



ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

IJDR

International Journal of Development Research

Vol. 10, Issue, 07, pp. 38607-38611, July, 2020

<https://doi.org/10.37118/ijdr.19497.07.2020>



RESEARCH ARTICLE

OPEN ACCESS

EVOLUTIONARY ANALYSIS OF POSTGRADUATE PROGRAMS IN PRODUCTION ENGINEERING IN BRAZIL FROM 2013 TO 2018

***Nathália de Miranda Barbosa and Armando Araújo de Souza Júnior**

Technology College, Federal University of Amazonas (UFAM)

ARTICLE INFO

Article History:

Received 19th April, 2020
Received in revised form
27th May, 2020
Accepted 29th June, 2020
Published online 30th July, 2020

Key Words:

Evolution of Programs,
Postgraduate, Production Engineering.

*Corresponding author:

Nathália de Miranda Barbosa,

ABSTRACT

The strictu sensu post-graduation has an important role in the technological, economic, and social development of a country. In recent years, the offer of courses of this modality has intensified in Brazil in the most diverse areas of knowledge. The objective of this work is to present an evolutionary analysis of graduate programs in production engineering in Brazil from the years 2013 to 2018. To achieve the proposed objective, descriptive exploratory research was carried out. Data were collected from CAPES 'Sucupira Platform. The survey results indicate that strictu sensu graduate programs in production engineering remain concentrated in the South and Southeast, regions that also concentrate a significant portion of the country's economic activity. The increase in the offer of courses was quantitatively small, the number of students, dissertations and theses defended and, program publications did not have significant variations in the analyzed period, which indicates the existence of opportunities for the expansion of graduate programs in production engineering in the country, mainly in the North, Northeast and Midwest regions.

Copyright © 2020, Nathália de Miranda Barbosa and Armando Araújo de Souza Júnior. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Nathália de Miranda Barbosa and Armando Araújo de Souza Júnior. "Evolutionary analysis of postgraduate programs in production engineering in Brazil from 2013 to 2018", *International Journal of Development Research*, 10, (07), 38607-38611.

INTRODUCTION

The Brazilian graduate developed from the 1950s through the reflection of the organization of the national economy, based on the development of industrial activity and, above all, focused on executive power that enabled the development of the public sector and provided the diversification other subsectors of activity in the Brazilian economy, thus accelerating the transformations of society, adapting it to the trends of the new urban-industrial society (Gouvêa, 2012). The recognition and expansion of Brazilian postgraduate studies are associated with the format and seriousness of public policies that have been implemented since its institutionalization in the country (Santos & Azevedo, 2009). However, graduate programs are concentrated in the Southeast and South regions of the country (Gazzola&Fenalti, 2010). According to the authors, even if some government programs have been created that allow the dissemination and expansion of higher federal public education towards more inland regions, there is still a concentration of programs that are better applied in regions that are also economically favored.

Based on this context, the objective of this paper is to present an evolutionary analysis of graduate programs in production engineering in Brazil from 2013 to 2018, considering their geographical situation and the number of documents and students, as well as presenting a reflection on the development of the production engineering area. This work is structured in five groups: a) introduction; b) materials and methods; c) results; d) conclusion and finally e) bibliographic references used in the research.

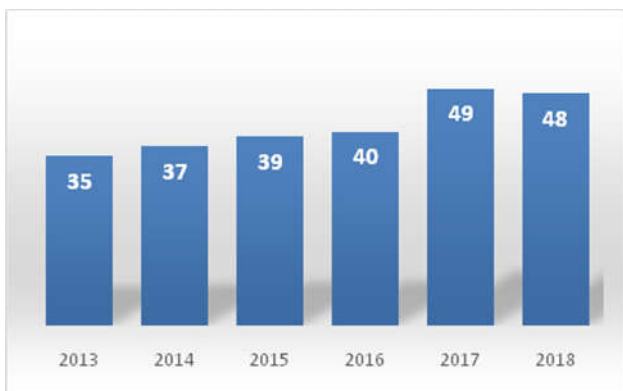
MATERIALS AND METHODS

To meet the objective proposed in the study, this research is exploratory and descriptive. Exploratory research seeks to provide information to deepen knowledge about an object, fact, or phenomenon, to allow greater familiarity with the problem, making it clearer (Malhotra, 2012). Descriptive research, on the other hand, aims to observe, record, and analyze the facts, without going into the merits of the contents. It describes certain attributes of a population or phenomenon or the establishment of relationships between variables (Perovano, 2014). The method used for data collection was

that of documentary research (Gil, 2017) with CAPES 'Sucupira Platform. The Sucupira Platform is a tool designed to collect data and information, perform analyzes and evaluations, in addition to being the reference base of the National Graduate System in Brazil. The information collected was organized and categorized into tables and graphs that detail the evolution of postgraduate programs in production engineering in Brazil between 2013 and 2018.

