Knowledge Production Systems in Tourism in Higher Education Institutions: Proposing A Performance Assessment Protocol Based on A Brazilian Experience°

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ABSTRACT

Considering the gap between production of knowledge in tourism and its transference (mainly by the socialization educational process, but also via tacit apprenticeship in workplace and also in general terms, e.g. university – society diffusion of knowledge), this paper presents a protocol developed by the authors driven to manage human resources (a critical factor of success) in the Knowledge Production Systems in Tourism (KPST). For that, we have made a literature review, giving relevance to the problem of the absence of knowledge production in tourism and its consequences. Methodologically, the paper focuses on the micro-level of the systems' components (human resources), aiming to identify the main regular characteristics and making a correlation of them with the other members of the system. These profiles, relationally combined, can offer an analytical structure of the team, and doing so, we can observe their most prominent and distinctive factors in a KPST, as well their fragilities. Specifically, it is presented here the assessment of the professors-researchers' team performance aiming to achieve an academic management tool. Our results show: (1) the collective productivity and their related profile, as well (2) the degree of expertise and asymmetry in individual productivity of professors-researchers, and (3) the possible inconsistencies between the expertise of these professionals versus their performanced areas. In conclusion, two main contributions are advocated: (1) the preparation of a research protocol itself, which has been translated into software, and (2) the derived indicators used for the survey of diagnosis, for monitoring and evaluating the performance academic management.

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1. Introduction: the problem of tourism knowledge and its relation to HEI's

There is a gap between knowledge production in tourism and its transference to the stakeholders (Cooper, 2006)[1]. It is seen in the diverse subsystems and processes, that, somehow, is related to tourism knowledge. The literature on tourism is plenty of examples: since the analysis of the structure of the production system itself (Pimentel, 2016, 2017, 2018; Pimentel et al. 2017, 2018), passing through the analysis the educational process (Tribe, 2008; Airey, 2008), in which the knowledge produced is packing theoretically in order to sum a large number of empirical situations, and then taught to the new students (who will be socialized and get a broader volume of knowledge in a faster and efficient way); until to analysis of the knowledge transference in a larger wave (Santos, 2006)[2], from the knowledge production system to society, in general, for ordinary purposes or even (in public or private) decision-makers[3] (Diaz, 2016; Díaz & Pimentel, 2019).

In tourism, Tribe and Liburd (2016) use the term "knowledge system" to make a broader basis, on the grounds of sociology of knowledge, from where the authors try to build upon and make an effort to reconstruct a "[…] reconceptualization of the structure, systems, processes and outcomes that define the field of tourism. These are explained by the creation of a model and detailed analysis that examines knowledge space, the knowledge force-field, knowledge networks, four key domains in knowledge creation and their interrelationships". (Tribe and Liburd, 2016: 44).

A holistic, multi-modal and multi-level approach (if possible, to be performed, synchronically) it is out of our aims. However, assuming the grounds of the sociology of knowledge, we will take a chance to explore empirically the issue, focusing on the process and constraints inside what we will call here (more specifically) "knowledge production system in tourism". Considering the human resources as the most critical point in knowledge production, here we focus on the micro-level of the systems' components (human resources). Our main attempt is to present a protocol, developed by the authors, driven to manage human resources in the context of knowledge production systems in tourism.

Since its origins, tourism has been connected with practice (Airey, 2008). Education in tourism began in technical & professional schools intending to develop the basic skills necessary for work in the areas of hospitality, hotel management and other tourism businesses (Butler, 1999; Morgan, 2004; Inui, Wheeler and Lankford, 2006).

In Higher Education Institutions (HEI), as Tribe (2000) points out, tourism has emerged as a research topic inside established sciences – such as economy, geography, and anthropology – at the beginning of the XX century, been incorporated as a program of studies in 1970, in the UK. For Tribe (1997), tourism knowledge is organized between extra-disciplinary disciplines (referring to tourism services), interdisciplinary disciplines (corresponding to environmental studies, commercialization, etc.) and established disciplines (those traditional disciplines that are the basis of tourism, such as economics, anthropology, among others). In different combinations, these disciplines make up the educational offer in tourism and also deal with research.

Airey (2008) adds that Tourism programs continue to be oriented towards the business sector. In his view, there are two challenges for tourism education to become an independent area

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[1] *As Cooper points out, there are several barriers, that may be summarized in cost, implementation gaps and transference to the end user. However, in his view, a previous problem is seen in a broader perspective, related to the very nature of the area: "For tourism barriers to transfer are related to its very nature. It is dominated by small enterprises, fragmented across a variety of activities, and has vocational reinforcers such as poor human resource practices militating against the continuity of absorption. As a result, there is a lack of trust between the knowledge creators and those who might use it, due to the different cultures and vocabularies of differing communities of practice (Cooper, 2006:59).*

[2] *See, in particular, about the diffusion of technological waves (Santos, 2006:30).*

[3] *Traditionally, in social sciences, there are three main levels of analysis: (1) the macrolevel (which means to the macro social systems, structures and process in the national, international and world systems), passing by (2) the meso social level (which refers to organizational and institutional arrangements, that stabilize any direction in a social system, giving it an – unidirectional - order), until to (3) microsocial level, due to the analysis of the relations among the parts of one system. To further information about analysis in levels of reality, see Brante (2001).*

of study: (1) it must be developed beyond disciplines related to professional practice; and (2) it must keep an autonomous distance from the other areas of tourism knowledge without cutting off connections with the industry and practice.

However, from where does come the knowledge taught in tourism? Thus, regarding research, authors have pointed out different indicators about the institutionalization process of knowledge production in tourism. While some have argued that the number of tourism scientific congress, journals and associations has increased in the world (Jafar, 2000) and also in Latin America (Leal and Padilha, 2008); others have searched structural factors related to the production of knowledge in tourism (Pimentel, 2016a,b) and its effects of transference to wider society and its stakeholders (Díaz & Pimentel, 2019). For example, according to Pimentel (2016 a, b, c), the existence of formal structures dedicated to research in tourism can be seen as an element that indicates the degree of institutionalization and maturity of the production of knowledge in this area.

In this context, we can see that knowledge production of tourism is associated with the knowledge (diffusion) about tourism (Pimentel, 2016). Whereas the first seems to be connected with formal structures and systems of research, generally with some practical implications; the second one seems to be more focused on the abstract form, it means, in the educational process of knowledge transference (via socialization in training of the labor force in this activity). In the extent of the research deals with and speaks about the empirical world, and the educational process summarizes, and package accumulated knowledge in small units to make easier to transfer them, theses process are interdepend and interconnected.

Thus, we can see, as argued in Pimentel, Carvalho & Oliveira (2017: 196-197) that "[…] increase of knowledge in the field of tourism is linked to the existence of a good articulation between research structures, higher education institutions and the governmental sphere. Thus, the academic subfield in which tourism knowledge is produced stands out in the centrality of the process of institutionalization and legitimization of all that is related to the theme of tourism as a whole".

Thus, for us, the question that will be raised here is: *in the context of articulation between education in tourism and the research production in this field, namely manifest after all in the Higher Education Institutions (HEI)[4], how can we improve the process of knowledge production in tourism, and its transference, regarding the role of the human resource in this system?*

The main objective of this paper is to present a social technology, in form of a technique protocol, developed by the authors to characterize the human resources in a knowledge production system in tourism, anchored in HEIs, and, from that, make possible the management and optimization of using these resources.

