Innovations in courts: Validation of a scale of technological innovation

Inovações nos tribunais: Validação de uma escala de inovação tecnológica

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Marcos de Moraes Sousa
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Abstract

The development of studies on technological innovations in the public sector, specifically in justice system, is still little explored in the literature. This article aimed to develop and validate a scale of technological innovation in the justice system during the period of the COVID-19 pandemic. Data collection procedures were carried out by means of questionnaires sent to 20,727 e-mails of civil servants and judges of the state courts of justice in Brazil. The relationships among the innovation variables that make up the technological innovation construct in the Brazilian judiciary were studied. The factor analyses resulted in the main factors listed by the respondents, as the innovative trend factor (IT); technological resources factor (TR); governance factor and its evidence (G); and innovation and technology factor (IT). For responses to the studies, descriptive statistical analysis was performed, and the innovative sensitivity and technological integration variables presented greater

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commonalities, and the two factors extracted explain 74% and 67% of the variance. After the descriptive statistical treatment, the confidence level was 99% and the error margin was 4.87%, resulting in a sample of 679 respondents.


**Introdução**

Currently, due to major technological changes, primarily resulting from globalization and the unprecedented global crisis, arising from COVID-19, which brought the need for more information and innovation for organisational performance (Sousa, 2017). It can also be used to measure organizational competencies and its capacity for continuity and survival. Drastic changes in work and employment have been and will occur rapidly (Hodder,2020; Renu, 2021; Queen, 2021).

Adoption of innovations, through the application of the practice of scientific knowledge, are of particular importance in the courts of Justice. The electronic judicial
process of Brazil represents procedural innovations (Sousa; Guimarães, 2014), becoming imperative to understand the extent of the effects generated in the adoption of innovation, related to its organisational environment (Lewis et al., 2013).

And one of the restlessness of innovative organisations is to welcome ideas that are applicable to their process (Tidd; Bessant, 2015). In this way, the article postulates and proposes to diagnose the factors that relate to the management of justice, especially in innovation in these public organisations.

Inserted historically in this scenario, it is the Brazilian judiciary system, observed by Teixeira et al., (2020), since the system presents barriers to innovation, resulting in harmful consequences for society. To this end, the following research question is proposed: how do organisational and individual factors correlate in the structure of Brazilian justice?

Considering the current situation of the pandemic, research on this worldwide phenomenon becomes necessary, with studies on the development of innovations in the public administration, and in particular in the management of justice. The main objective of this investigation is to develop and validate a scale of technological innovation in the Brazilian justice in the period of the pandemic of COVID-19. The results have implications not only for Brazil, but also for other contexts, given that the pandemic has put pressure on courts for the accelerated application of innovations in a very short period of time in a global environment.

**Theoretical Reference**

There has been an increase in the publication on the administration of justice in recent years, however, “innovation studies in the judiciary that favour a more quantitative and explanatory orientation are still scarce” (Teixeira et al., 2020, p. 383), but nothing compared to the current scenario. Corroborating this perspective, Sousa and Guimarães (2018) clarifies the need to adopt innovation and performance improvement in courts. Innovating covers the unfolding and effectiveness of technological resources (Schumpeter, 1984). The concept of innovation has also been used in the Brazilian judiciary system (Castro; Guimarães, 2020).

Under the look of pressing need of a policy of innovation, and legitimising the proposed study of innovation in the public sector, facing the lack of versatile public services, demands from organisations a new proposal for a management model (Klumb; Hoffmann, 2016), “one of these important issues is to investigate the types of innovations that develop in the public sector, and if your study is analytically feasible in the light of theoretical models already used to analyse the service sector in general” (Ferreira et al., 2015, p. 100), which was
also studied by Makowski and Kajikawa (2021); Castro and Guimarães (2020); Teixeira et al. (2020); Sucupira et al. (2019) and Sousa and Guimarães (2018).