RESULTS

According Santos & Azevedo (2009), the graduate system in Brazil is recognized by the scientific community, nationally and internationally. This fact is due to the formation of public policies for postgraduate courses implemented in terms of actions aimed at this sector that has been in continuous expansion in the last 40 years since it was in the 1960s that postgraduate courses were institutionalized when had 38 courses installed in the country. Velloso (2014) adds that in 25 years (1987 to 2012), the number of graduate students increased from 861 to 42,878 in master's and doctoral grew from 385 to 13,912. Graph 1 shows the evolution in the number of graduate programs in production engineering in Brazil in the years 2013 to 2018. It is observed that in the year of 2014 it had a growth of 5.71%, as well as in the years 2015 with 5.40% and 2016 with 2.56%. In the year 2017 there was a significant increase of 22.5%, as in 2018 was a decrease of 2,04%.



Source: Prepared by the authors based on Open Data Capes (2020).

Graph 1. Number of postgraduate programs in Production Engineering in the years 2013 to 2018

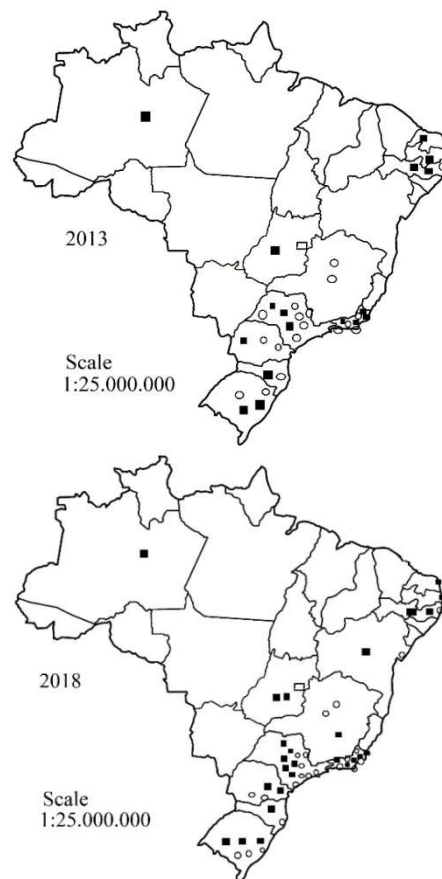
Table 1 shows the growth of academic master's courses in 1 course each year in the years 2014 and 2015. In 2016, the same amount of the previous year remained, and from 2017 onwards, an increase of 16, 66%, with a decrease of 7.14% in 2018. With regard to professional master's degrees, there was an increase of 1 course each year in the years 2014, 2015 and 2016. In the year 2017, there was an expressive increase of 40%, and in the year 2018 a decrease of 7.14%. The academic master's and doctoral degrees remained with the same number of courses in the years 2013 to 2016, when it was in the year 2017 it had an increase of 16.66% and remained with an increase in the year of 2018 by 4.76%. Graph 2 shows the distribution of the programs of the production engineering course according to the regions of Brazil in the years 2013 and 2018. It is observed that in the year 2013, postgraduate courses were concentrated in the Southeast and South, with 10 municipalities having at least one postgraduate course in production engineering and 7 municipalities having at least one doctoral degree, represented by the states of PE, RJ, MG, SP, PR, SC, and RS.

Table 1. Courses offered by the post-graduate program in Production Engineering in the years 2013 to 2018

YEAR	ME	MP	ME/DO
2013	10	7	18
2014	11	8	18
2015	12	9	18
2016	12	10	18
2017	14	14	21
2018	13	13	22

Source: Prepared by the authors based on Open Data Capes (2020).