For that, we have made a literature review, giving relevance to the problem of the absence of knowledge production in tourism and its consequences. Methodologically, these profiles, relationally combined, can offer an analytical structure of the team, an doing so, we can observe their most prominent and distinctive factors as well their fragilities. Specifically, it is presented here the assessment of the professor-researchers' team performance aiming to achieve an academic management tool.

Our results show the collective productivity and their related profile, as well the degree of specialization and asymmetry in individual productivity of professors, in addition to possible inconsistencies between the expertise of professionals versus the performance areas, lectured and conducted orientations disciplines.

If we can point out, two main contributions are advocated in this study: (1) the preparation of a research protocol itself, which has been translated into software, and (2) the derived indicators used for the survey of diagnosis, for monitoring and

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[4] *Despite this is not a unique form, in general, there is a strong connection between Higher Education Institutions (mainly universities) and Knowledge Production Systems in Tourism. After all, in developing countries (like in Brazil), where State takes a prominent role in the society, in almost all systems, even and strongly in educational ones. Besides, the KPST, in this context, is strongly dependent on public HEIs.*

evaluating the performance academic management.

2. Literature Review

2.1 Knowledge Production and Management in Tourism

In the last 50 years, tourism has been increased its space on the agenda of political agendas in international bodies, and it became seen as a driving activity of the economy, generation of employment and income and in the development of world economies. After all, it was strongly recommended to developing countries a way to improve their economies (Pimentel, M., 2016).

According to Ruhanem and Cooper (2004; 2015), the competitiveness of nations has been governed in the global market by intellectual capital and the knowledge production base, as opposed to the common exploitation of commodities. Tourism, in turn, is not isolated from this dynamic, the constant changes in consumer behavior require adaptation to new situations in the market (Simková, 2009).

In this scenario, scientific production and its management play an important role in the search for the consolidation of sustainable tourism activity, based on technological development and innovation. According to Ruhanem and Cooper (2004; 2015, p.13) "If tourism is to become a sustainable industry sector and accept this new economic structure, it must collectively refocus its research agenda and move beyond short-term ad hoc and market-driven research".

However, tourism research is something recent and is still in the process of being institutionalized. Zehrer (2011) states that the study and practice on the production and management of knowledge have grown rapidly since 1990, albeit timidly in the field of tourism. Ruhanem and Cooper (2004; 2015) show that the pragmatic essence of the area

generally leads investigations to a pragmatic profile path, focused on functional purposes, which tactical short-term objectives, essentially descriptive, with case studies or problem-specific investigations.

According to Pimentel (2016), and Pimentel, Carvalho and Pimentel (2019), a factor of institutionalization and maturity of the profile of knowledge production in tourism is the existence of formal structures dedicated to the research of the theme[5]. In this way, the Tourism Observatories (TO) have shown themselves to be an example of a formal tourism research structure. Maintaining a close interrelationship with the daily practice of tourism activity provide the data of surveys and applied research, of simple topics such as the profile of the tourist, the tourist destination, the tourist flow; and the most complex topics such as those related to the production of historical series.

Concerning the production of knowledge in tourism and its management, without a doubt, universities have a fundamental component in the production of knowledge about tourism. Thus, it is argued that the propulsion of scientific production starts from the potential contribution resulting from the synchronic strength of multiple actors so that knowledge is stimulated and shared. The different FSRTs help to evaluate the social and environmental impacts, as well as the tourism development policies and specific tourism events. Through academic publications, researchers inform about recent events in tourism research. The most important journals related to tourism studies and economic or statistical models about tourism studies originated from academia.

Pimentel, Carvalho, and Oliveira (2018) start from the potential contribution in the interaction between tourism research centers (TRC) to feedback the production of knowledge, distribute information and exchange experiences of the tourism sector, aiming at the collaboration of

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[5] *Different types of formal structures can be seen, with specific purposes, organisational design, and degree of theoretical and practical guidance, for example: the Tourism Observatories (more practice-oriented and regularly independent of academia); Formal Tourism Research Structures (regularly small groups working as an integrated team in academia); and Tourism Research Centres (usually a cluster of two or more formal research structures, usually related to academia). Here we will consider these different forms in their related common ground, i.e. the fact that they are institutionalised forms of organisation to collectively produce knowledge in tourism. A further discntion can be found in: Pimentel (2016a,b).*

[6] *In the world, the AIEST conference (International Association of Scientific Experts in Tourism) is probably the most representative one. In Latin America, see, Latin American Congress on Tourism Research (Congresso Latino Americano de Pesquisa Turística – CLAIT). In Brazil, see National Association of Pos-Graduation in Tourism (Associação Nacional de Pós-Gradução e Pesquisa em Turismo – ANPTUR).*

countries involved in the TRC network. The authors' highlight initiatives to promote the connection of social networks (of researchers) and organizational (of institutions) between the scientific academies of tourism of several countries, as it is verified in large number of institutional events and congress, in this area[6].

However, currently, there is a pulverization of scientific production so that it is difficult to articulate and identify within the network of knowledge production. In the investigation on the mapping of tourism research centers in Mercosur, Pimentel, Carvalho, and Oliveira (2018) show that the emphases of studies of these centers are also diverse, which hinders the same line of study among them. These few centers found also have few relationships with each other. There are occasional partnerships with other universities but from countries outside Mercosur, such as Spain, and little involvement of countries that are close and that already have a relationship with the same economic bloc. In this regard, it can be inferred that the stage of institutionalization of knowledge production in tourism, as a precondition for its development, is still incipient and local, lacking formal structures and on national and supranational scales.

Wang, Huyton, Gao and Ayres (2010) evaluating the programs in the universities of Australia and China also portray that although there is a consensus of the high level of education in tourism, there are variations in the course structure, focus of the thematic areas and profile. While tourism education in China is somewhat rigid and inflexible, training in Australia is more dynamic, with a more holistic approach, serving both domestic and international interests.

Since the production of knowledge in tourism is highly concentrated in the institutions, the importance of the evaluation of teaching professionals and their respective profiles of intellectual production is then introduced in order to allow alignment of efforts in the institutionalization of scientific production as well

as to identify experts and consultants from different areas that embrace tourism activity. It is also a question of identifying the central and elementary/essential competencies that, in turn, transcend the discussion of the utilitarian capacity of tourism training.

2.2 Human Resources Management in Knowledge Production Systems in Tourism (KPST)

Competency management is a kind of human resource management (HRM) that highlights the strategic role of HRM. This approach comprises the organization as subject to the level of performance and qualification of its employees to achieve high-performance levels. Includes the HRM as an element of strategic relevance (Armstrong, 2006) in the dissemination of skills, where we emphasize its importance mainly in university management, which is very dependent on persons and his knowledge.

The preparation of management by competence centers on an initial assessment of skills to identify gaps that need to be correct to achieve an expected performance (Zareei, 2014). It also focuses on the clear definition of the strategic objectives by creating a skills mapping organizing the planning and management projects framework (Simon, 2010; Rejas-Muslera et al, 2011; Howells, 2014)

The development control of skills offers possibilities to value the effectiveness of investment and spending on higher education by reducing barriers in both directions. First, avoid spraying of the characteristic features of bureaucratic and ineffective systems concentrating them in strategic areas identifying the operations or subsystems that contribute inversely to the organization's goals. Second, identify gaps in areas that require higher increments investment (Neckel et al, 2013).