The research field of public administration has been incipient in the Brazilian context. There are few administration studies in the Brazilian Courts (Sátiro; Sousa, 2021). In the public sector, innovation is linked to the organisational scenario (Lewis et al., 2013). Because it is a highly bureaucratic/institutionalised environment, different characters operate in the search for improved processes and services (Rogers, 2005). Studies on the intersection topic, covid 19 and innovation, have been observed in the UK, where activity innovation is key to transformative recovery (Almarzooq et al., 2020; Fisk et al., 2020 and Yaacob & Gan, 2021).

Innovation process has not yet been a priority by the state and much less by people who represent the “figure of the State”. Although, contradicting this information, Dumoulin and Licoppe (2016, p. 313) argue “that, since the late 1990s, governments have been promoting the development and adoption of innovations as a way to increase public sector efficiency”.

In this sense, considering the lack of research on this worldwide critical period, research on the phenomenon of the effects of COVID-19 and pressing innovation policies in public administration become necessary, especially in the underdeveloped countries on the periphery of the capitalist system. It is comprehended that the study proposal is a field that will seek to explain and even predict and suggest changes in the behaviour of public institutions.

Contemporary issues such as efficiency, efficacy, effectiveness, sustainability of processes and activities performed by people for organisational development are essential for the State Public Administration (Ortiz; Medeiros, 2017; Gurgel, 2017; Faria; Faria, 2017). Nevertheless, the new public administration noted that technological progress and scientific development completely changed the physical environment of all societies of the globe. There was a clear and far-reaching impact of all those on the environment (Matias-Pereira, 2010). Administrative reforms that emerged in the face of different contexts were carried out to solve similar problems, with strategies inspired by the private sector (Hood, 1991; Faria & Faria, 2017).

Innovation is an attractive alternative for organisations that seek to respond to the demands of today's technological, competitive and dynamic, with efficient information systems, continuously introduced in all areas, including the Judiciary and the courts (Teixeira; Rêgo, 2017). Technology supported systems have become significant components in almost everything in organisations.
Pioneer in studies that linked innovation to economic development, Schumpeter (1984) saw innovation as the mechanism of growth and economic development in a process he called “creative destruction” (Sucupira et al., 2019). The following studies corroborate with the innovation premise: Wan et al. (2020), Castro and Guimarães (2020), Machado et al. (2018), Sousa and Guimarães (2017), Oh et al. (2014) and Freitas and Medeiros (2015).

The use of new technologies is reality in legal practice. Carmagnani Filho (2018) predicts that the application of “data science” to law will promote major changes, as artificial intelligence (machine learning), Jurimetrics and Big Data are among the tools used. Through them, it is possible to produce online documents, mass customized services, outsourced legal processes, web-based conflict resolution practice, online arbitration, online audiences, greater access and information security. Bourke et al. (2020) corroborate with this study, where the generation and implementation of ideas are based on resources, skills and staff within organisations, since automation increases and optimises workflow, in addition to enabling us to save resources and increase productivity (Makowski; Kajikawa, 2021).

In this context, society must adapt, with a constant updating and adaptation of efficient and effective support instruments that allow standardisation in application of legal norms (Magalhães et al., 2020), thus providing greater celerity, legal certainty and reliability to the decisions of the Judiciary. “The closer people's behaviour is to the expected behaviour, the more organised the society will be and the more successful the law will be” (Nunes, 2016, p. 111).


In this sense, it is considered that judicial provision – effective, efficient and effective – is inherent to the very conception of democracy, being pointed out as a factor associated with the very dignity of the human person, sometimes elevated to the important condition of fundamental right (Sátiro, 2019). It is emphasise that the main factors pointed to success is the intensive use of information and communication technology (ICT) (Castillo, 2020; Wang et al., 2020; Ting et al., 2020). The present research used, as a reference for the scale development, the dimensions and definitions presented in Chart 1, with scientific explanations used in the reference literature described in the text. The dimensions in the literature about innovation process in the judiciary is primarily related to changes and improvements in processes, with the use of practices related to ICT governance.
Innovations in courts: Validation of a scale of technological innovation

