



ICDD

Thales Penha

Social Upgrading in Global Agricultural Value Chains:

**What impacts labour relations in fruit
production in the Brazilian Northeast?**

The International
Center for Development
and Decent Work

Thales Penha is an Assistant Professor of the Department of Economics at the Federal University of Rio Grande do Norte (UFRN), Brazil. He received a Ph. D in Economic Development from the Institute of Economics of the State University of Campinas (Unicamp), Brazil. He holds an M.A. and bachelor's degree in economics from the Federal University of Rio Grande do Norte. Currently, he is the coordinator of the Undergraduate Program in Economics at UFRN. He joined the research network on global agricultural value chains coordinated by the International Center for Development and Decent Work (ICDD) at the University of Kassel. His main research topics are: Social and economic upgrading in global agricultural value chains, and international trade in the agrifood system. Contact: thales.penha@ufrn.com.

Editorial Board

Prof. Dr. Scherrer (University of Kassel)
The ICDD Working Papers are peer-reviewed.

Contact Address

Prof. Dr. Christoph Scherrer
ICDD – University of Kassel, Germany
Mailing address: Mönchebergstr. 19, D-34109 Kassel
Visitors' address: Kleine Rosenstr. 3, D-34117 Kassel
Contact: florian.doerr@icdd.uni-kassel.de

Design / Layout: Nina Sangenstedt, gestaltvoll.de

ICDD Working Papers

ISBN: 978-3-7376-1084-1

DOI: <https://doi.org/doi:10.17170/kobra-202211287169>

This document – excluding quotations and otherwise identified parts – is licensed under the Creative Commons Attribution-Share Alike 4.0 International License (CC BY-SA 4.0)
<https://creativecommons.org/licenses/by-sa/4.0/>




© International Center for Development and Decent Work. All rights reserved.

The material in this publication may not be reproduced, stored or transmitted without the prior permission of the copyright holder. Short extracts may be quoted, provided the source is fully acknowledged. The views expressed in this publication are not necessarily the ones of the ICDD or of the organization for which the author works.

First published 12/2022 in Kassel, Germany

Publishing House:

kassel university press GmbH
www.upress.uni-kassel.de

kassel
university 
press

Thales Penha

Social Upgrading in Global Agricultural Value Chains:

What impacts labour relations in fruit
production in the Brazilian Northeast?

Contents

Abstract	3
1 Introduction	4
2 The evolution of the organization of fruit production in the Northeast and its impact on the formal labour market	6
Changes in the production process	7
The new institutional environment: the relationship between labour legislation, certifications and rural unions	9
3 Methodological procedures	12
General methodological aspects	12
Procedures adopted in the construction of the analysis variables	12
Model of Analysis	17
4 Model Specifications and Analysis of Results	18
Analysis of the results	25
5 Conclusion	28
References	30
ICDD Working Paper Series	32

Abstract

The paper aims to analyse the impacts on social upgrading in the two main fruit-producing areas of the Brazilian Northeast – Açú-Mossoró and Petrolina-Juazeiro. The concept of decent work deficit was elected as a guideline for the theoretical background, as many authors have applied it to address social upgrading in a more objective way. The paper has adopted the time series econometric analysis to identify possible structural breaks in the formal workers' demand per hectare for the two regions. The main results indicate some structural breaks in the formal labour market in both regions. This corroborates with the literature that some institutional changes impact working conditions. However, the intensity and direction of these impacts differed in each researched area. With the results is possible to affirm that a decrease in the decent work deficit resulted from the enforcement of the labour laws since the emergence of a new institutional environment.

Keywords: Agrifood value chains; Decent work deficit; Social upgrading; Time series analysis.

1 Introduction

At the beginning of the 2000s, Brazil consolidated itself as an important player in the international fruit market, especially in mangoes, melons, and grapes. This was possible as the semi-arid region in the Brazilian northeastern region attained good irrigation facilities. Since the mid-1990s these regions specialized in the production of high-quality fruits (Penha, 2018; Hespanhol, 2015; Buanain and Garcia, 2015).

As Penha (2018) points out, developing countries entered world trade owing to the convergence of certain aspects that changed the geopolitical scenario in the agrifood system. While technological innovations made it possible to increase the shelf life of perishable fresh produce, there has been an increasing demand for products that have high nutritional value and are sustainable and safe. Moreover, a new global pattern has emerged in agricultural policies, as a result of which lesser subsidies are granted to producers. With the growing competitiveness of international trade, economies have opened up in favour of increasing imports of agricultural goods. These changes have created room for the inclusion of the northeast irrigated areas in the global agricultural value chains.

Global agricultural chains are complex systems that involve producers from different parts of the world, offering them substitute products as well. These products require high-quality standards and specific attributes that are guaranteed by certification schemes, which, in turn, can be attained through coordination, monitoring, and control. This process is headed by the supermarket and retail chains of developed countries as they are the final point of the chain and is the space of interaction with the consumers of such products (Lee et al., 2012).

Global value chains are a phenomenon that emerges from the breaking down of the productive process into tasks spread across several countries in the world. Because of this, the literature has sought to analyse, to a large extent, the economic and social impacts in the countries that are part of these chains. In terms of economic upgrading, the studies seek to analyse the behaviour of agents or countries within the chain to understand whether their positions have improved or not, as detailed by Marcato and Baltar (2017). However, the analysis of social upgrading is complicated, since measuring welfare in a country owing to it being included in value chains is difficult as it is hard to identify and isolate the effect. As Marcato and Baltar (2017) observe, the analysis of the concept of decent work in workers involved in the chain has been a path adopted by some researchers and allows for addressing an important aspect of the process.

The concept of decent work was developed by the ILO and addresses four central aspects: job creation; social protection; social dialogue; and guaranteeing workers' rights (Ferraro et al. 2016). In agriculture, although the ILO has included rural workers in its agenda since 1921, the document titled *Decent Work in Rural Economy* (2017) points out the need for a deeper analysis, since about one-third of the workforce is employed in rural areas and it is also the sector that has great deficits in relation to the institution's concept of decent work (Scherrer and Verma, 2018). Thus, the ILO with FAO has developed a decent work agenda considering the specificities of rural occupations.

Therefore, understanding that the rural areas hold a large contingent of workers and that historically these are in more vulnerable working conditions, this paper aims to analyse the impact of global agrifood chains on decent work deficit in the fruits production in the Brazilian Northeast. Although there have been extensive discussions in the literature about the condition of labour involved in fruit production in the Brazilian Northeast, studies linking the transformations in terms of governance of global value chains of fresh fruits and their impacts on the labour market, i.e., the extent of influence that global value chains of fruit production have on social upgrading, are inadequate. This paper starts from the hypothesis raised in the works of Mehdi et al.(2021) on mango production in the Petrolina-Juazeiro Region and of Apolinário et al. (2018) on melon production in the Açú-Mossoró Area, both of which point out that the confluence of the enforcement of the Brazilian labour legislation in the rural areas, together with new forms of certification, as well as the presence of rural workers' unions, had led to improvements in the working conditions of employees in the production of fresh fruits in the Brazilian semi-arid regions.