Legend: ME - Academic Master; DO - Academic Doctorate; MP - Professional Master's Degree; ME / DO - Academic Master / Academic Doctorate.



Source: Prepared by the authors based on Open Data Capes (2020).

Legend: ■ Master's degree; ○ Master and Doctorate.

Graph 2. Distribution of Production Engineering programs in the regions of Brazil in the year of 2013 and 2018

Graph 2 shows the distribution of the programs of the production engineering course according to the regions of Brazil in the years 2013 and 2018. It is observed that in the year 2013, postgraduate courses were concentrated in the Southeast and South, with 10 municipalities having at least one postgraduate course in production engineering and 7 municipalities having at least one doctoral degree, represented by the states of PE, RJ, MG, SP, PR, SC, and RS.

Data in 2013 reveal that in the Midwest region had one graduate course in the area, represented by the state of Goiás. In the region northeast, 6 states did not have any program as well as the state of Espírito Santo, in the Southeast. The North region, in turn, offered only a professional master's degree, represented by the state of Amazonas. In the scenario of 2018, 12 municipalities counted with at least one graduate course in production engineering, with the highest concentration in the Southeast and South of the country and eight municipalities

had at least one graduate course, represented by the states of PE, RJ, MG, SP, PR, SC, RS, and BA. The state of Espírito Santo was still the only one in the Southeast region that did not offer a course in the area, and the North region, being represented only by the state of Amazonas. In the Midwest, the Goiás state began to present two production engineering courses, and in the Northeast, the state of Bahia started to offer a Master's degree and Ph.D. in the area. Table 2 shows the quality of the master's and doctoral courses in 2013, in which the eight courses best evaluated by Capes, with a grade 5 or higher, most of them were concentrated in public universities, namely UFPE, PUC-RIO, UFRGS, UFRJ, UNIFEI, USP / SC, UNIP, and UFSC. It is observed that no course obtained grade 7, considered the maximum grade in the concept scale of Capes.

Table 2. Distribution of grades for the Production Engineering programs in 2013

EDUCATIONAL INSTITUTION	MP	ME/DO
UFPE	5	6
PUC-RIO	5	5
UFRGS	5	6
UFRJ	-	5
UNIFEI	-	5
USP / SC	-	5
UNIP	-	5
UFSC	-	5

Source: Prepared by the authors based on Open Data Capes (2020).

Legend: MP - Professional Master's Degree; ME / DO - Academic Master / Academic Doctorate.

Table 3 presents an evaluation of the year 2018, which is the number of courses best evaluated by Capes, with grade 5 or higher, also had the highest concentration in public universities, they are UFSCAR, UFPE, UFRGS, PUC-RIO, UFBA, USP/SC, UNESP/BAURU, UFSC, PUC/PR, UNIP, and UFMG. It is observed that two courses had a score of 7, considered the maximum score on the Capes concept scale, they are UFPE and UFRGS.

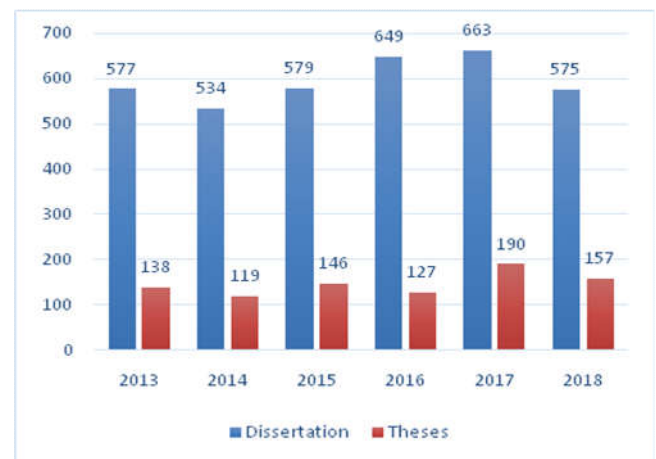
Table 3. Distribution of grades of the Production Engineering programs in 2018

Educational Institution	Me/Do
UFSCAR	5
UFPE	7
UFRGS	7
PUC-RIO	5
UFBA	5
USP / SC	5
UNESP-BAURU	5
UFSC	5
PUC / PR	5
UNIP	5
UFMG	5

Source: Prepared by the authors based on Open Data Capes (2020).