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Constitutive definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovative Trend</td>
<td>Innovative processes with the objective of reducing management time, improving the user-citizen experience and bringing transparency to the process (CASTIGLIONI, 2019). One of the most important instruments of technical and social change (SOUSA; GUIMARÃES, 2017). Finding innovative digital solutions to social, economic, political pressures, and how they are transformed in the process (ARIAS et al., 2019).</td>
</tr>
<tr>
<td>Technological resources</td>
<td>The use of IT in government operations, including its effects on public service delivery, citizen satisfaction, and democratic standards (ARIAS et al., 2019).</td>
</tr>
<tr>
<td>Governance and its evidences</td>
<td>Set of politics, behaviors, strategies and practices related to court administration, with the purpose of supporting the delivery of justice services according to society's demands, supported by institutions, that is, laws, norms, standards of conduct that regulate social relations (AKUTSU et al., 2017).</td>
</tr>
<tr>
<td>Innovation and technology</td>
<td>Result of processes of learning, searching and exploration and produces new products, new techniques, new organizational forms, institutional changes, as well as market or service changes, which may be technological or social (CASTRO; GUIMARÃES, 2019). Tool for attempting to debureaucratize the judiciary (TEIXEIRA; RÊGO, 2017). Process by which an innovation is communicated through certain channels over time among members of a social system. Stages of the same continuum, given the strong interdependence between them (SOUSA; GUIMARÃES, 2017).</td>
</tr>
</tbody>
</table>

Chart 1 - Constitutive definitions of dimensions that may influence innovation in courts
Source: The authors (2021)

Method

The present study had a “cross-sectional” time frame, with data collection in a single moment, a method also observed by Hu et al. (2020, p. 3), Salman et al. (2020, p. 2) and Every-Palmer et al. (2020, p. 3). The design was based on a quantitative and exploratory study. “Factor analysis for extraction of main components” and analyses of the reliability and consistency of the scales contained in the survey questionnaire were performed (Tang et al., 2014, p. 209).

To estimate the reliability of the scale, the “Cronbach's Alpha” was used (Cronbach, 1995, p. 305), also used by Do (2021), and represented according to Cervantes (2005, p.9) by the equation:

$$\alpha = \frac{N^2 \overline{Cov}}{\sum S^2 Item + \sum Cov Item}$$
The numerator of the equation is the number of items (N) squared, multiplied by the mean covariance between items, the denominator is the sum of all variances and covariances of the item (FIELD, 2009).

The study population was the civil servants and judges of the State Courts of Justice of Brazil. An electronic form was used for data collection, with the sending of 20,727 emails, from February 10 to March 30, 2021, containing a structured questionnaire with 30 items, with variables to identify sociodemographic factors and theoretical variables.

In the general verification of the instrument of this research, the result demonstrated consistency of the questionnaire applied, based on the psychometrics of a test associated with the degree of inter-item correlations and factor saturation, regardless of the duration of the test (Tang; Cui; Babenko, 2014). The measures adopted for the development of the scientific investigation were: planning and elaboration of the questionnaire; planning the collecting data; data tabulation; preliminary data analysis; assessment; and definition of sample adequacy and statistical measures.

Seeking to deepen the understanding, a reliability analysis was performed, grouping the main variables defined by the research team, such as: innovative trend factor (IT); technological resources factor (TR); governance factor and its evidence (G); and innovation and technology factor (IT), having as reference the innovative technological factors constructs. Factor analyses were carried out in order to test the unidimensionality of the factors described. Specifically, for the proper interpretation of the exploratory factor model, the following indices were previously calculated: Bartlett's sphericity test, KMO calculation and determinant matrix of correlations.

The Chi-square test was applied to verify normality; Cronbach's Alpha test for instrument reliability; and exploratory factor analysis (EFA), proposed by Watkins (2018) and the technique of main components and simple linear correlation (Agahi and Kim, 2021). The software “IBM® SPSS® Statistics, version 24.0.0.0, 64-bit version” (Wirries 2020, p. 11) and Microsoft Office Excel® (Microsoft Excel) were used, both used to explore the data and perform multivariate analyses to accomplish the research objectives.