Thus, the paper focuses on the analysis of the evolution of formal agricultural employment in the two main regions of fresh fruit production in the Brazilian northeastern semi-arid region – the Açú-Mossoró and Petrolina-Juazeiro regions. In methodological terms, this work adopts both a qualitative and quantitative approach to analyse the labour market associated with fresh fruit production in these two regions. The data collection of the study combines bibliographical and documental research thereby merging specialized bibliographies about the subject to interpret the results obtained from the analysis of descriptive statistics of the data of the labour market, as well as from the application procedure of structural break of time series. The analysed data were collected from public databases regarding the labour market (RAIS 1996-2019) and Agricultural Censuses (1996, 2006 and 2017). The methodological procedures adopted will be detailed in a specific section.

2 The evolution of the organization of fruit production in the Northeast and its impact on the formal labour market

In the last three decades, Brazil has become one of the most important players in the international market of fresh tropical fruits. This prominence is largely due to the consolidation of the irrigated areas in the northeast region, especially the Açú-Mossoró territory for melon production and the Petrolina-Juazeiro territory for grapes and mango production. However, the path of these two territories is permeated by constant adjustments in the relationships between the agents due to changes in the panorama in which they are included. One of the main points that have changed over the last decades was the labour market, due to general changes in Brazilian agriculture and consequently its labour relations as highlighted by Sakamoto and Maia (2022). In addition, local changes have also had an important impact on it (Apolinário et al. 2018; Penha, 2018; Selwyn, 2014).

According to Sakamoto and Maia (2022) the changes in the Brazilian labour market is a result of two elements productive changes and institutional aspects. For the authors, the process of modernization of Brazilian agriculture since the 1960s had an impact on labour productivity, increasing the demand for more qualified workers, which had an impact on labour relations. On the other hand, institutional changes, especially at the end of the twentieth century, with new policies aimed at family farm agriculture, as well as the *enforcement of labour laws*, created room for new labour relations (Sakamoto and Maia, 2022).

As argued by Sakamoto and Maia (2022), the production structure and productivity gains in the agricultural sector are reflected in the labour relations established. In this regard, Santos and Viera Filho (2012) point out that the process of productivity gains in Brazilian agriculture has happened over the years in a very unequal way, generating a profound inequality in labour productivity and consequently in the labour market. The authors highlight the northeast region, which has lower labour productivity than other Brazilian regions, and this implies greater informality of labour in the region. Corroborating this last argument, Da Silva and Vian (2021) point out that the northeast, together with the north, are the regions that have the lowest degrees of modernization in Brazil. However, the same authors point out that it is possible to see “islands” of modernity in the northeast region, especially when analysing the capital-labour relationship, in which it is possible to observe higher productivity of agricultural production.

As Silva (2001) points out, the two most important areas of irrigated fruit production in the northeast have undergone an important restructuring process that delineated the path for each one of them. The Petrolina-Juazeiro region underwent significant changes in the productive process and in labour relations. These transformations have been a result of technological intensification and new forms of relationships in the organization of labour with the emergence of outsourcing of certain activities, new specific tasks and partnership contract regimes. These movements resulted in a drop in the quantity of workers per area in the Petrolina-Juazeiro region. The Açú-Mossoró area went through a similar pathway (Silva, 2001). Hence, recognizing these productive and institutional transformations, as defined by Sakamoto and Maia (2022), is the key to understanding labour relations.

Changes in the production process

The starting point for the consolidation of the Northeast fresh fruit-producing areas was the water infrastructure that began to be built in the 1960s. Since the region historically suffers from water shortage, this infrastructure allowed the rise of several irrigated areas in the semi-arid regions of Brazil that boosted agricultural production (Buainain and Garcia, 2015). However, as Silva (2001) points out, the great turning point in irrigated areas occurred in the mid-1980s, a period in which irrigated fruit farming began to stand out.

The rising of the fresh fruit-producing areas in the Brazilian Northeast, as identified by Silva (2001), stems in part from the serious economic crisis that the Brazilian state faced in the 1980s. This crisis changed the perspective of Brazilian economic development policy, due to the need for foreign exchange to stabilize the balance of payment. So, the promotion of agricultural production directed to the international market was boosted which included the tropical fruits that were appearing in the irrigated areas. This new trend, on the other hand, is also the result of paradigmatic transformations in the Agrifood System, which resulted from gradual changes that have led to the transition from a production model concentrated on a few large-scale crops to supply the food industry inside the countries that had practised strong protectionism policies for agricultural goods, to a new regime in which there is a diversification of products with distinct attributes linked

to the new desires of consumers in a globalized world with fewer trade barriers. This rupture has allowed the insertion of new products and producers in different regions. This environment created room for the consolidation of the Northeast fresh fruit chains in the international market structured in global value chains (Penha, 2018).

Silva (2001) also mentions an important local aspect in the Petrolina-Juazeiro path is that the production is based on large companies. This fact allowed the consolidation of private governance through associations that enabled their insertion in the global value chains. This process can also be observed in the Açú-Mossoró area, as corroborated by Nunes (2009). These global value chains that had set up in the irrigated areas of the semi-arid Northeast, in the mid-1990s, demanded specific attributes of the fruits and modern inputs and agricultural techniques in the production process that were unviable at that time for small producers (Penha, 2018; Nunes, 2009; Silva, 2001). Although over time the knowledge has spread to small and medium producers, allowing them also to integrate into these global value chains, it is important to highlight that in the first years of fruit production in the hubs it is the large firms that were the key players and they consolidated the region as an important fruit-producing area for international markets (Selwyn, 2008).

As the expansion was based on large companies, the labour market was consolidated, with regular demand in the region, as argued by Silva (2016), when analysing the region of Petrolina-Juazeiro. However, even though fruit production has had an impact on job creation, it should be noted that in the early years of the fruit-producing areas, labour relations were far from the ILO's concept of decent work. As Apolinário et al. (2018) and Silva (2016) analysed, much of the work in fruit production in the hubs at the beginning of their trajectory was informal. Apolinário et al. (2018) are even more assertive about the working conditions, stating that the workers did not use adequate protective equipment and had no decent housing or food.

In this way, the workers employed in fruit production during the initial period found themselves in extremely vulnerable work situations. They were even outside the labour legislation, which was in force for urban workers. Thus, the labour relations established showed a large deficit of decent work. However, the region went through important changes from the late 1990s and early 2000s that culminates in a new institutional environment with important impacts on the labour market.

The new institutional environment: the relationship between labour legislation, certifications and rural unions

One key aspect when dealing with the labour market in Brazilian rural areas is to highlight the struggle that rural workers had in relation to the regulation of working conditions. This is because, since 1943, with the Consolidation of Labour Laws (CLT), the legislation that regulated workers, though the basic rights such as minimum wage and maximum weekly working hours, were established, the institutionalization of the labour rules was applied exclusively to urban workers; the rural workers were left out of the regulation in the enactment of Law 5.452/1943. It was only in 1963 that the Statute of the Rural Worker was created to cover specific aspects of the rural workers, and only in 1973 the CLT was “ruralized” through Law 5.889/1973 with the extension of the rights of urban workers to all rural workers including the category of temporary worker that appeared in this period during the modernization process of Brazilian agriculture. The 1988 Constitution ratified the full extension of labour rights to urban and rural workers, considering some specificities (Krein and Stravinski, 2008; Sakamoto and Maia, 2022).