For significant contributions of competency management, specially in the academic field, where knowledge is the most important element, it is necessary to stimulate the development of systemic skills by supporting processes. To this

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end, it is required various techniques and procedures (Syryamkin & Syryamkina, 2015) that aim to make clear these core competencies and allowing identification of needs, planning of interventions, implementation, and evaluation (Simon, 2010).

However, the implementation of a competency management model is difficult and complex, mainly due to the peculiarities of university management, as it involves challenges the adequacy of tools that allows managing individual and organizational knowledge (Simon, 2010; Rejas-Muslera et al, 2011). In this way, we propose a competency model identification among professors of higher education courses pointing considerations for tourism.

2.3 The Role of HEI in the Knowledge Production Systems in Tourism (KPST): the Brazilian case

In the context of great efforts to intensify the process of evaluation of education, Brazil has adopted mechanisms to evaluate the quality specially those involved with scientific production through its criteria and indicators. The Coordination for the Improvement of Higher Education Personnel (CAPES), focused on post-graduation efforts, was implemented in 1976 and aims to evaluate the quality of the programs and point out the areas that the State aims to develop.

Another instrument of high capillarity that supports the evaluations of Higher Education Institutions (HEI) is the Lattes Platform or System that consists of a database of curricula and institutions in the areas of Science and Technology created by CNPq - National Council for Scientific and Technological Development. The Lattes system gained its first version in the mid-1980s and had as its main objective the use of a standard form capable of, besides evaluating the Brazilian researcher, offering a database of specialists and consultants in Brazil as well as presenting the distribution of scientific research in the territory (Brazil, Lattes, 2018). And over the years it has undergone several modifications to become a more user-friendly, intuitive and reliable tool, becoming the most robust database of

national academic evaluation. These evaluations, instituted at the state level, bring to light the importance of quality management and the monitoring of the expertise developed within the academic field.

However, for Buckley (2019), despite the recognition gained by tourism, as scientific production in the field is still lower worldwide than many other disciplines, the opportunities for improvement involve less inertia than in other areas. Besides, the author highlights the gap between universities that causes opportunities for expansion in scientific production to tend to move towards universities that are already highly ranked.

Within the scenario of evaluation of scientific production and the challenges of its management, Aydin (2017) presents the factors and measurements that affect the performance of research and its dissemination (research performance). From a literature review on the main measurements of academic production, the author identified between 20 and 54 variables that can be classified basically into two major groups: individual variables (internal) and external variables. While internal factors include individual attributes and demographic variables, external variables involve questions about the profile of institutions and bring to light the importance of academic management, specially to identify the main reasons behind the poor position of research performance in universities.

Therefore, it is up to us to elucidate the paths that educational institutions take to evaluate their management. Furthermore, according to Brauer, Dymitrow, and Tribe (2019), we are attentive to the transformations of universities resulting from the strategies designed by them to better satisfy the evaluation structures to which they are submitted. Considering the unintended consequences and changes in culture.

Once the profile of a certain group has been identified, it is possible to manage that it becomes more effective and congruent in terms of knowledge production.

According to Pimentel (2016b), in the evaluation model of HEIs in Mexico, it was possible to identify asymmetries and internal discrepancies in the Tourism Educational Offer (TEO) itself (such as the predominance of degree courses)[7]. This suggests that the TEO needs to be rebalanced between its different types and levels, in addition to improving the production and dissemination of knowledge related to it.

3. Methodology

3.1 Object of research: HEI, its system knowledge production in tourism and sample

The aim is to present a tool based on the model of management by the competence of human resources for the universities that provide a database for decision-making aimed at the development of triad research-teaching-extension.

To carry out this research an empirical case study on the academic management of tourism at the Federal University of Juiz de Fora/MG. the goal was to present an evaluation of the performance of the tourism course faculty of Federal University of Juiz de Fora through the analysis of Curriculum Lattes as his expertise and productivity.

The sample was clipping of 16 professors of tourism, tenured and temporary ones, who were exercising teaching the academic year of 2013. As

Table 1: Data collected from the cv Lattes platform from the professors-researchers in the KPST analyzed.

Code	Last update by teacher	Pickup date
D16	10.05.2010	System-generated page in04/06/2013at 14:37:59
D15	6.09.2012	System-generated page in06/07/2013aı 15:37:20
D14	05.25.2013	System-generated page in04/25/2013at 15:34:21
D13	03.25.2013	System-generated page in04/06/2013aı 14:40:52
D12	4.02.2013	System-generated page in04/06/2013aı 14:41:32
D11	1.08.2013	System-generated page in04/06/2013at 14:40:40
D10	01.21.2013	System-generated page in04/06/2013at 14:41:44
D9	7.11.2009	System-generated page in04/06/2013at 14:41:09
D8	09.14.2012	System-generated page in04/06/2013at 10:00:52
D7	02.27.2013	System-generated page in04/06/2013at 14:40:31
D6	03.25.2013	System-generated page in04/10/2013aı 10:02:41
D5	04.13.2013	System-generated page in04/25/2013at 15:32: 14
D4	02.28.2012	System-generated page in25/04/2013at 15:33:35
D3	03.23.2013	System-generated page in25/04/2013at 15:31:16
D2	04.25.2013	System-generated page in06/07/201.3at 15:39:40
D1	04.16.2013	System-generated page in04/25/2013at 15:35:53

Source: Lattes/CNPq Plataform (Brazil, 2013).

observable in table 1, the curriculum vitae collected are for the period of April 2013 and were updated by professors on the following dates[8].

Combining the techniques of quantitative and qualitative research, supported by the existence of a national system information databases of lecturers and researchers, the study develops a proper instrument named professional profile analysis protocol. This instrument was elaborated based on data classification structure and organization of teaching activities, research, and extension available on Brazilian electronic informational platform named Curriculum Lattes.

The proposed analysis is framing the elements components available on the platform of curriculum Lattes in the three central pillars (research, teaching, and extension) of a University. The classification used in the research considers how the extension practice research project, production techniques, organizing events. As research activity, the productions and the practice of teaching from the disciplines taught and training.

3.2 Data Collection, Unit of analysis and variables

The survey identified the major science and categories involved in the course of tourism for grouping and sorting of teaching performance. The set of semantic blocks, as shown in table 1, seeks to encompass the issues directly or indirectly related to tourism.

The tool consists of three stages of analysis: (a) identify the categories involved in the course; (b) stratification of Lattes platform; and, (c) elaboration of a coefficient of productivity and expertise from the data of Lattes curriculum. The database used from Conselho Nacional de Desenvolvimento Científico e Tecnológico (Brasil, 2013) which aims at standardizing the records of the early life of researchers and students in

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[7] *Pimentel (2016) has mapped out the Tourism Educational Offer – in different levels (undergraduate, graduate and technical and vocational programs) – in 21.000 HEIs in 23 countries in the world. As he points out, this offer is very asymmetric one, in all possible ways: between developed and underdeveloped countries, between graduate and undergraduate programs, between HEIs with and HEIs without Knowledge Production Systems in Tourism (KPST).*

[8]*The data used here are merely illustrative and have the function of showing how the technique can be executed.*

training in scientific and technological research of Brazil. Its information, detailing reliability and breadth, are recognized as indispensable instruments in the "analysis of merit and competence of applications [...] in the area of science and technology" (Brasil, 2013, s/p).