3.1 Sampling procedures

Through searches carried out on the websites of the Courts of Justice of Brazil, it was not possible to identify the emails of the civil servants and judges. To identify contacts through emails, the “data mining technique” was used (Amin et al., 2019. p. 1), characterized as a set...
of techniques used to analyse large amounts of data (Junior et al., 2014), also observed by Saura (2020, p. 1), Wang et al. (2020, p. 1), Medina-Ortiz et al. (2020, p. 1), Maitrey and Gupta (2020, p. 179), Hassanien et al. (2020, p. 1), Jeong et al. (2020, p. 1), Li (2020, p. 1) and KAO et al. (2017, p. 1). There are studies on the use of the data mining technique in the Brazilian judiciary system, as in the study by Cunha, Silva and Talon (2013).

Specifically, it was used the Web Scraping construction (data extraction), the AutoHotkey scripting language was used together with the Javascript programming language, also found in Wirfs-Brock and Eich (2020), Park et al. (2016) and Balkman and Siegel (2014), used for the automation of data collection activities, allowing the creation of an algorithm that captures the e-mail address of the civil servants for each website of the Court of Justice of Brazil.

After tabulating the e-mail data, an electronic form was sent to the respective civil servants and judges, containing an invitation message to participate in the research voluntarily, anonymously and without remuneration. The composition of the scale structured in the form was predominantly constructed with closed questions, such as sociodemographic variations, organisational climate and deliberative barriers in the execution of Brazilian justice activities in that Court of Justice.

The form elaboration was performed in the Google Docs online application. Its validation took place through validation by a panel of experts in the field of administration of justice for the scale preparation and application of pilot tests with 15 multidisciplinary professionals, such as: law professors and researchers; lawyers and prosecutors. It is noteworthy that the test sample was excluded from the research results.

To participate in the research, the respondents first accessed the first page of the electronic form, with relevant information, such as the objective and guarantee of anonymity, making it clear that it was an academic research and that the data would be analysed as a whole, guaranteeing anonymity in the responses.

The Google Docs application database was exported to a spreadsheet, in which the data were tabulated and analysed in the “Statistical Package for Social Science for Windows version 2.0” program, observed by (Johari, et al., 2018, p. 1). Descriptive statistical treatment was implemented with a confidence level of 99% and a margin of error of 4.87%, resulting in a sample of 679 respondents.

The information was collected through the survey technique (Creswell et al., 2007; Richardson, 1999), whose results were treated with statistical techniques, in order to avoid analysis distortions in the interpretation of data, based on Creswell et al. (2017).
Results and discussion