However, the point that Krein and Stravinski (2008) highlight is the enforcement power of the laws. For the authors, the existence of legislation and its enforcement depends on an institutional relationship between the state and union organizations so that the legislation can be enforced without violations. It was this absence of synergy that led to the intense informality in the labour market of the irrigated areas in the Northeast region during the beginning of the 1990s. Although legislation with minimum guarantees for rural workers exist since the 1970s, according to Apolinário et al. (2018), it was possible to identify violations in melon production in the 1990s. This fact was due to an institutional environment with no capacity to enforce labour laws.

It was only after the promulgation of the 1988 Constitution that the Brazilian state, as well as civil society, managed to have a legal apparatus to deal with consolidated political power forces in the rural areas, such as the oligarchies in the Northeast. Despite important rural union movements at the turn of the 1970s into the 1980s, as Krein and Stravinski (2008) elucidate, the capacity for union organization was difficult; the same authors show that the number of union members did not exceed 15% in 1992. In addition, Apolinário et al. (2018) describe the difficulty faced by trade unions in Rio Grande do Norte state, where there were boycotts by workers of producing farms who participated in the unions.

However, since the mid-1990s, this environment changed as the labour inspection state agencies, under the umbrella of the Labour Justice, began to act in the rural areas applying the current labour laws. This action put pressure on the fruit-producing farms in the Northeast region, which began to be punished for not complying with the legislation. This impulse allowed a better atmosphere for the unions; that had allowed the rural unions of the two regions to act in the coordination of labour relations with the fruit-producing companies and execute collective bargaining agreements (Apolinário et al., 2018; Selwyn, 2008).

Another aspect that had consequences in the design of the new institutional environment for the fruit-producing area in the Brazilian Northeast was the changes that occurred globally in the geopolitical scene as evident in the way the process of integration of agricultural markets intensified in the dawn of the World Trade Organization (WTO) in 1995 as a result of negotiations for fewer protectionism policies of countries (Penha, 2018).

However, it is important to highlight that together with the greater integration of the global agrifood chains, Europe faced a crisis in these chains, in terms of traceability and safety issues due to food contaminations, such as the case of the 'mad cow disease' and salmonella. According to Penha and Belik (2019), these two events combined were decisive for the increased private role and emergence of third-party certifications (TPC). The authors emphasize the important difference between TPCs and Standards such as Codex Alimentarius, as also in the national guidelines of the health authorities. This distinction is the role played by the TPCs in chain governance since these certifications allow for broader coordination among the various agents involved in the global chain, but in a flexible manner, without the costs of integration. This fact materializes to the extent that the specific standards are established by major global retailers, at the same time, using agencies (public or private) to monitor producers around the world (Penha and Belik, 2019).

The greatest example of TPC certification is the Global Gap, which is a protocol to produce agrifood products created in 1997. This label was first created under the name EurepGap and was the result of the articulation of large European retailers. The GlobalGap protocol includes four main topics – food safety, environmental preservation, occupational health and safety and animal welfare (Asfaw et al., 2010). The consolidation of the GlobalGap hallmark marks the beginning of a new era in certification standards, which requires governance, involving quality and regulation criteria, among the agents of the global chain. This is done by private agents themselves, which places the public sector of the countries in second place in the decision-making process (Hatanaka et al., 2005). This greater enforcement capacity of private agents on agrifood chains is even more evident in developing countries that have consolidated themselves as important suppliers of global chains (Penha and Belik, 2019).

Given this, Hatanaka et al. (2005) argue that these TPC certifications are not just impartial ways of coordinating trade, as their wide-scale adoption has caused repercussions on the economic and social environment and on the operation of agents within the global agricultural chains. Certifications organize, reorganize and discipline those involved in asymmetric power relations (Penha and Belik, 2019). In this sense, one of the consequences of this new pattern of coordination of global agrifood chains driven by TPC certifications has made the labour market flexible, especially in developing countries. This process is an outcome of seasonal production to meet export windows. Therefore, the labour market is characterized by a lower level of employment with a great oscillation of temporary workers (Bain, 2010). Penha et al. (2018) underline this last point by analysing the global melon chain in the Brazilian Northeast. The authors identified a strong oscillation in the labour market, with peaks of admissions in the months of June to August in contrast to the large volume of layoffs in the months of December to March, which coincides with the export window. Therefore, this volatility has repercussions on income instability which, depending on the labour legislation and social protection mechanisms of the countries, downgrades the condition of workers (Penha and Belik, 2019).

For Bain (2010), certifications, particularly GlobalGAP, have a limited effect due to the greater flexibility of labour relations that obscures certain information, as is the case of subcontracting (Bain, 2010). The intensification of capital which allowed to have tasks with low demand for labour and others with higher demand, as shown by Penha et al. (2018), lead to this major labour flexibility.

Although in the GlobalGap criteria, responsibility for direct labour relations and subcontractors are also subject to inspections, this tangle of contracts makes monitoring narrow and difficult (Penha and Belik, 2019). Thus, certifications alone do not guarantee the reduction of the decent work deficit as already pointed out by Bain (2010). However, as Mehdi et al. (2021) observe, the improvement in working conditions in fruit production in the Brazilian Northeast was largely due to the confluence of factors, such as changes in the trade process with the participation of certifications that incorporate social responsibility, together with the progressive and enforced labour legislation that allowed the Labour Auditing Offices to better monitor the achievement of labour laws, as also mentioned by Apolinário et al. (2018). This political support for the workers also let rural unions have a strong presence in the regions of fruit production, which enabled the settlement of collective labour agreements in the second half of the 1990s, thereby improving working conditions (Apolinário et al. 2018; Selwyn, 2014; Selwyn, 2008).

The subsequent sections present the methodological procedures and analysis of the results that seek to identify whether these changes have caused structural changes in the labour market, as well as to locate the period in which they occurred.

3 Methodological procedures

General methodological aspects

The methodological procedures used in this article were based on some important assumptions to make it possible to judge the hypothesis presented in the introduction, as well as to answer the research question. Thus, this section will detail all the methods developed in the research.

First, it must be made clear that as to the type of research adopted, this is an empirical study that adopts qualitative and quantitative methods to seek evidence on the topic under analysis. To reach the objective explained in the introduction, the bibliographical and documental procedures were combined. The analysis model used descriptive statistics of the data collected, as well as the method of analysis of structural break of time series. The results obtained were interpreted based on the consulted bibliography.

Procedures adopted in the construction of the analysis variables

As explained earlier, this study sought to verify to what extent there was social upgrading in fruit production in the semi-arid region of north-eastern Brazil. However, due to the complexity to define and measure a broad topic such as social upgrading as pointed out by Marcato and Baltar (2017), the decent work deficit for farm workers as social upgrading was adopted.