3.3 *The Assessment Protocol Construction Process*

Based on content analysis (Gil, 1999) the Lattes platform structures were classified in the categories of study and teaching-research and extension tripod. For each item belongs to Lattes (on-line) curriculum vitae of the Faculty is assigned the value "1" corresponding area of studies in tourism, resulting in a frequency distribution by categories. Table 3 shows the worksheet of one of the professors.

After the process of classification and enumeration of frequency, we carried out elaborate tool applications in this research. It was developed a specific parameter called *Production and Expertise Coefficient* ($\sum Coef$) for each of the professors-researchers analyzed. This coefficient has the function to express the professional research specialization in terms of its productivity.

To achieve this, the coefficient after the computation of frequencies (f) was removed from the category "Other" due to the possibility of its inclusion into the disparate coefficients to the reality of tourism. Thus, to compare the expertise and productivity among professors-researchers, it was elaborated a process of correction based on proportionality, known as *Comparative frequency Corrector* (μ). This broker, who is a relative rate, has a claim to enable the comparison of the professors-researchers expertise with production load significantly discrepant.

Thus, applying the broker (μ) to individual frequency ($find_{xi}$), the research was a comparison between the coefficients of the professors-researchers and their expertise and productivity. The sum of the coefficients represents the numbers representing production and degree of specialization (or expertise) in Tourism at Federal University of Juiz de Fora. The methodological procedure for calculating the elaborate coefficient can be expressed by the following:

$$\mu = \frac{findx_i^j}{\sum_{j=1}^{14}\sum_{i=1}^{16}fcat_{xi}^j}$$

Where:

μ: Broker comparison of frequencies (relative rate)

Table 2: Classification of the main areas and issues in Tourism.

Social Sciences	Culture, anthropology. Sociology, history.
Economics and management	Administration business management theory of the firm micro and macroeconomics, intellectual property, tacit knowledge, production, strategic management, corporatism.
Feasibility planning and design of projects	Project resources (cost, labor and tune), organization, strategic planning, strategic action plan, development and applicability of corporate strategies.
Marketing and communications	Product development marketing strategies marketing mix (product price place and promotion), loyalty strategies, marketing plan, brand monitoring, disclosure, advertising, writing, media, customer profile, theory of consumer behavior
Entertainment and leisure	Leisure activities, entertainment and recreation
Events	Promotion training dissemination related factors social impacts structuring of events, space, city planning and structures for events.
Cuisine	Regional Food, gastronomic tourist attractions, social identity based on gastronomy, hotel and gastronomy, gastronomic space
Geography	Environment, space, impacts, protected areas, regionalism.
Politics and the local community.	Sustainable local development social impacts r participatory management of communities, community-based tourism, solidarity economy, interests, conflicts and negotiations, structuring.
Hospitality	Social and commercial responsiveness of tourists
Cultural heritage	Space or custom activity that carries characteristics or history of the local community making it a symbol of the same.
Agency, transport and logistics in tourist service	Travel agency, locomotion, transportation, distribution channels.
Education (vocational training)	Activities, events, or body of knowledge for the promotion of training and professional development in tourism.
General Tourism	Too much knowledge and activities directly related to tourism is not amenable to classification in other groups.
Other	Too much knowledge and activities that do not present explicit link with the tourism.

Table 3: Quantification of Lattes curriculum.

Classificação conforme Plataforma Lattes

Código Docente	Docente	Cv	Áreas	Graduação	Especialização	Mestrado	Doutorado	Formação complementar	Atuação Profissional	Lecionada Na UFJF	Outras instituições de ensino	Pesquisa	Extensão	Desenvolvimento	Outros	Membro de corpo editorial	Revisor de periódicos	Artigos completos periódicos	Trabalhos completos anais de congresso	Livros publicados/organizados ou edições	capítulos de livros publicados	Resumos Publicados em Anais de Congresso	Textos em jornais de notícias/revistas	Resumo expandidos publicados em anais de congressos	Apresentações de Trabalho	Artigos aceitos para publicação	Outras publicações bibliográficas	Assessoria e Consultoria	Trabalhos Técnicos	Demais tipos de produção técnica	Produção artística/cultural	Demais trabalhos	TCC	Especialização	Mestrado	Doutorado	Eventos	Contratação*/ Banca de Comissão julgadora	Participação	Organização	Iniciação Científica	Outros	TCC	Especialização	Mestrado	Doutorado	Artigos Completos em periódicos	Livros e capítulos	Apres. de Trabalho	(Soma) f índx	%	fr individual s/ Outros	Somatório das f s/ a cat "outros"	corretor μ
D4	(link)	Ciencias Sociais			1	1					3	1						5														18							7	1		7								**44**	22,80%	0,0165351		**0,727546**
		Economia e Gestão					2	2										1														3							1			1								10	5,18%	0,0037580		0,037580
		Planejamento/Projeto							Projetos Turísticos II	1								1														3										1								6	3,11%	0,0022548		0,013529
		Marketing/Comunicação					1										1															10										5								17	8,81%	0,0063886		0,108606
		Entretenimento/Lazer					2																									2										2								6	3,11%	0,0022548		0,013529
		Eventos						1																								5										2								8	4,15%	0,0030064		0,024051
		Gastronomia/Restauração																														2						1				1								4	2,07%	0,0015032		0,006013
		Política, comunidade local e Desenvolvimento																														10							2	1	1	4	1							**19**	9,84%	0,0071402		0,135663
		Geografia			1																											7																		8	4,15%	0,0030064		0,024051
		Hospitalidade						1	informação	1							2															5						1	1			1								12	6,22%	0,0045096		0,054115
		Patrimônio Cultural																1		1												10							1			1								14	7,25%	0,0052612		0,073657
		Agencia /Transporte/ Logística no Serviço turístico							Transporte/ Agenciamento				4																		8							6			7								**25**	12,95%	0,0093950		0,234874
		Educação (Formação profissional)						4									1							1	1	1				1			3	1					1							13	6,74%	0,0048854		0,063510
		Turismo Geral		1					Fundamentos do Turismo/Traba	1							1													1										3								7	3,63%	0,0026306		0,018414
		Outros																																																0				0,000000

Table 4: Calculating the comparative frequencies and broker of the coefficients of expertise and productivity.