4.1 Descriptive analyses

According to Favero and Belfiore (2017, p. 11), “descriptive statistics describe the main characteristics observed in a data set”, allowing a better understanding of the data. Method also used by Banasik et al. (2021). Seeking this understanding, an electronic form was sent, with questions related to function, gender, age group, marital status, education and beginning in the activity, observed in Table 1:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Frequency (n=679)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupation</td>
<td>Judge</td>
<td>10</td>
<td>1,5</td>
</tr>
<tr>
<td></td>
<td>Civil servant</td>
<td>669</td>
<td>98,5</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>338</td>
<td>49,8</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>341</td>
<td>50,2</td>
</tr>
<tr>
<td>Age</td>
<td>Up to 30 years</td>
<td>67</td>
<td>9,9</td>
</tr>
<tr>
<td></td>
<td>31 to 35 years</td>
<td>91</td>
<td>13,4</td>
</tr>
<tr>
<td></td>
<td>36 to 40 years</td>
<td>120</td>
<td>17,7</td>
</tr>
<tr>
<td></td>
<td>41 to 45 years</td>
<td>112</td>
<td>16,5</td>
</tr>
<tr>
<td></td>
<td>46 to 50 years</td>
<td>110</td>
<td>16,2</td>
</tr>
<tr>
<td></td>
<td>Beyond de 51 years</td>
<td>179</td>
<td>26,4</td>
</tr>
<tr>
<td>Marital status</td>
<td>Single</td>
<td>150</td>
<td>22,1</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>387</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>Stable union</td>
<td>81</td>
<td>11,9</td>
</tr>
<tr>
<td></td>
<td>Separated</td>
<td>56</td>
<td>8,2</td>
</tr>
<tr>
<td></td>
<td>Widow</td>
<td>5</td>
<td>0,8</td>
</tr>
<tr>
<td>Education</td>
<td>High school</td>
<td>38</td>
<td>5,6</td>
</tr>
<tr>
<td></td>
<td>Undergraduate</td>
<td>262</td>
<td>38,6</td>
</tr>
<tr>
<td></td>
<td>Specialization</td>
<td>323</td>
<td>47,6</td>
</tr>
<tr>
<td></td>
<td>Master</td>
<td>45</td>
<td>6,6</td>
</tr>
<tr>
<td></td>
<td>PhD</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Posdoc</td>
<td>4</td>
<td>0,6</td>
</tr>
<tr>
<td>Beginning in office</td>
<td>Up to 1990</td>
<td>49</td>
<td>7,2</td>
</tr>
<tr>
<td></td>
<td>1991 to 1995</td>
<td>63</td>
<td>9,3</td>
</tr>
<tr>
<td></td>
<td>1996 to 2000</td>
<td>81</td>
<td>11,9</td>
</tr>
<tr>
<td></td>
<td>2001 to 2005</td>
<td>77</td>
<td>11,3</td>
</tr>
<tr>
<td></td>
<td>2006 to 2010</td>
<td>113</td>
<td>16,6</td>
</tr>
<tr>
<td></td>
<td>2011 to 2015</td>
<td>179</td>
<td>26,4</td>
</tr>
<tr>
<td></td>
<td>Após 2016</td>
<td>117</td>
<td>17,3</td>
</tr>
</tbody>
</table>

Table 1 – Distribution of respondents’ socio-demographic data
Source: The authors (2021)

Regarding the total sample of 679 respondents, 10 were magistrates (1.5%) and 669 (98.5%) were civil servants. Of this sample, 338 individuals (49.8%) were male and 341 (50.2%) female. It is observed that there is a concentration of civil servants and magistrates in the age group above 51 years old (26.4%).
Regarding the marital status, the results indicate that 57% of the respondents are married. The level of education presented by the respondents stands out between undergraduate (38.6%) and specialisation with (47.6%), in which master's, doctoral and postdoctoral degrees had low representation, that is, below (7%) of the respondents. Regarding the sociodemographic profile, 179 respondents (26.4%) initiated their activities in the Brazilian judiciary between 2011 and 2015, preceded by those who started between 2006 and 2010 (16.6%).

4.2 Exploratory factor analysis - main components

The techniques used in this section aim to select consistent variables, statistical validity and evaluation of their correlations, identifying the scientific model capable of producing correlations between the variables presented in the sample structure (Marôco, 2014). After Cronbach's alpha tests, “also known as an internal consistency measure used in the context of multi-item measurement instruments” (Amirrudin, 2021, p. 224), also also employed by Cervantes (2005), who describes that the reliability statistics of the collection instrument is fundamental for the validation of the variables derived from the survey questionnaire, in which the Cronbach coefficient has a value greater than 0.7 as a reference.

In the overview of the instrument of this research, the result presented was 0.874, demonstrating consistency of the questionnaire. Seeking to deepen this understanding, a reliability analysis was performed in the constructs: innovative trend; technological resources; governance and its evidence and technological innovation, presenting the respective Cronbach indexes of 0.794, 0.838, 0.434 and 0.774. For the governance construct and its evidence, composed of nine indicators, the calculation of Cronbach's alpha (0.434) indicates that its internal consistency is low, that is, below the index of 0.7. For the mentioned construct, in which it did not present good consistency, it became evident that governance did not present a direct relationship with the innovative technological factors, instigating further research to better understand this result. Previous studies showed that scale above 0.7, presents good consistency between the relationships (Chan, et al., 2002).