Legend: ME / DO - Academic Master / Academic Doctorate

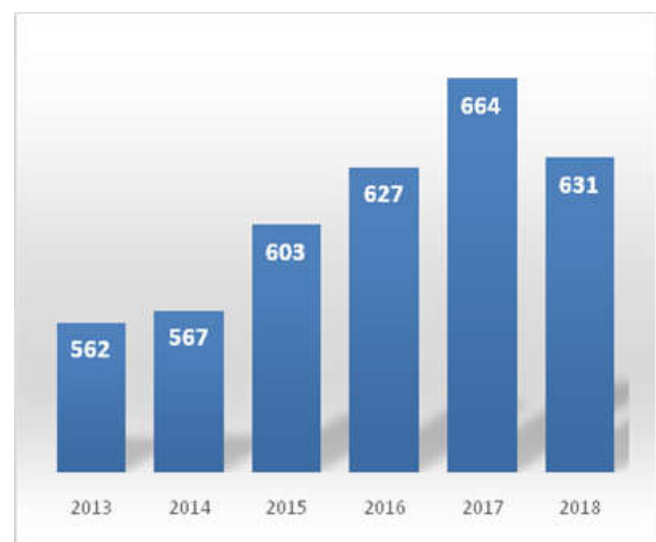
Graph 3 shows the evolution in the number of dissertations and theses defended from 2013 to 2018. It can be seen that the number of dissertations decreased by 7.45% in 2014, got one increase of 8.43% in the year 2015 and the years 2016 and 2017 followed an increase of 12.09 % and 2.16%, respectively, already in 2018 it had a decrease of 13.27%. In relation to the number of theses, there was a decrease in 13.77% in 2014, in 2015 had an increase of 22.69 % by the year 2016 obtained a decrease of 13.01%. In 2017, there was an increase of 49.61%, and in 2018 a decrease of 17.37%.



Source: Prepared by the authors based on Open Data Capes (2020).

Graph 3. Number of dissertations and theses defended in the years 2013 and 2018

Graph 3 shows the evolution in the number of dissertations and theses defended from 2013 to 2018. It can be seen that the number of dissertations decreased by 7.45% in 2014, got one increase of 8.43% in the year 2015 and the years 2016 and 2017 followed an increase of 12.09 % and 2.16%, respectively, already in 2018 it had a decrease of 13.27%. In relation to the number of theses, there was a decrease in 13.77% in 2014, in 2015 had an increase of 22.69 % by the year 2016 obtained a decrease of 13.01%. In 2017, there was an increase of 49.61%, and in 2018 a decrease of 17.37%. Graph 4 shows the number of professors in post-graduate studies in production engineering, revealing a growth trend over the years, with 2017 having the highest number with 664 teachers and in 2018 there was a decrease of 4.97%.

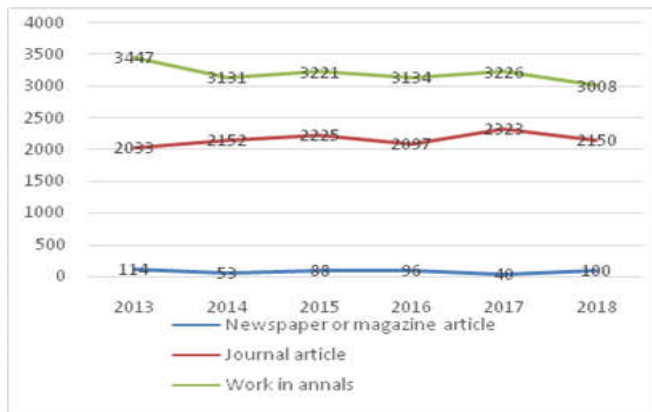


Source: Prepared by the authors based on Open Data Capes (2020).