Classificação conforme Plataforma Lattes

Código Docente	Docente	Cv	Áreas	Graduação	Especialização	Mestrado	Doutorado	Formação complementar	Atuação Profissional	Lecionada Na UFJF	Outras instituições de ensino	Pesquisa	Extensão	Desenvolvimento	Outros	Membro de corpo editorial	Revisor de periódicos	Artigos completos periódicos	Trabalhos completos anais de congresso	Livros publicados/organizados ou edições	capítulos de livros publicados	Resumos Publicados em Anais de Congresso	Textos em jornais de notícias/revistas	Resumo expandidos publicados em anais de congressos	Apresentações de Trabalho	Artigos aceitos para publicação	Outras publicações bibliográficas	Assessoria e Consultoria	Trabalhos Técnicos	Demais tipos de produção técnica	Produção artística/cultural	Demais trabalhos	TCC	Especialização	Mestrado	Doutorado	Eventos	Contratação*/ Banca de Comissão julgadora	Participação	Organização	Iniciação Científica	Outros	TCC	Especialização	Mestrado	Doutorado	Artigos Completos em periódicos	Livros e capítulos	Apres. de Trabalho	(Soma) f indx	fr individual s/ Outros	Somatório das f s/ a cat "outros"	corretor µ (AX5/AX22)
D1	http://lattes.cnpq.br/9841188234449467	Ciencias Sociais				1	1				4					11	19				2			8	2	3	9	3			4						5				1								**73**	15,90%	0,0274333	2,002631
		Economia e Gestão			1		1	1	Orga	Tópi 10				1	1	6	11	12	2	2	4	2	1	11		2	31	4			5						10			3	4			1	1				**127**	28,67%	0,0477264	**6,061255**
		Planejamento/Projeto					1		Proje	Planejamento es		1			1	3	4		7		1	6	1		1	3	10			5						1				4								49	15,51%	0,0184141	0,902292
		Marketing/Comunicação															2								1					3								1	1									8	0,24%	0,0030064	0,024051
		Entretenimento/Lazer																												1																		1	0,03%	0,0003758	0,000376
		Eventos										1																	1											1								3	0,09%	0,0011274	0,003382
		Gastronomia/Restauração																												1																		1	0,03%	0,0003758	0,000376
		Política, comunidade local e Desenvolvimento					3			Topicos Especia	1	1			1	8	13	3	2		10		2	18	3			7						4				5								**81**	2,42%	0,0304397	2,465614
		Geografia									2					1	1		1		1	1			1	4								2		1	4								19	0,58%	0,0071402	0,135663
		Hospitalidade														1									3						1					2											7	0,22%	0,0026306	0,018414
		Patrimônio Cultural														1									5						1		1															8	0,25%	0,0030064	0,024051
		Agencia /Transporte/ Logística no Serviço turístico				1	1								1										4							2				1											11	0,34%	0,0041338	0,045472
		Educação (Formação profissional)						10	Meto Méto 2					3						1	1			5				1								5	2	4								34	1,06%	0,0127772	0,434423
		Turismo Geral	1		2		Trabalho de Cor	2	1	2	1	1															5								1	2	1		16	2							37	1,16%	0,0139045	0,514468
		Outros				12		Trabalho de Conclusão de Curso (adm	36	1			1						4							3																						57			0,000000

i: Index that specifies the professor-researcher

j: Index that specifies the category

$find_x$: Individual frequency of each faculty member in a respective category x

x: Categories of study $x_1, x_2, x_3 \ldots x_{14}$

$\sum fcat_x$: Sum of the frequencies of categories.

The mathematical notation represents the following equation:

$$(fcat_{x1}^1 + fcat_{x2}^1 + \cdots + fcat_{x14}^1) + \cdots + (fcat_{x1}^{16} + fcat_{x2}^{16} + \cdots + fcat_{x14}^{16})$$

Being:

i: Index that specifies the professor-researcher
j: Index that specifies the category

The expertise and coefficient of productivity continues so,

$$Coef_j = \sum_{i=1}^{14} find.\mu$$

Where:

$Coef$: expertise professor-researcher production coefficient
i: Index that specifies the professor-researcher
j: Index that specifies the category
μ:: Comparative frequency corrector
$find_x$: Individual frequency of each faculty member in a respective category x
x: Category of study $x_1, x_2, x_3 \ldots x_{15}$

Once the individual frequency of each faculty member is high squared, the formula presents an emphasis on productivity item thus allowing the academic production is highlighted on the display. The coefficient of expertise and productivity is a value that determines a rate to measure the average frequency of a faculty member. Thus, the tabulated data collection worksheet for each professor-researcher has the following configuration conform table 4.

After the generation of the coefficients of expertise and productivity (category/ productivity), the comparative form of information was worked as table 5. It also shows the coefficient of expertise and productivity of the

course in the last column (right), and the coefficient of each professor-researcher in that applies to each category in the last line.

4.Results and Discussion

In the case of the KPST, object of this study, we highlight for analysis of this research: (a) identification of the scientific categories most evident in the system; (b) marginal contribution per professor-researcher both in the total production (relevance of the professor-researcher) and in the area of greatest attention to academic management.

4.1 Identification of Main Expertise Areas and their Gaps

From the principle of competence-based management, we understand that the sum of the professors-researchers expertise corresponds to the expertise level of the KPST itself (as a collective structure). In this way, we identify the areas in development and the categories with gaps in the training structure. From the data, it was possible to identify the categories linked to scientific production in greater evidence in the KPST (table 6).

In the table 6, the values highlighted (in green) represent the three main expressive categories of KPST analyzed. They are: "Economy and Management" (20.50%), "Politics, Local Community and Development" (17.20%), followed by "Social Sciences" (11.40%). The coefficients (distinguished in Red) correspond to the categories considered as vulnerable in the system, because they express the lowest level in the system. They are: "Gastronomy/Restauration", (1.40%) "Entertainment/Leisure", (1.03%) and finally, "Agency/Transportation/Logistics in the Tourism Service", (1.03%). The coefficient of productivity in the KPST of UFJF is 33.57, and it means that 20.5% of their academic productivity belongs to his expertise: Economics and Management.

Other data amenable to measurement is the interference and contribution of each faculty member in the areas of academic management's attention.

Table 5: Coefficients in the last column determine expertise of the KPST.

Areas \ Teaching Code	p13	p12	p11	p10	p9	p8	p7	p6	p5	p4	p3	p2	p1	Coeficiente
Economics and Management	0,006012777	0,01841413	0,07365652	0,013528749	0,01841413	0,181886509	0,000375799	0,181886509	0	0,72754604	0,48703495	0,003382187	2,00263059	3,843291995
Politics, Local Community, and Develop.	0,045471627	0,030439684	0,013528749	0,009394964	0,009394964	0,030439684	0,013528749	0,16572717	0,36114243	0,037579857	0,000375799	0	6,06125517	6,882750846
social Sciences	0	0,006012777	0,00150319	0,024051109	0,013528749	0,084554679	0,01841413	0,024051109	0	0,013528749	0,00150319	0	0,302292371	1,483652762
Geography	0,27395716	0,01841413	0,00150319	0,030439684	0,003382187	0,07365652	0,006012777	0,135663284	0,037579857	0,108605787	0,000375799	0,024051109	0,024051109	2,073280722
General Tourism	0	0,006012777	0,024051109	0,000375799	0,006012777	0,273957159	0,003382187	0,006012777	0	0,013528749	0	0,024051109	0,000375799	0,346862092
Marketing / Communication	0,006012777	0,01841413	0,030439684	0,000375799	0,003382187	0,013528749	0	0,254033835	0	0,024051109	0	0,024051109	0,003382187	1,391953711
Education (Vocational Training)	0,000375799	0,00150319	0,003382187	0,00150319	0,00150319	0	0	0,434423149	0	0,006012777	0	0,00150319	0,000375799	0,465614431
Planning / Project	0,037579857	1,220196956	0,054114994	1,13679068	0,121758737	0,030439684	0,054114994	0,054114994	0,009394964	0,135663284	0,013528749	0	2,465614431	5,76850808
Events	0,037579857	0,384617738	0,024051109	0,045471627	0,030439684	0,054114994	0,006012777	0,006012777	0	0,024051109	0,000375799	0,037757986	0,135663284	3,788425404
Hospitality	0,07365652	0	0,024051109	0,003394964	0,006012777	0,096204434	0,00150319	0,030439684	0	0,07365652	0,01841413	0,006012777	0,01841413	1,278466742
Cultural heritage	0	0,006012777	0,003382187	0,003394964	0,009394964	0,003382187	0	0,006012777	0	0,234874107	0	0,003382187	0,045471627	0,738819392
Gastronomy / Catering	0,037579857	0,054114994	0,121758737	0,135663284	0,084554679	0,198797445	0,003382187	0,054114994	0,01841413	0,063509959	0,01841413	0,000375799	0,434423149	0,345734586
Entertainment / Leisure	0,030439684	0,037579857	0,024051109	0,254033835	0,121758737	0,030439684	0,006012777	0,01841413	0,000375799	0,01841413	0,030439684	0,000375799	0,514468245	1,736941
Agency / Transportation / Logistics	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	3,429913566
Others	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	
Productivity Coefficient	0,550063109	3,644118752	0,581360391	3,037955656	0,724163848	1,366027809	0,186396092	1,831266441	0,426907178	1,535137166	0,570838031	0,106726794	12,632469	33,57422022
Specialty	0,273957159	1,844113003	0,181886509	1,35287486	0,23462608	0,23462608	0,07365652	0,460035251	0,36114243	0,727546035	0,487034949	0,037579857	6,06125567	6,882750846
%	49,80%	50,53%	31,29%	44,53%	40,69%	21,57%	39,52%	25,14%	84,60%	47,39%	85,32%	35,21%	47,98%	20,50%