Through Pearson's chi-square test ($\chi^2$), also found in Ali, et al., (2021), it was decided to eliminate the variables contained in the governance construct and their evidence as they did not demonstrate the necessary reliability for statistical purposes, and the others were submitted to “exploratory factor analysis of main components for the evaluation of their correlations”,
as suggested by Schreiber (2021, p.2) and similar in previous literature (MacCallum et al., 1999 & Marsh et al., 1998).

The EFA initially considers the Kaiser-Meyer-Olkin (KMO) measure, which measures the adequacy of sampling, which can range from zero to one. When the values are close to zero, they indicate that the sum of the partial correlations of the items verified is high in relation to the sum of the total correlations, configuring an inappropriate factor analysis (Pestana; GAGEIRO, 2008). As expressed by Marroco (2007), the KMO index obtained was greater than 0.5 (0.91), that is, it is acceptable, demonstrating a very good factor analysis. The results are in accordance with the findings in the literature (Mahmoudi et al., Morley et al., and Nayal et al., 2021), stating that KMO values greater than 0.8 represent a high degree of accuracy in the results obtained.

Bartlett’s sphericity test has an important effect, assessing the extent to which the covariance matrix is similar to an identity matrix (Field, 2005), as well as the general significance of correlations in a data matrix (Hair et al., 2009). The values of Bartlett’s sphericity test with significance levels a (p-Value, 0.05) demonstrate that the matrix is factorable, which rejects the null hypothesis that the data matrix is similar to an identity matrix (Tabachnick; Fidell, 2007). Same result as previously found (Morley et al., and Nayal et al., 2021), demonstrating an acceptable Bartlett’s test of sphericity.

In the evaluation of the extraction of commonalities, 0.50 is considered as the minimum acceptable value (Schawb, 2007). Therefore, variables with commonalities below this level were removed from the sample for a repetition of the test, since the low commonality between a group of variables is an indication that they are not linearly correlated and, therefore, should not be included in the factor analysis (Figueiredo Filho; Silva Júnior, 2010). Table 2 presents the test results:

<table>
<thead>
<tr>
<th>Rotating component matrix</th>
<th>Hypothesis test summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor</td>
<td>Communalities</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>receptivity to decision</td>
<td>0.083</td>
</tr>
<tr>
<td>innovative sensibility</td>
<td>0.225</td>
</tr>
<tr>
<td>technology integration</td>
<td>0.173</td>
</tr>
<tr>
<td>change</td>
<td>0.521</td>
</tr>
<tr>
<td>technology implementation</td>
<td>0.575*</td>
</tr>
</tbody>
</table>
After a new EFA test, the commonality of the variables - innovative sensitivity and technological integration - presented greater commonalities, with the two extracted factors explaining 74% and 67% of the variance. The factor loadings were verified, from the coefficients of the columns, representing the relationship between each of the variables and their respective factors. With an asterisk are the factor loadings with greater value for the variables. In factor 1, technological application (0.575), technological access (0.688), adequacy (0.727), information (0.812) and systemic view (0.803) variables remained. In factor 2, they were receptivity to decision (0.761), innovative sensitivity (0.831), technological integration (0.801) and change (0.526). The same method was used in scientific research before (Subramanian et al., 2017; Can Saglam et al., and Çankaya 2020; Nayal et. al., 2021).

The Chi-square test of independence is used to find out if there is an association between the row variable and column variable in a contingency table developed from the sample data. The null hypothesis is that the variables are not associated; in other words, they are independent. The alternative hypothesis is that the variables are associated, or dependent. After applying the Chi-Square test, the factors showed a p-Value < 0.05, that is, rejects the null hypothesis. Some authors differ on the rules for acceptable levels of these indexes; however, they focus, as a rule, on the minimum and maximum values indicated for each index, also tested by Gruginskie and Vaccaro (2018), and on the same line as Nayal et., (2021), another observation was made by (Yilmaz et al., 2021) in which binary logistic regression tests were used as statistical methods, with statistical significance of <0.05 for the analysis of the data studied by them. Thus, demonstrating the degree of reliability in the present study.

