staff, managers, and work teams (9th position) and costumer service (11th position); and (ii) in the original set, the consolidation of information from different spreadsheets (10th position) and process management (11th position).

Spearman's rank correlation between the original rankings and the CPP rankings indicates a high level of agreement, at 93.3%. Despite the similarity in results, the literature and open data appear to reinforce the subset of results projected by the CPP. For instance, public interaction and interpersonal relations—essential for mediating conflicts among staff, managers, and work teams—appear more prominent than the consolidation of data from various spreadsheets or process management. The CPP ranking takes all evaluations into account, and the lower end of the probability density functions can influence the outcomes. Thus, the results are more robust because they do not disregard a significant number of evaluations that received lower preferences.

5 CONCLUSION

The cross-cutting training agenda for SESP-MT presented in this research is evolutionary in nature, requiring alignment with the changing context of human resource development. Furthermore, the study aims to demonstrate potential solutions for developing a training agenda focused on cross-cutting competencies—solutions that can not only enhance the efficiency of resource utilization but also contribute to the integration process, which is crucial to the institution's strategic environment.

This study analyzed the perceptions of SESP-MT staff regarding the importance of a set of transversal competencies—using relative frequency descriptions—and compared this to the CPP method for ranking these competencies. The CPP proves to be a viable technique for

supporting decisions on prioritizing the competencies under study, thereby refining the decision-making process regarding which training needs to be addressed. Notable features of the CPP include its ability to account for the density of evaluations based on Likert scale criteria and to avoid statistical theory controversies by not parameterizing data collected on an ordinal scale. However, the CPP requires knowledge of multivariate analysis, joint probabilities, and integral calculus, as well as proficiency in R language algorithms—a language utilized for its statistical foundation and the availability of hundreds of probability distribution models. Despite its advantages and versatility, these requirements may pose limitations to learning and applying the method.

Future longitudinal research expanding on this work could examine changes in participants' viewpoints and interpretive patterns at the individual analytical level (qualitative), as well as recurring sample patterns and the prioritization of criteria at the structural analytical level (quantitative). Regarding the use of the CPP method, it would be worthwhile including two or more criteria for assessing competence needs—such as accessibility and implementation costs, thereby enabling the completion of the final stage: the aggregation of probabilistic preferences.

Thus, the research gathered analyses aimed at updating and standardizing guidelines for the development and training of transversal competencies within the Mato Grosso State Secretariat of Public Security. These guidelines are intended to enable both the resolution of current problems and the alignment of efforts to achieve future objectives, focusing on transversal training to secure better organizational results.

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