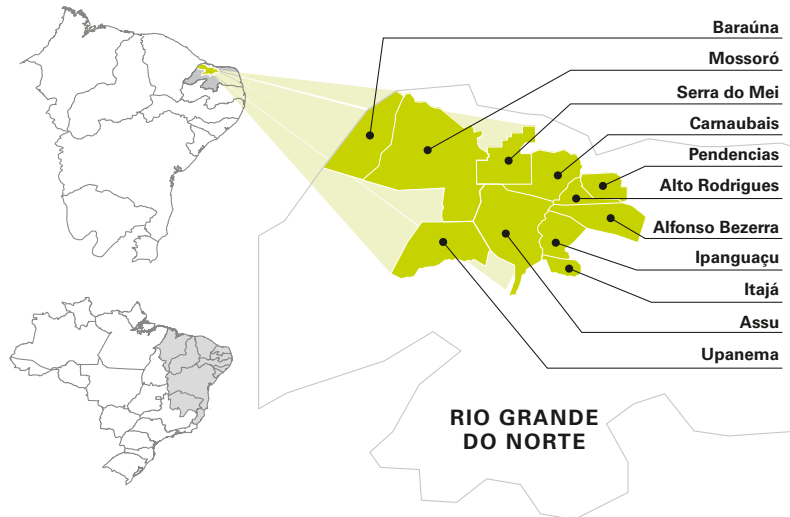
Thus, although it is understood that the concept of decent work in the production chain goes beyond the number of formal workers, this assumption was adopted here since there are no long-time series that incorporate other forms of occupation in fruit production in the region, in the detail required for the analysis. Furthermore, it is important to consider that formal employment under Brazilian labour law assures rights linked with some of the 11 aspects of decent work pointed out by the ILO. In general, the Brazilian Institutional Framework already guarantee some fundamental rights of the decent work agenda for all citizens, especially in terms of social dialogue, which guarantees to all Brazilian citizens the

right of free association, collective bargaining, promoting strikes and protection against gender discrimination. However, despite the changes in some points of the labour law in Brazil in 2017, the formal labour contracts protect the workers in a wider way that drives the workers to a minor decent work deficit. In terms of promoting better jobs, the Brazilian labour law assures that i) minimum wage is defined each year by the central government; ii) working time is fair (maximum 44 hours per week) and extra hours regulated; iii) there is unemployment wage; iv) there are paid vacations. For the pillar of rights at work, the formal workers benefit from norms that regulate safe workplaces. But the main gain is in terms of social protection because it allows the workers access to a safety net which includes pensions for retirement and death pension for the family, also the support of maternity leave of four months with full salary and some short allowances in case of sickness or work injury. So, it is possible to affirm that workers under a formal contract have a minor decent work deficit. Thus, the increase in formalization was adopted as a good proxy to measure a reduction in the decent work deficit.

In this way, a long-time series of the evolution of the number of formal workers was built so that it would be possible to see performance based on the insights pointed out in the consulted literature. The data on formal workers was collected from RAIS' database. However, it is important to mention that due to methodological alterations in the database, it is not possible to isolate the quantity of workers for specific crops for years less than 2002. However, the second half of the 1990s is a relevant period to analyse, since important transformations occurred in the regions as pointed out by Apolinário et al. (2018) and Mehdi et al. (2021). Thus, it is only possible to have a historical series that encompasses the 1990s for the two regions that are focused on in this paper and considering only the distinction between temporary and permanent crops. However, as will be shown in the next paragraphs some strategies to minimize the bias was adopted.

The Açú-Mossoró Area is formed by 11 municipalities, as shown in Figure 1. However, to minimize the selection bias of municipalities that have formal workers in temporary crops other than melon, only the most relevant municipalities in the production of melon in the region was selected throughout the series that goes from 1996 to 2019.

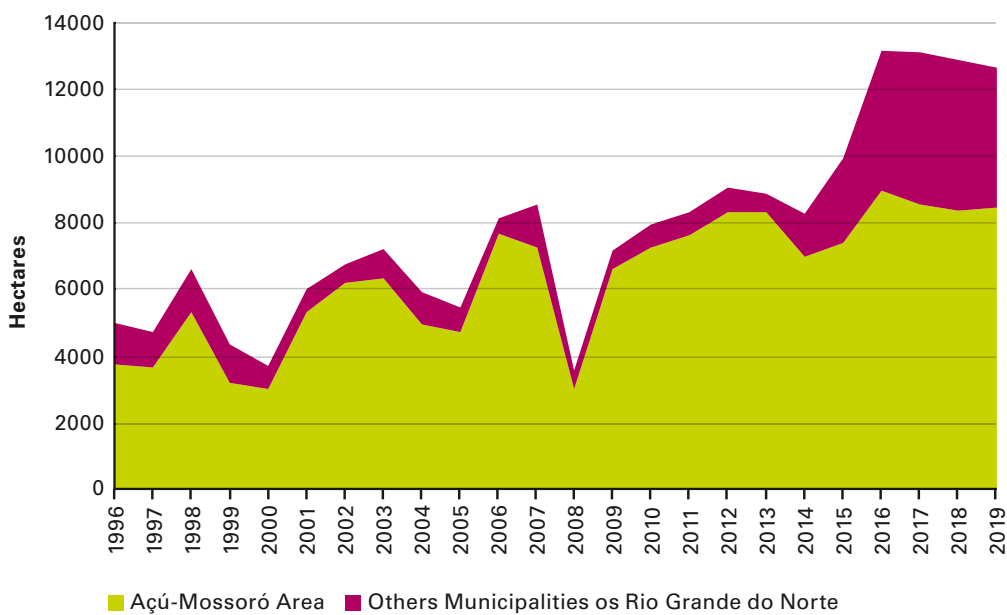
Figure 1: Location of the Açú-Mossoró Area



Source: Nunes (2009)

That said, over the period (1996-2019), the main municipalities with melon plantations in the Açú-Mossoró Area were: Açú, Mossoró, Baraúna and Ipanguaçu, as illustrated in Figure 2, showing the total comparative planted area of these four municipalities in the state of Rio Grande do Norte. On average, over the period analysed, these four selected municipalities extended over more than 80% of the planted area.

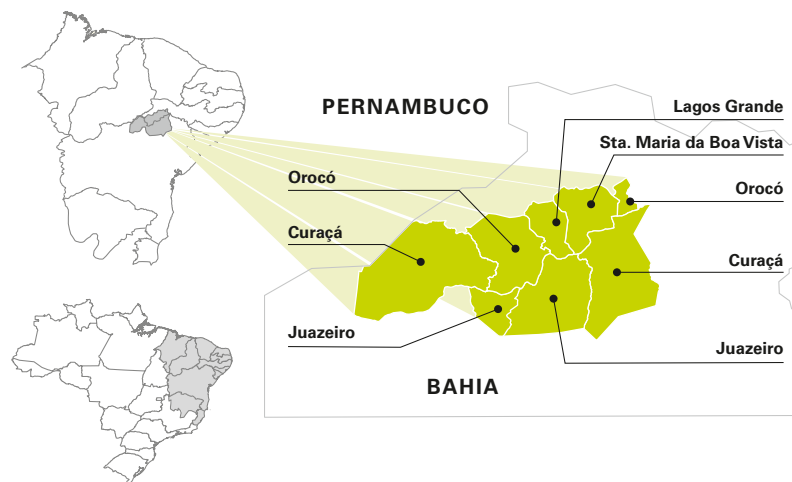
Figure 2: Evolution of the planted area of melon between melon producers of the Açú-Mossoró Area and the other municipalities of Rio Grande do Norte.