### 4.3 Evaluation of correlations between variables

In the evaluation of correlations, it is necessary to establish criteria for the effectiveness of the scores to determine the degree of connection between the variables. For this purpose, the range from -1 to 1 was standardised to verify the connection or disconnection between the variables under test. Cohen (2013) uses a scale for the analysis in which values

<table>
<thead>
<tr>
<th>Variable</th>
<th>Loadings 1</th>
<th>Loadings 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>technological access</td>
<td>0.688*</td>
<td>0.280</td>
</tr>
<tr>
<td>adequacy</td>
<td>0.727*</td>
<td>0.245</td>
</tr>
<tr>
<td>information</td>
<td>0.812*</td>
<td>0.049</td>
</tr>
<tr>
<td>systemic view</td>
<td>0.803*</td>
<td>0.117</td>
</tr>
</tbody>
</table>

Table 2 – Normality test
Source: The authors (2021)
between 0.10 and 0.29 are classified as small; values between 0.30 and 0.49 are classified as medium; and values between 0.50 and 1 are evaluated as having a strong connection between the variables, regardless of the sign.

The correlations presented in Table 3 show a reasonable adjustment of the final measurement model, but susceptible to improvement.

<table>
<thead>
<tr>
<th></th>
<th>1- receptivity to decision</th>
<th>2- innovative sensibility</th>
<th>3- technology integration</th>
<th>4- change</th>
<th>5- technological application</th>
<th>6- technological access</th>
<th>7- adequacy</th>
<th>8- information</th>
<th>9- systemic vision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- receptivity to decision</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>2- innovative sensibility</td>
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<td>3- technology integration</td>
<td>.436</td>
<td>.636</td>
<td>.000</td>
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<td>4- change</td>
<td>.350</td>
<td>.485</td>
<td>.442</td>
<td>.000</td>
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<td>5- technological application</td>
<td>.348</td>
<td>.481</td>
<td>.478</td>
<td>.576</td>
<td>.000</td>
<td></td>
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<td>6- technological access</td>
<td>.280</td>
<td>.335</td>
<td>.293</td>
<td>.427</td>
<td>.573</td>
<td>.000</td>
<td></td>
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<td>7- adequacy</td>
<td>.224</td>
<td>.339</td>
<td>.346</td>
<td>.418</td>
<td>.528</td>
<td>.586</td>
<td>.000</td>
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<td>8- information</td>
<td>.197</td>
<td>.299</td>
<td>.209</td>
<td>.402</td>
<td>.369</td>
<td>.399</td>
<td>.450</td>
<td>.000</td>
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<tr>
<td>9- systemic vision</td>
<td>.231</td>
<td>.330</td>
<td>.270</td>
<td>.428</td>
<td>.411</td>
<td>.413</td>
<td>.458</td>
<td>.685</td>
<td>.000</td>
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</table>

Table 3 – Evaluation of the correlations between the numerical variables
Source: The authors (2021)

The correlations identified were less than 0.6, taking into account that the correlation value between the technological integration and technological application constructs, equal to (0.636), it can also be used to measure organizational competencies and its capacity for continuity and survival, thus indicating evidence of discriminant validity, according to the criterion of values equal to or less than 0.90 (Kline, 2011). In the same way, studies on correlation (Mahmoudi et al., 2021), with values greater than 0.5.

In this research, there is a valid correlation between the receptivity to decision and innovative sensitivity (0.564) dimensions. Holders of leadership positions are open to suggestions for the use of innovation in their internal processes. Receptiveness towards technological changes and that provide an environment that encourages a constant updating for the use of innovation (Attard et al., 2015).

In relation to innovative sensitivity and technological integration (0.636), with the incorporation of new technologies and organisational processes, composing mechanisms to achieve the objectives of the courts of justice. The computerisation of the judicial process is also pointed out as one of the central agents in the transformation of the information system.
and data availability, with the adoption of innovations being one of the most important instruments of technical and social change (Katz; Levin; Hamilton, 1963).