Source: prepared by the authors upon the data collected.

Table 6: Coefficients of expertise and productivity from the professors-researchers

Areas \ Teaching Code	p16	p15	p14	p13	p12	p11	p10	p9	p8	p7	p6	p5	p4	p3	p2	p1	Coefficient
Economics and Management	0.018414	0.084555	0.001503	0.045472	0.030440	0.013529	0.009395	0.009395	0.030440	0.013529	0.165727	0.361142	0.037580	0.000376	0.000000	6.061255	6,882751
Politics, Local Community, and Develop.	0.024051	0.096204	0.030440	0.037580	1.220970	0.054115	1.136791	0.121759	0.294626	0.073657	0.054115	0.009395	0.135663	0.013529	0.000000	2.465614	5,768508
social Sciences	0.045472	0.009395	0.073657	0.006013	0.018414	0.073657	0.013529	0.018414	0.181887	0.000376	0.181887	0.000000	0.727546	0.487035	0.003382	2.002631	3.843292
Geography	0.003382	0.018414	0.001503	0.001503	1.841413	0.024051	1.352875	0.294626	0.030440	0.054115	0.006013	0.000000	0.024051	0.000376	0.000000	0.135663	3.788425
General Tourism	0.571590	1.686960	0.084555	0.030440	0.037580	0.024051	0.254040	0.121759	0.030440	0.006013	0.018414	0.000376	0.018414	0.030440	0.000376	0.514468	3.429914
Marketing / Communication	1,308155	0.024051	0.003382	0.2773957	0.018414	0.001503	0.030440	0.003382	0.073657	0.006013	0.135663	0.037580	0.108606	0.000376	0.024051	0.024051	2.073281
Education (Vocational Training)	0.108606	0.108606	0.003382	0.037580	0.054115	0.121759	0.135663	0.084555	0.198797	0.003382	0.054115	0.018414	0.063510	0.018414	0.000376	0.434423	1.736941
Planning / Project	0.073657	0.198797	0.121759	0.000000	0.006013	0.001503	0.024051	0.013529	0.084555	0.018414	0.024051	0.000000	0.013529	0.001503	0.000000	0.902292	1.483653
Events	0.830139	0.165727	0.018414	0.006013	0.018414	0.030440	0.000376	0.003382	0.013529	0.000000	0.254040	0.000000	0.024051	0.000000	0.024051	0.003382	1.391958
Hospitality	0.024051	0.063510	0.037580	0.037580	0.384818	0.024051	0.045472	0.030440	0.054115	0.006013	0.460353	0.000000	0.054115	0.000376	0.000000	0.018414	1.278467
Cultural heritage	0.108606	0.063510	0.045472	0.073657	0.000000	0.181887	0.009395	0.006013	0.096204	0.001503	0.030440	0.000000	0.073657	0.018414	0.006013	0.024051	0.738820
Gastronomy / Catering	0.013529	0.001503	0.000000	0.000376	0.001503	0.003382	0.001503	0.001503	0.000000	0.000000	0.434423	0.000000	0.006013	0.000000	0.001503	0.000376	0.465614
Entertainment / Leisure	0.003382	0.000376	0.003382	0.000000	0.006013	0.024051	0.000376	0.006013	0.2773957	0.003382	0.006013	0.000000	0.013529	0.000000	0.006013	0.000376	0.3446862
Agency / Transportation / Logistics	0.003382	0.006013	0.000376	0.000000	0.006013	0.003382	0.024051	0.009395	0.003382	0.000000	0.006013	0.000000	0.234874	0.000000	0.003382	0.045472	0.345735
Others	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	Desc.	
Productivity Coefficient	3,136415	2.527621	0.716648	0.550169	3,644119	0.581360	3.037956	0.724164	1.366028	0.186396	1.831266	0.426907	1.535137	0.570838	0.106727	12.632469	33,574220
Specialty	1,308155	1.686960	0.294626	0.2773957	1.841413	0.181887	1.352875	0.294626	0.294626	0.073657	0.460353	0.361142	0.727546	0.487035	0.037580	6.061255	6,882751
%	41.71%	66.74%	41.11%	49.80%	50.53%	31.29%	44.53%	40.69%	21.57%	39.52%	25.14%	84.60%	47.39%	85.32%	35.21%	47.98%	20.50%

Source: prepared by the authors upon the data collected

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The data allow inferring individual analyses the production of every professors-researchers in your expertise area and others (also as show in table 6). It is possible to identify the professors-researcher expertise comparing the representativeness in the general framework of the professors (table 7).

It is possible to observe that, despite the professor-researcher "D5" 84.60% owning production within their expertise area (Management and Economics), the interference that has on academic production corresponds to only 1.27% of the total teaching collection. In turn, the professor-researcher "D1" has a percentage of smaller expertise, 47, 98%. However, the knowledge production of this unique human resource represents 37.63% of the total knowledge production performed by the KPST analyzed.

In table 6, also it is possible to observe an asymmetric distribution of the proportion of expertise and representativeness ("market share") in terms of individual contribution to the total in the KPST analyzed. The data allow inferring individual analyses pointing to the contribution by professors-researchers in scientific areas, both in general and also allows greater attention in areas of interest of academic management.

However, it is just a professor-researcher among the sixteen features, leaving the other 12.63

coefficients averaged 1.39 for each. These data reveal the discrepancies in knowledge management in the academic sphere. From the coefficients listed, we extract the following scenario:

According to graphic 1, it is possible to observe that the proportions of the categories of scientific areas are discrepant. The total average corresponds to 7.14% and is closer to the average of the three most fragile areas (MeanL of 1.15%) than the average of the areas considered as the program' expertise of the KPST analyzed (MeanE equal to 16.38%).