Hence, the quantity of formal workers employed in temporary farming in these municipalities was collected, since in the period analysed the melon crop was the main temporary farming demand, according to the union of workers of the region. So, it is possible to conclude that the formal workers of these municipalities were surely almost all employed in melon production (Apolinário et al. 2018).

Similar procedures were adopted for the Petrolina-Juazeiro area; this region is made up of eight municipalities (illustrated in Figure 3), belonging to the states of Bahia and Pernambuco.

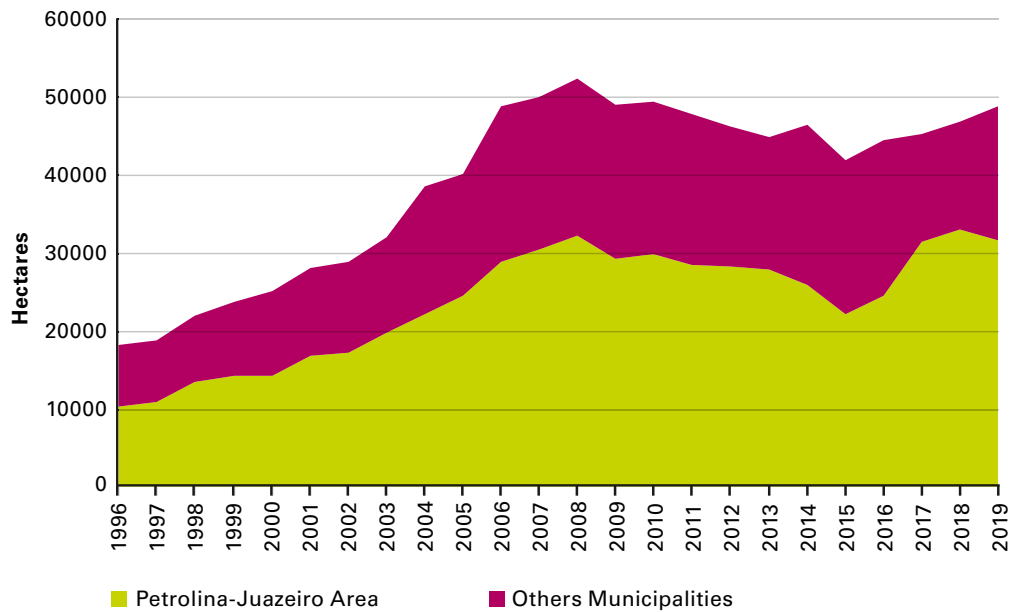
Figure 3: Location of the Area



Source: Sobel and Ortega (2010)

However, when the main grape and mango-producing municipalities were studied for this research work in the period 1996 to 2019, it was observed that the municipalities of Petrolina, Juazeiro, Curaçá, Santa Maria da Boa Vista, Lagoa Grande and Casa Nova were the largest producers of these two permanent crops, as illustrated in Figure 4. Thus, the data from Sobradinho and Orocó were excluded to avoid the bias of workers in permanent crops other than mango or grape.

Figure 4: Evolution of the planted area of mangos and grapes in the Petrolina-Juazeiro Area and the other municipalities



In their research about mango production in the region, Mehdi et al. (2021) pointed out that according to the rural workers' union of Petrolina, most of the formal workers in the region during the period analysed have been in the mango and grape fields. Based on this information, it was considered prudent to conclude that it was in the production of the grape and mango fields that agricultural workers were formally and permanently employed in these municipalities.

Model of Analysis

This paper adopted the method of structural breaks analysis. So through the techniques of structural breaks it would be possible to identify whether there have been sudden changes in the performance of formal employment in the areas analysed, and, if so, when had it occurred. In this way, it makes it possible to shed light on the hypothesis adopted in this work.

The analysis of structural breaks in time series is used to indicate whether there are changes in the level of the series, of slope or both (Da Silveira Bueno, 2008). Structural breaks affect the estimation of time series models by violating two basic assumptions that are the stationarity of the series in terms of mean and variance, which leads to bias in the estimated parameters. This, in turn, can cause an error in the interpretation of unit root tests, which is the second basic principle that can be impacted because of structural breaks (Shikida et al. 2016). Hence, the analysis of structural breaks is important for the accuracy of the specification of econometric models. However, as Enders (2008) points out, the growth of interest in understanding economic dynamics broadened the scope of these econometric models for interpreting data, as well as for testing hypotheses. It is from this broad perspective that this work has chosen to use the structural breaks approach, to judge the hypothesis stated in the introduction, as well as to understand the trend of the formal labour market of tropical fruit in the Brazilian Northeast. Therefore, this paper adopted the structural breaks approach to identify whether there are significant changes in the evolution of employment, and, in case there are breaks, in which period they occur.

For this, some procedures were adopted, since there are tests that seek to identify whether there are structural breaks in the time series and to determine the moment of the break. Thus, as Kleiber and Zeileis (2008) point out, there are two ways to identify whether there are structural breaks, which are the fluctuation tests and the tests based on the F statistic. On the other hand, the tests to determine the moments of breakage are derived from the works of Bai and Perron (1998; 2003). The gain of the adoption of this methodology is that the structural break analysis provides strong evidence of important disturbances that change deeply the time series analysed. This kind of finding is meaningful to a better understanding of complex variables that suffers a lot of different interferences during the time. However, it is important to highlight that this method identifies the possible breaks only and does not explain the causes. So once the breaks are found, the key procedure to be adopted is to explain what causes the breaks to progress further in the research.

4 Model Specifications and Analysis of Results

This section explains the econometric procedures adopted in this paper in more detail and analyses the findings for each procedure.

Structural break test I: OLS-COSUM fluctuation test

To perform structural break tests, it is started with a standard linear regression of the type:

$$Y_i = X_i^T \beta_i + u_i (i = 1, \dots, n) \quad (1)$$

Where,

i = time

Y_i = dependent variables

X_i^C = independent variable

β_i = estimated coefficient

u = residuals

However, in the case of the existence of structural breaks, the assumption should be made that there may be more breaks in the period. Thus, the model should adopt the following structure.

$$Y_i = X_i^T \beta_i + u_i (i = i_{j-1} + 1, \dots, i_j, j = 1, \dots, m + 1) \quad (2)$$

Where,

j = is the segment index

$I_{m,n} = \{i_1, \dots, i_m\}$ = set of breaks

So, the OLS-CUSUM fluctuation test uses the cumulative and moving sum of the residuals from Ordinary Least Square (OLS) estimation, $\hat{u} = Y_i - X_i^T \hat{\beta}_i$ (Shikida et al. 2016).