For the correlation between technological application and change (0.576), with a focus on the organisation management, regarding the prioritisation and allocation of technological resources, the awareness of civil servants and judges about the need to prepare for the changes required for the moment of the pandemic is evident. The allocation of resources is influenced by managers because, as holders of authority, they can strongly influence the use of ICT, stimulating changes and motivating the training of civil servants and judges (Hansen, 2011).

The relationship between technological application and technological access also has a significant correlation (0.576), representing that respondents have the necessary technological resources to perform their services, which is also observed by Tuzovic et al. (2018). Regarding the technological application and adequacy dimensions (0.573), it is observed that the organisation adapted its information technology systems during the pandemic period, protecting the health of civil servants and judges. Above all, CNJ established administrative routines in this emergency period (Antunes; Fischer, 2020).

Ultimately, the correlation between information and systemic view (0.685) is significantly high. Data management; information; collaboration; publicity; platform; security and transparency were implemented by the Brazilian courts during the pandemic period, converging to an innovative approach, which the organisation is seen as a collective and interactive unit.

**Conclusion**

This research aimed to develop and validate a scale of technological innovation in the courts of justice. The organisational and individual aspects of civil servants and judges in the Brazilian judiciary were described, and the discussion demonstrated the importance of covering the institutional environment, the innovative behaviour of people, and the organisational resources that influence the process in an institutionalised environment.

The research presented a significant sample that included the civil servants and judges of the Brazilian state courts, 20,727 emails were sent, containing a questionnaire with 30 items, and after descriptive statistical treatment, with a confidence level of 99% and a margin of error of 4.87%, resulting in a sample of 679 respondents.

Descriptive statistical analysis was performed in the data; the innovative sensitivity and technological integration variables presented greater commonalities, and, the two factors
extracted explain 74% and 67% of the variance. The factor analysis resulted in the main factors listed by the respondents, namely: innovative trend factor (IT); technological resources factor (TR); governance factor and its evidence (G); and innovation and technology factor (IT), having as reference the innovative technological factors construct. For the governance construct and its evidence, composed of nine indicators, the calculation of Cronbach's alpha (0.434) indicated that its internal consistency is low, inducing the improvement of other theoretical aspects.

Corroborating the research results, it was possible to verify that there is a great connection between the listed variables, that is, greater than 0.50. The information and systemic view (0.685) constructs presented in the organisational context as motivators for the implementation and use of technological innovation. It was admitted to observe that the receptivity to decision dimension is strongly related to the innovative sensitivity.

The results of this study may support studies with significant samples, based on the perceptions of the subjects involved, such as judges and civil servants of the Brazilian courts. The results have implications not only for Brazil courts, but also for other contexts, given that the pandemic has put pressure on courts for the accelerated application of innovations in a very short period of time in a global environment and the outcomes will be reflected for many years to come. In this sense, it would be possible to have general data for the construction of a new look at science.

A limitation of this study is that the interviews were carried out during a pandemic period, in which the respondents were with their remote activities and the sample is for one country only. It is suggested that future studies on this topic use a longitudinal approach to understand the use of technological innovation at different times. Another limitation was that only judges and civil servants were surveyed. Therefore, it is suggested that future studies include other actors who may be key to understanding innovation in courts, such as lawyers, technology managers, among others.

The authors make it clear that the research is not at an end, leaving room for further research. The data were treated in a correlational manner, where all findings are therefore associated and were not repeated with the same individuals. Future work could work with a regional sample, with repeated experiments.

Additionally, the research brought important characteristics to the administration of justice, indicating the need for future research for the implementation of a strategy that stimulates innovation and that suggests the generation of ideas, improving the services provided not only in the Brazilian context but also in an international perspective.
The authors declare that there are no competing interests. The opinions expressed in this article do not necessarily reflect the opinions of the surveyed sample.

Acknowledgement

The authors would like to thank the support of the Goiano Federal Institute, Campus Rio Verde and to the Graduate Program in Administration of the Federal University of Goiás (PPGADM – UFG).

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Submetido em: 23.11.2022
Aceito em: 30.12.2022