Graph 4. Number of teachers in the years 2013 and 2018

The data regarding the intellectual production of teachers are shown in Graph 5. The publication of articles in newspapers or magazines decreased by 53.51% in 2014, in the following years in 2015 and 2016, they increased by 66.04% and 9, 09%, respectively. In 2017 it presented a decrease of 58.33%, while in 2018 a significant increase of 150%. The number of articles in journals increased by 5.85% and 3.39% in 2014 and 2015, respectively, while in 2016 it showed a decrease of 5.75%. In 2017 it had an increase of 10.78% and in 2018 a decrease of 7.45%. With regard to work in annals, in 2014 there was a

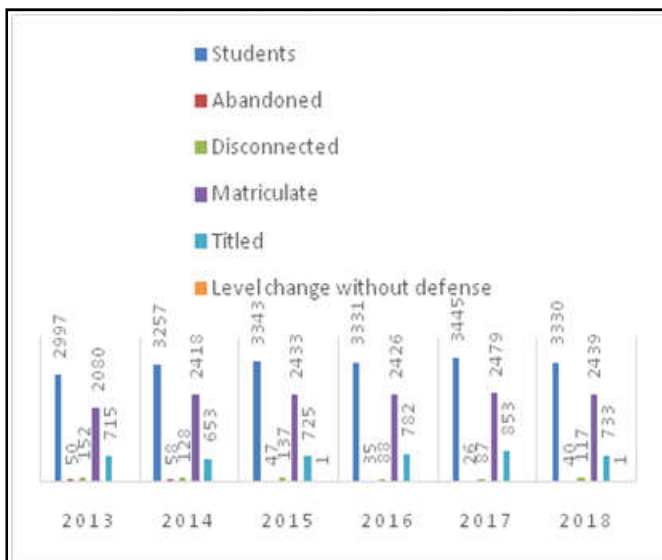
decrease of 9.17%, in 2015 an increase of 2.87%, and a decrease of 2.70% in 2016. In 2017 it obtained an increase of 2.94 % and a decrease of 6.76% in 2018.



Source: Prepared by the authors based on Open Data Capes (2020).

Graph 5. Intellectual production of teachers in the years 2013 and 2018

The number of graduate students in production engineering, as well as their situation, are listed in Graph 6. In 2014 the number of students increased by 8.67%, maintaining in 2015 an increase of 2.64%, in 2016 it had a decrease of 0.36%, in 2017 it had an increase of 3.42% and in 2018 a decrease of 3.34%. In relation to students who abandoned the course, in 2014 there was an increase of 16%, a decrease in the years 2015, 2016, and 2017 of 18.96%, 25.53%, and 25.71%, respectively, already in 2018 had an increase of 53.85%. Disconnected students had a decrease in 2014 of 15.79%, an increase of 7.03% in 2015, a decrease in the years 2016 and 2017 of 35.77% and 1.14%, respectively, and an increase of 34.48% in 2018. Enrolled students had an increase in the years 2014 and 2015 of 16.25% and 0.62%, respectively, in 2016 it had a decrease of 0.29%, 2017 had an increase of 2.18% and in 2018 it decreased by 1.61%. In relation to graduated students, in 2014 there was a decrease of 8.67%, an increase in the years 2015, 2016 and 2017 of 11.03%, 7.86%, and 9.08%, respectively, in 2018 a decrease of 14.07% and only in the years 2015 and 2018 there was a request for each level change without defense.



Source: Prepared by the authors based on Open Data Capes (2020).

Graph 6. Number of students and their distribution in the years 2013 and 2018

Conclusion

From the evolutionary analysis of graduate programs in production engineering, it is concluded that the number of programs and the qualification of masters and doctors has grown over the years. The regions, with most offering programs s graduates in production engineering, are still the Southeast and South. However, in the Midwest region, Goiás state began to present two production engineering courses and in the Northeast region, the state of Bahia started offering a master's and doctoral course in the area. In the Southeast region, the only state that has no program yet is Espírito Santo. The North region is represented only by the state of Amazonas, although this region concentrates industrial activities, plant and mineral extraction, including oil and natural gas, agriculture and livestock, the postgraduate offer in production engineering is limited to a single state. The results of the study allow a critical reflection in the area of production engineering through the geographic distribution of these programs, the great challenge being to expand the offer throughout the national territory, as well as the evaluation of courses and their academic production which, in turn, time, it will bring benefits in economic and social waiting. The study indicates that greater efforts are needed in order to guarantee its expansion, meeting the demands and needs of society and the country's development.