Therefore,

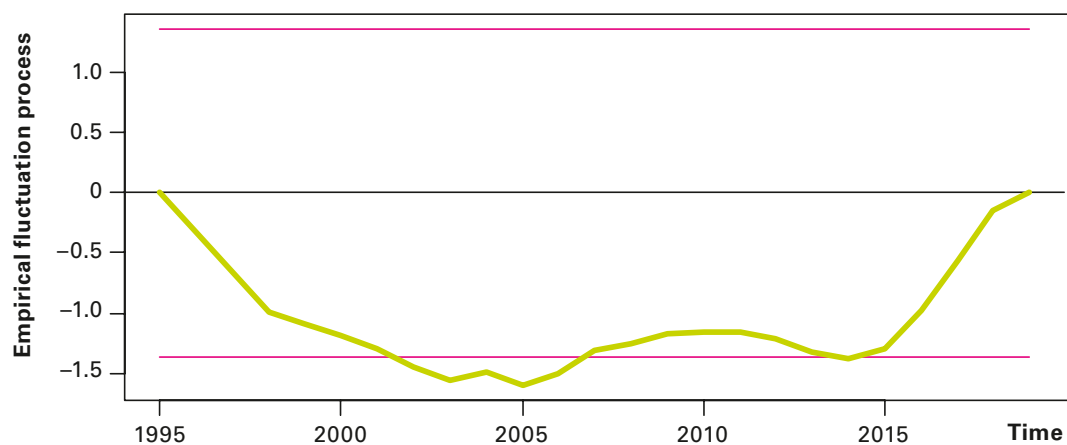
$$efp(s) = \frac{1}{\hat{\sigma} \sqrt{n}} \sum_{t=1}^{ns} \hat{u}_t, 0 \leq s \leq 1 \quad (3)$$

Thus, the test is made considering under the null hypothesis that the accumulated sum of the residuals follows the Brownian pattern and, therefore, the violation of this behaviour would lead to the rejection of the null hypothesis of no structural break. In this paper, such procedure was carried out for the series of the quantity of formal jobs per hectare for each of the two researched areas. As mentioned by Shikida et al. (2016), the regression of the series was estimated against a constant. In this way, the model does not incorporate any other explanation variable. The aim is only to analyse the behaviour of the explained variable (formal worker per hectare) during the time. Although the test allows for statistical analysis, it is the graphic visualization of the empirical fluctuation of the process (*efp*) that let not only the evaluation of structural breaks observed, but also to have an insight of which period(s) this fact(s) occurred.

Cusum test in Açú-Mossoró area

The Cusum test reveals that the series exceeded the critical values at a significance level of 5% during the first half of the decade of the 2000s in the Açú-Mossoró Area. Also, around 2014, the values touched the critical limit. In this way, from Figure 5 of the test presented below there are evidences of breaks along the series.

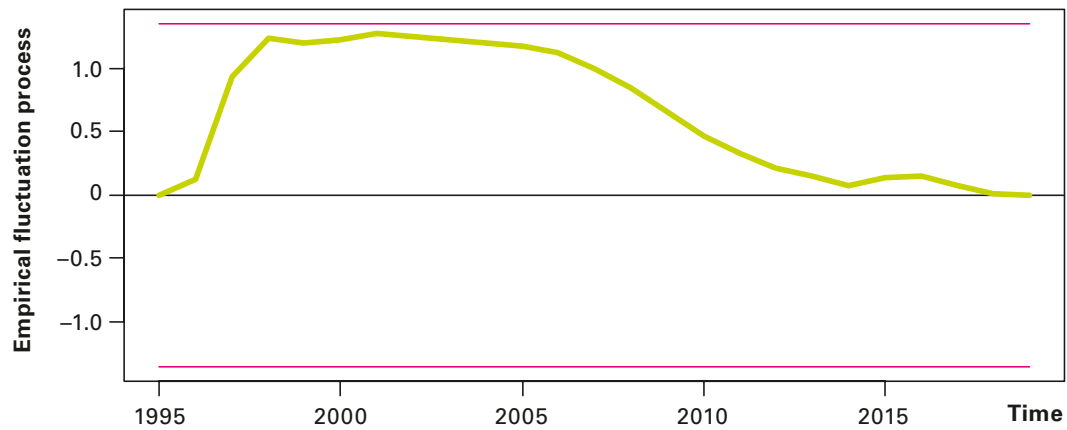
Figure 5: Cusum Test in the Açú-Mossoró Area



Cusum test in Petrolina-Juazeiro area

About the Petrolina-Juazeiro area the estimation presented a significant p-value only at 10% level and reached close to the critical value at the turn of the 1990s to 2000. Thus, the result indicates a possibility of structural break in the series.

Figure 6: Cusum Test in the Petrolina-Juazeiro Area



Structural break test II: SUP-Wald test

Besides the Ols-Cusum fluctuation tests, the SUP-Wald test, based on F statistic was also performed. The test uses the residuals estimated by OLS from segments and compares them with the residuals estimated without segmentation as follows.

$$F_i = \frac{\hat{u}^\tau \hat{u} - \hat{u}(i)^\tau \hat{u}(i)}{\frac{\hat{u}(i)^\tau \hat{u}(i)}{n-2k}} \quad (4)$$

Where,

i = indicates the residuals of the segmented estimation.

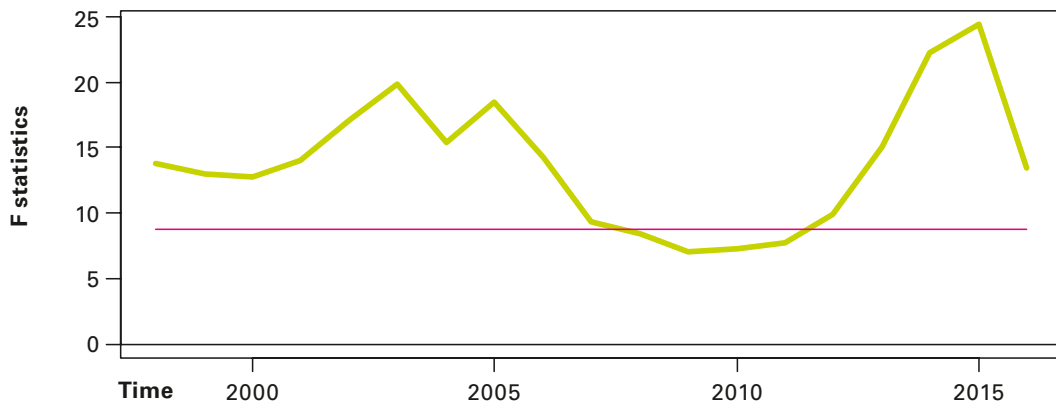
\hat{u} = indicates the residuals of the non-segmented estimation.

The F statistic was computed and analysed from the *supremum* function (SUP-Wald test). It was analysed to see if the results obtained exceed the critical values (Shikida, et al., 2016).