Graphic 1: Expertise rate of the KPST
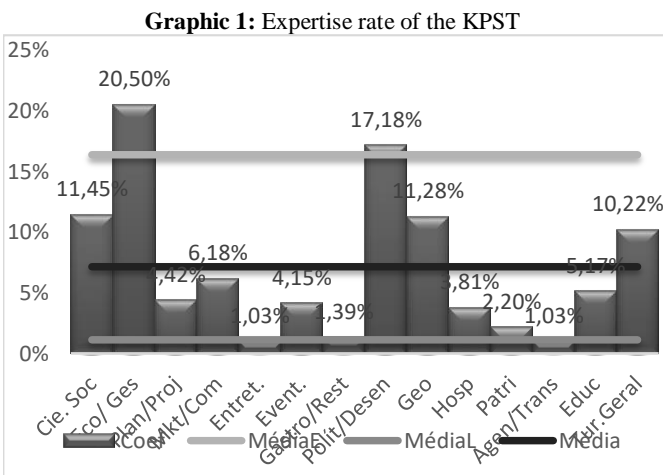
Source: prepared by the authors upon the data collected

Table 7: market share of individual production in relation to collectivity production of tbc KPST, and expertise area.

Professors-researchers	Prod. Professor / Prod. Total course	Concentration Expertise	Area of expertise
D1	37.63%	47.98%	Management and Economics
D12	10.85%	50.53%	Geography
D16	9.34%	41.71%	Marketing and communication
D10	9.05%	44.53%	Geography
D15	7.53%	66.74%	General Tourism
D6	5.45%	25.14%	Hospitality
D4	4.57%	47.39%	Social Sciences
D8	4.07%	21.57%	Politics, local and community development
D9	2.16%	40.69%	Geography
D14	2.13%	41.11%	Education (vocational training)
D11	1.73%	31.29%	Cultural Heritage
D3	1.70%	85.32%	Social Sciences
D13	1.64%	49.80%	Marketing and communication
D5	1.27%	84.60%	Management and Economics
D7	0.56%	39.52%	Politics, local and community development
D2	0.32%	35.21%	Hospitality

Source: prepared by the authors upon the data collected

Table 8: Professors-researchers contribution - Relative and Accumulated.

Professor-researcher	Coef Productivity	Relev. R	Relev. A	% from individual production related to expertise area	Expertise area
D1	12.63247	37.63%	37.63%	47.98%	Management and Economics
D2	3.64412	10.85%	48.48%	50.53%	Geography
D3	3.13641	9.34%	57.82%	41.71%	Marketing and Communication
D4	3.03796	9.05%	66.87%	44.53%	Geography
D5	2.52762	7.53%	74.40%	66.74%	Tourism in General (Unespecific)
D6	1.83127	5.45%	79.85%	25.14%	Hospitality
D7	1.53514	4.57%	84.42%	47.39%	Social Sciences
D8	1.36603	4.07%	88.49%	21.57%	Politics, local community and development
D9	0.72416	2.16%	90.65%	40.69%	Geography
D10	0.71665	2.13%	92.78%	41.11%	Education (vocational training)
D11	0.58136	1.73%	94.52%	31.29%	Cultural Heritage
D12	0.57084	1.70%	96.22%	85.32%	Social Sciences
D13	0.55017	1.64%	97.86%	49.80%	Marketing and Communication
D14	0.42691	1.27%	99.13%	84.60%	Management and Economics
D15	0.18640	0.56%	99.68%	39.52%	Politics, local community and development
D16	0.10673	0.32%	100.00%	35.21%	Hospitality

Source: prepared by the authors upon the data collected.

4.2 Distribution (and concentration) in terms of expertise vs. Distribution (and concentration) in terms of the total amount of collective production of KPST

Table 8 also shows that half of the professors-researchers do not influence 90% of the course production. Besides, as shown in graphic 2 (and also in table 8), no professor-researcher has an expertise in the areas identified as deficit areas of the KPST. These two aspects may indicate areas with the necessary support of new professors-researchers through new hires as well as the overlapping of knowledge of the professors-researchers that make up the KPST.

Although "Economy and management" is pointed out as an expertise area of the KPST in focus, only two professors-researchers have representative production in this area (12.6324 and 0.4369). The difference between these two professors-researchers allows us to state that there is a significant concentration on the production of a single individual. In other words, the category "Economy and management" does not correspond to the expertise of the KPST, as a whole, since it is overloaded with the production of only one professor-researcher.

Since the analysis of the total production of KPST is an aggregate amount of the individual production of each teacher-researcher, for a greater accuracy in the analysis of the KPST expertise it seems necessary to remove the outlier element of the sample, in order to see how is the regular performance of the team on average. If the data referring to the P1 (which is an outlier) were remove from the sample, the expertise of the course would be "Geography" with 3.6527 followed by "Politics, Local Community and Development" with 3.3028 and "General Tourism" with 2.9154.

Graphic 2: Relative distribution of'tl1e individual production concentration vs. collective production of the KPST.
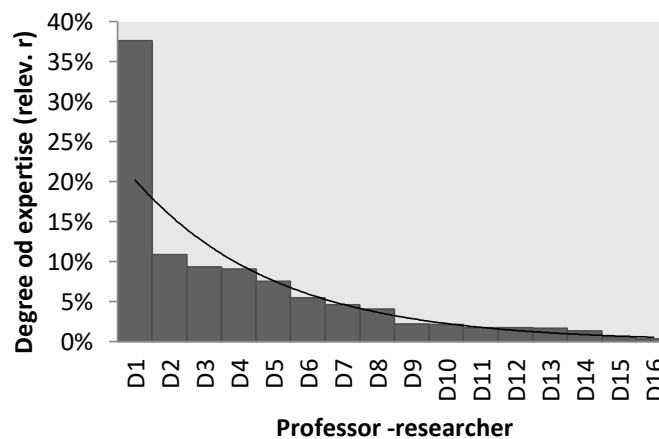
Source: prepared by the authors upon the data collected

Graphic 2: Relative distribution of'tl1e individual production concentration vs. collective production of the KPST.

From this comparison, it is feasible to identify the best proposal for allocation of professor in the disciplines, but also facilitated the allocation process for each discipline distributing contents of each cv Lattes by inhibiting the repetition of content. Another use is in the assessment of hiring new professionals. The data obtained indicate areas where there is a need for hiring professors-researchers that contrasts with potential areas of overlap.

4.3 Actual Allocation of Subjects and Disciplines

Another aspect of the analysis of the contribution by professors-researchers is to identify the best

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distributive arrangements for allocation in the disciplines and hiring. Thus, once the expertise is calculated, it is feasible to select the most suitable for the subject to distribute the contents of each curriculum with optimal utilization and avoiding marginal or secondary use of professors-researchers competence[9].

Table 9 shows the expertise of each professor-researcher and the subjects taught by them according to data from the Lattes curriculum. We observe that some professors-researchers have a direct relationship between their production and the subjects taught. Others, on the other hand, are outliers and there are also professors-researchers who present the same configuration for both the subjects taught and their expertise without any differentiation[10]

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[9]*Specially in public universities, in Brazil, the investment in new hiring of human resources cannot be so easily expanded since it becomes a permanent expense for the State, via the payroll. And once hired, the employee has statutory rights and cannot easily be dismissed. As a result, there is a double challenge for university public management: to offer a course based on an inelastic contingent of professors-researchers as the main basic input and simultaneously have as wide diversity and as high a qualification as possible to be able to provide quality education. Some consequential contributions may affect future hiring, such as making choices in terms of candidates with expertise in vulnerable areas of the system. Besides, considering an inelastic scenario of hiring teaching professionals, it is possible to elaborate on research and extension proposals as well as courses to fulfill weaknesses in the training of students to compensate for the training gaps in undergraduate courses.*

[10]*It is important in a relatively small space to have different performance profiles. If the tool is applied to a larger group of professors-researchers, for example, the group of universities in a given state or federation, it is possible to compare the expertise coefficients in the same field of knowledge.*
gaps in undergraduate courses.