REFERENCES

- Alves, I. M., Maricato, J. M., & Martins, D. L. (2015). Fatores que interferem no (não) credenciamento de pesquisadores em programas de pós-graduação: um estudo nas universidades públicas em Goiás. *Em Questão*, 21(1), 150-172.
- Azevedo, M. L. N., de Oliveira, J. F., & Catani, A. M. (2016). O Sistema Nacional de Pós-graduação (SNPG) e o Plano Nacional de Educação (PNE 2014-2024): regulação, avaliação e financiamento. *Revista Brasileira de Política e Administração da Educação-Periódico científico editado pela ANPAE*, 32(3), 783-803.
- Bittencourt, H. R., Viali, L., & Beltrame, E. (2010). A engenharia de produção no Brasil: um panorama dos cursos de graduação e pós-graduação. *Revista de ensino de engenharia*, 29(1).
- Broadberry, S., Campbell, B. M., & Van Leeuwen, B. (2013). When did Britain industrialise? The sectoral distribution of the labour force and labour productivity in Britain, 1381–1851. *Explorations in economic history*, 50(1), 16-27.
- Curvelo, M. C. D. S. (2018). O ensino no cenário da pós-graduação em Geografia no Brasil (Master's thesis, Brasil).
- Ferreira, A. (2012). Desenvolvimento regional: limites e possibilidades institucionais: um estudo de caso da região do Vale do Paraíba—RJ. Rio de Janeiro.
- França, I. A. (2012). A gestão da pós-graduação no Brasil através de seus planos nacionais: os desafios dos gestores de cursos. *Revista Gestão Universitária na América Latina-GUAL*, 5(4), 43-67.
- Gazzola, A. L. A., & Fenalti, R.. (2010). A pós-graduação brasileira no horizonte de 2020. In: CAPES (Ed.), *Plano Nacional de Pós-Graduação 2011-2020 (Vol. 2)*. Brasília: CAPES – Ministério da Educação..
- Gil, A. C. (2017). *Pós-Graduação-Metodologia-Como Elaborar Projetos de Pesquisa-Cap 2*.

- Gouvêa, F. C. F. (2012). A institucionalização da pós-graduação no Brasil: o primeiro decênio da Capes (1951-1961). *Revista Brasileira de Pós-Graduação*, 9(17).
- Iarozinski Neto, A., & Leite, M. S. (2010). A abordagem sistêmica na pesquisa em Engenharia de Produção. *Production*, 20(1), 1-14.
- Lievore, C., Picinin, C. T., & Pilatti, L. A. (2017). Los campos de conocimiento en postgrado en Brasil: crecimiento longitudinal entre 1995 y 2014. *Ensaio: avaliação e políticas públicas em Educação*, 25(94), 207-237.
- Malhotra, N. K. (2012). *Pesquisa de Marketing-: Uma Orientação Aplicada*. Bookman Editora.
- Martins, C. B. (2018). As origens pós-graduação nacional (1960-1980). *Revista Brasileira de Sociologia*, 6(13), 9-26.
- Nobre, L. N., & Freitas, R. R. D. (2017). A evolução da pós-graduação no Brasil: histórico, políticas e avaliação. *Brazilian Journal of Production Engineering*, 3(2), 18-30.
- Oliveira, J. F. D., & Fonseca, M. (2010). A pós-graduação brasileira e o seu sistema de avaliação. *Pós-graduação e avaliação: impactos e perspectivas no Brasil e no cenário internacional*. Campinas: Mercado de Letras, 15-52.
- Perovano, D. G. (2014). *Manual de metodologia científica para a segurança pública e defesa social*. Curitiba: Juruá, 155-169.
- Rosa, S. D., & Lopes, R. E. (2009). Residência multiprofissional em saúde e pós-graduação lato sensu no Brasil: apontamentos históricos. *Trabalho, educação e saúde*, 7(3), 479-498.
- Santana, A., & Martins, H. F. (2012). Gestão estratégica de políticas públicas: A Capes e a política de Formação de Recursos Humanos para o desenvolvimento do país.
- Santos, A. L. F. D., & Azevedo, J. M. L. D. (2009). A pós-graduação no Brasil, a pesquisa em educação e os estudos sobre a política educacional: os contornos da constituição de um campo acadêmico. *Revista brasileira de educação*, 14(42), 534-550.
- Velloso, A. (2014). A pós-graduação no Brasil: legados e desafios. *Almanaque multidisciplinar de pesquisa*, 1(1).