SUP-Wald test in Açú-Mossoró area

The Sup-Wald test supports the evidence of breakdown showed in the Cusum test in the Açú-Mossoró area, as can be seen in the graphical analysis of Figure 7. The curve crosses the critical line indicating changes in the overall average of the series

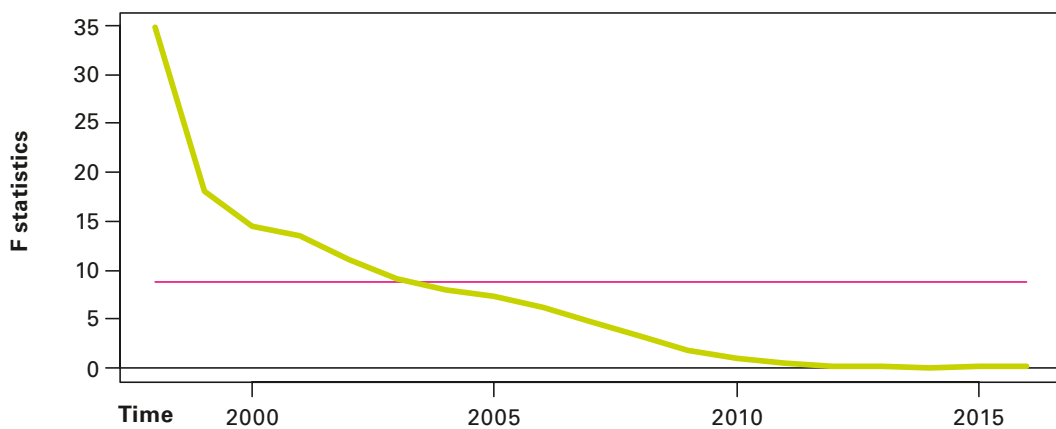
Figure 7: Sup-Wald in the Açú-Mossoró Area.



SUP-Wald test in Açú-Mossoró area

The Sup-Wald test applied for the Petrolina-Juazeiro Area is more conclusive than the OLS-Cusum test and indicates, as Figure 8 shows, that there must be some structural break for the series.

Figure 8: Sup-Wald in the Petrolina-Juazeiro Area.



Structural break test III: Bai-Perron test

Finally, it was analysed in the time series the period(s) that occurred the possible(s) structural break(s). For this, the Bai-Perron endogenous break test was used. As Shikida et al. (2016) point out, the test employs a dynamic algorithm based on Bellman's optimization principle to find the breaks that minimize the Residual Sum of Squares (RSS) in a segmented model. However, a minimum segment size must be determined, which is the "h" parameter that the literature points to as a value between 0.1 and 0.15. Then it is possible to compute the number of breaks and the periods in which they occur (Kleiber and Zeileis, 2008). The test is performed by incorporating a segment split (i_1, \dots, i_m) in equation 2. Therefore, it is estimated by OLS with the smallest RSS value obtained through the following equation.

$$RSS(i_1, \dots, i_m) = \sum_{j=1}^{m+1} RSS(i_{j-1} + 1, i_j) \quad (5)$$

Where $RSS(i_{j-1} + 1, i_j)$ represents the RSSj-th segment. From that to estimate the dates of the breaks we determine the points that minimize the following function.

$$(\hat{i}_1, \dots, \hat{i}_m) = \underset{(i_1, \dots, i_m)}{\operatorname{argmin}} RSS(i_1, \dots, i_m) \quad (6)$$

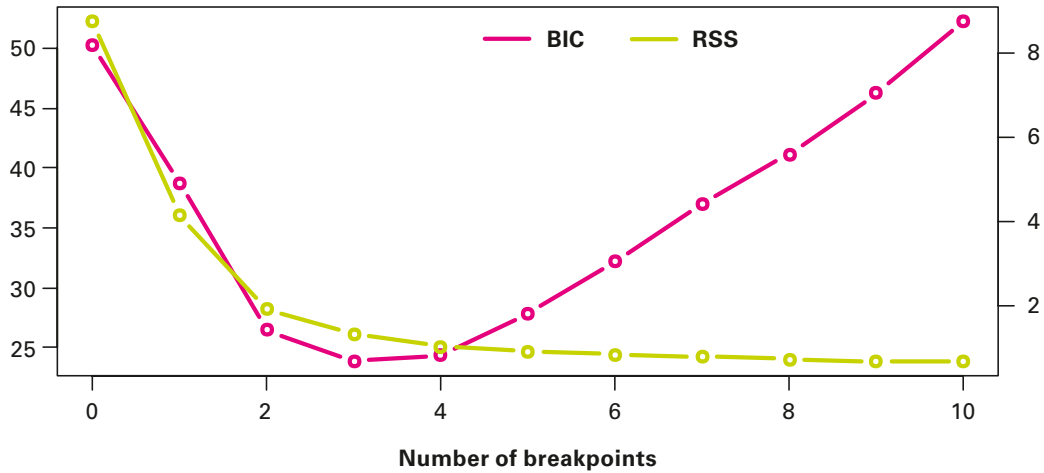
Considering all segments (i_1, \dots, i_m) with $i_j - i_{j-1} \geq n_h \geq k$.

Thus, acknowledging the presence of structural breaks in the series of formal employment in the two regions, this paper also sought to infer in which periods these changes occurred. This was determined by how many breaks occurred along the series, using the Bayesian Information Criteria (BIC) selection criterion, as suggested by Bai and Perron (2003), adopting the segment cut-off as $h=0.1$, as also indicated in the literature on the method (Shikida et al, 2016).

Bai-Perron test for Açú-Mossoró area

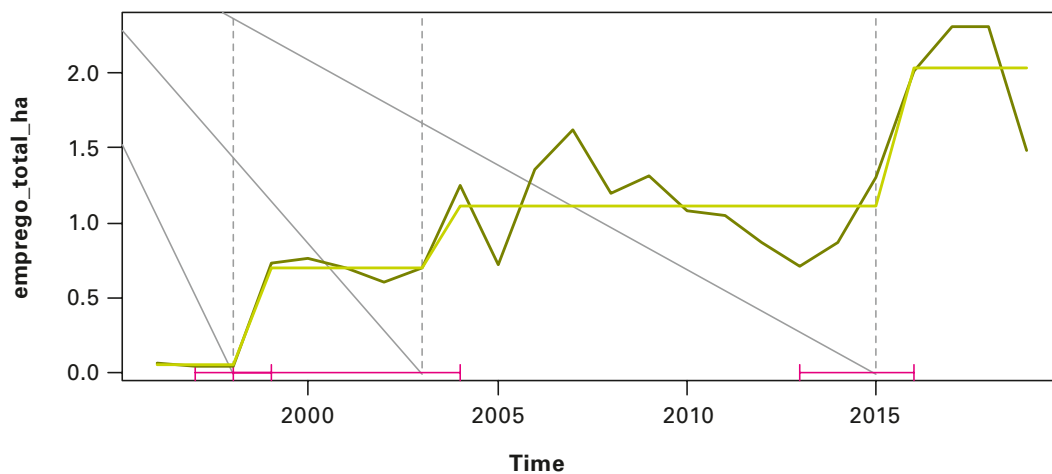
Analysing the results of the calculation of the BIC statistic came to light that the Açú-Mossoró area presented three structural breaks in the series, as shown in Figure 9.

Figure 9: Minimization of the RSS and the BIC selection criterion in the Açú-Mossoró Area



Hence, knowing the quantity of segments in the series it is possible to determine the dates when the average of the series changes producing structural alterations in the quantity of formal workers per hectare in the Açú-Mossoró area. Figure 10 highlights the optimal segments and the dates of the breaks in the series which are: 1998, 2003 and 2015.