Table 9: Expertise vs. subjects taught by the professors-researchers.

Professors-Researchers	Expertise Area	Disciplines
p16	Marketing and Communication	Tourist Projects Events Organization and Production Supervised Internship/ Supervision of Thesis Graduation General Theory of Tourism II/ Special Topics in Tourism/ Supervised Internship I, II and III/ Supervision of Thesis Graduation / Theoretical Approaches to Tourism Production Technique in Printed Journalism/ Experimental Project II/ Preparation and revision of originals, proofs and videotext
p15	General Tourism	Environmental Tourism Planning / Tourism Planning and Organization II / Tourism Planning and Organization I
p14	Education (vocational training)	Planning and Organization of Tourism II/ Tourism Projects Public Policies in Tourism Environmental Tourism Planning / Tourism and Environmental Education
p13	Marketing and Communication	Innovation in Tourism Products Fundamentals of Planning/ Tourism Planning and Organization I/
p12	Geography	Events Development Approaches in Tourism Types of Accommodation I, II Fundamentals of Tourism / Supervision of Thesis Graduation/ Special Topics in Tourism / General Tourism Theory
p11	Cultural Heritage	Planning and Organization of Tourism I Fundamentals of Leisure Transport Theoretical Approaches to Tourism I / General Tourism Theory II
p10	Geography	Environment and Society Tourism Planning and Organization / Tourism Projects II Environmental Education in Tourism Special Topics in Environmental Education Types of Accommodation General Theory of Tourism II/ Monograph Orientation Tourist Transportation/Agencies and Tour Operators
p9	Geography	Environmental Tourism Planning/ Tourism Planning I and II/ Tourism Projects I and II General Tourism Theory
p8	Politics, local community and development	Contemporary Mobilities Tourism Planning and Organization I Dimensions of Hospitality Special topics in tourism: tourism, interculturality and globalization/ Tourism Research Methodology/ General Tourism Theory Communication Research Methodology
p7	Politics, local community and development	Environmental Tourism Planning General Tourism Theory I and II/ Supervised Internship I, II, III
p6	Hospitality	Food and Beverage Characteristics and importance of the reservation and reception sector/ Fundamentals of Tourism and Hospitality/ Types of Accommodation I, II Supervision of Thesis Graduation / Supervised Internship I, II, III
p5	Management and Economics	Tourist Projects II/ Segment Tourism Transportation/ Agency Business Fundamentals of Tourism/ Supervision of Thesis Graduation / General Tourism Theory I and II/ Tourism Research Methodology
p4	Social Sciences	Representations and Cultural Practices in Tourism Contemporary Mobilities Theoretical Approaches to Tourism/
p3	Social Sciences	Representations and Cultural Practices in Tourism Contemporary Mobilities Theoretical Approaches to Tourism
p2	Hospitality	Food and Beverage Means of Accommodation
p1	Management and Economics	Organization & Production of Tourist Goods Tourism Projects I and II/ Tourism Planning and Organization I and II/ Environmental Tourism Planning Special Topics in Tourism: Social Management and Third Sector in Tourism Tourism Research Methodology Supervised Internship/ Supervision of Thesis Graduation

Source: prepared by the authors upon the data collected.

5. Conclusion and Recommendations

The objective of this paper was to present a protocol developed by the authors driven to manage human resources (a critical factor of success) in the Knowledge Production Systems in Tourism (KPST). It was important because education-research-transference are transversal and intertwined process that are intensive dependent on intellectual capital, where the expertise plays a major role. Thus, the development of a protocol to deal with this issue can be useful in the human resources management of the KPST in particular, as well the universities, in general.

The study brings direct implications on the dynamics of human resources management as well as pedagogical management of courses, pointing to overcome challenges and possible ways of performance optimization and improvement of courses. This study has academic and practical implications. Two central contributions are defended here: (1) the development of a research protocol itself, which is in the process of developing management software and (2) derived indicators that serve both for the diagnostic survey, for monitoring and benchmarking of academic management in long term.

Particularly we think that the main contribution of this paper is to show that the collective production of a knowledge system in tourism is mainly related to two sets of variables, aggregated in two different levels of the system: (1) in the individual level, the (1.a) profile of its members; as well the (1.b) expertise areas of these professionals versus the main themes, areas, lectures etc. in which they actually work, and, also (1.c) the degree of specialization (from each professor-researcher) in a specific area/theme; these variables seem to be highly determinant of the type of production in a knowledge production system in tourism. On the other hand, in a (2) aggregated level, (2.a) the amount of the production, (2.b) the congruence (or incongruence) between the profile of individual production and the profile of the collective production, and (2.c) the asymmetry between in individual and collective productivity; these variables seem to be mainly determinant of the

knowledge production system in tourism's performance. Thus, regarding the findings supported by the real case analyzed we argue that the analytical tool provides here can be a useful method to help management of the knowledge production systems in tourism, since it can: 1) make an assessment of the individual skills and competences, 2) check the balance level of the individual and collective productivity (in terms of quantity, type and areas of production), and 3) identifying the individual and collectivity areas of expertise of the knowledge production system. Once we can retain this kind of information, we should be capable to put on march strategies to intervene in this system to optimize it.

For use of the Protocol as a management tool it is necessary to point out some of the limitations in its development and applicability. As the project includes elements of the content analysis technique, it carries the inherent limitations of this method as well as the observations and descriptive statistical treatment (Gil, 1996).

Regarding the representativeness of the sample, expertise coefficient due to the correction factor (μ), the characteristic value is strictly component/resultant of the sample and cannot be extrapolated to another universe except with expansion of the sample. Another restriction is that the category "Others" was discarded in the analysis and may represent important categories in the formation since the scientific areas in tourism do not represent a hegemonic consensus. In future applications of the tool, this category can be incorporated into the calculation as a function of the significance balanced by weights. Thus, the plurality of knowledge will be considered without allowing the correcting factor to bias the science focus of the course.

It is also noteworthy the strong relationship between the coefficient and the update performed by the professors-researchers on the Lattes Platform and it supposes and depends on the previous existence of the data gathered. Also, the strong correlation between the coefficient and the intensity of update performed by professors-researchers curriculum Lattes platform. In this topic, for further studies, it is important to consider

the integration of other government indicators and the testing of the model in different contexts considering other comparison techniques. Also, the assignment of parallel weights to CAPES measures. Another possibility is from the trend analysis giving space to the time item in the Lattes curriculum in the protocol allowing monitoring over time the development of the KPST to repair research and training gaps.

Despite we highlight the need to test the model and its suitability for various contexts, if the proposal here presented is correct, we think that this protocol can help to deal with the heterogeneity of quality in HEIs showing the areas a professor could be better employed, according to his profile and expertise; to research it could be very helpful to know the main areas and kind of knowledge are characteristics of a particular KPST and foster the junction of shared research centers among institutions that have areas of expertise in common. It can also to shed light to what areas the KPST has more competence to transfer knowledge to stakeholders.

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