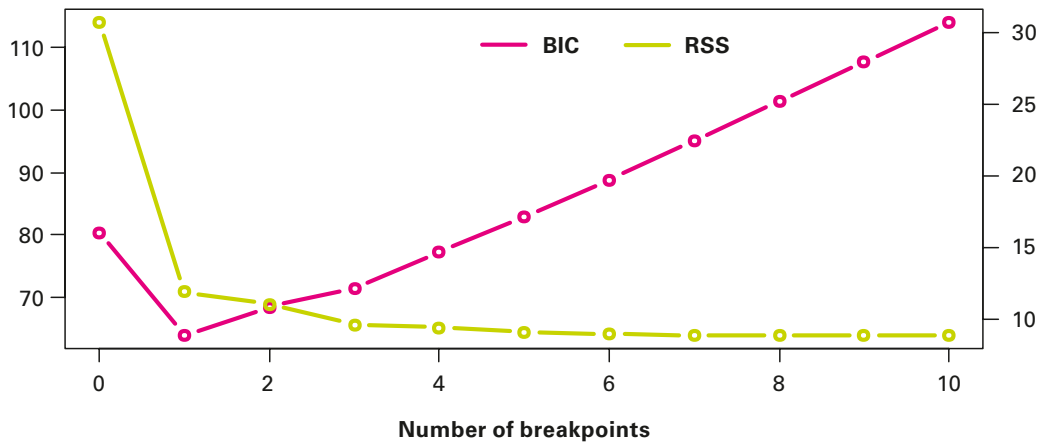
Figure 10: Formal employment per hectare in the Açú-Mossoró area with breakpoints



Bai-Perron test for Petrolina-Juazeiro area

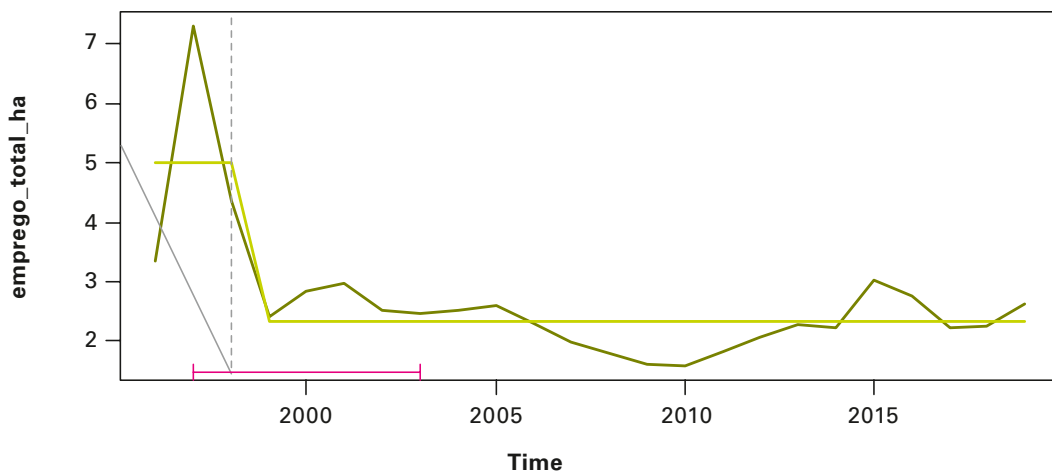
Running the BIC selection criterion for the series of formal workers in permanent crops in the Petrolina-Juazeiro Area, the statistics pointed to only one structural break, as can be seen in Figure 11, with the BIC statistics curve reaching the lowest value with 1 breakpoint.

Figure 11: Minimization of the RSS and the BIC selection criterion in the Petrolina-Juazeiro Area



So, knowing the quantity of structural breaks and applying the Bai and Perron test it was possible to achieve that the break date is in 1998 and thus produces two segments in the Petrolina-Juazeiro area series, as can be seen in Figure 12.

Figure 12: Formal employment per hectare in the Petrolina-Juazeiro Area with breakpoints



Analysis of the results

So after doing the tests, it was possible to identify the exact period(s) during which the change(s) occurred in the demand for workers per hectare.

Table 1 groups the periods derived from the structural breaks in the series of formal workers per hectare in the researched areas, showing the change in the intercept in each respective break.

Table 1: Periods determined by the Bai-Perron method and their respective intercepts in the Açú-Mossoró and Petrolina-Juazeiro Areas

POLO	PERIOD	INTERCEPT
Açú-Mossoró	1996–1998	0.05322647
	1999–2003	0.70115783
	2004–2015	1.11221306
	2016–2019	2.02705976
Petrolina-Juazeiro	1996–1998	5.009129
	1999–2019	2.330310

One intriguing aspect that arose while analysing the evolution of the time series for demand of workers per hectare in the researched areas is that despite being in similar agrifood value chains they showed different trends over the last decades. While the Petrolina-Juazeiro Area presented a decrease in the number of workers per hectare from 1999 onwards, the Açú-Mossoró Area had three structural changes, and all of these increasing the quantity for formal workers per hectare. This fact calls our attention to the intrinsic aspects of each area, such as the kind of crop, spatial distribution, and features of the farms. In this sense, the Açú-Mossoró area concentrates on the production in one temporary crop (melon), on the other hand, the Petrolina-Juazeiro area produces mango and grape as its main crops, and both are permanent crops. This distinction in terms of kind of crop could impact the demand for workers, once temporary crops involve some recurrent tasks that the permanent crop does not, such as plantation. Furthermore, it is important to note that a striking difference between these areas that can affect the labour market is the land concentration once this can determine the capital-labour relation, in a way that bigger players may intensify in the adoption of capital rather than labour. Table 2 is taken from the field research of Penha (2018) who conducted questionnaires with producers in the regions analysed in this paper in 2014.

Table 2: Farm Size in the producing areas of Açú-Mossoró and Petrolina-Juazeiro

MEASURES	PETROLINA-JUAZEIROPOLE	AÇÚ-MOSSORÓPOLE
Quantity of Farms	3.376	44
Average	26,37 (ha)	2,690.37 (ha)
Median	8 (ha)	470 (ha)
Minimum Size	1.5 (ha)	0.5 (ha)
Maximum Size	600 (ha)	22,000 (ha)
Standard Deviation	73,00	6.217,22
Coefficient of Variation	2,77	2,31
Ginicoefficient	0,70	0,79

Source: Adapted from Penha (2018).

As can be seen from the data summarized in the table there is a big difference in terms of land tenure structure between the two researched areas. The Petrolina-Juazeiro area has more farms, as well as the land tenure is less concentrate, resulting in a greater amount of small and medium farmers. In the case of the Açú-Mossoró area has proportionally more large farmers, comparing with Petrolina-Juazeiro area.

However, it is interesting to note that despite these differences that may have led to different movements in the demand for formal workers per hectare in the two researched areas, there is a common date of break in the series which is 1998. In both series, this date was a landmark of change in the pattern, even though it produced different routes, an increase in demand in the Açú-Mossoró Area and a decline in the case of the Petrolina-Juazeiro Area.

Nevertheless, pondering the results obtained until now in terms of the formal labour market in the two areas researched, it is important always to keep in mind that there is relevant quantity of people engaged in rural activities outside of formal work regulations. The forms of not formal workers have many angles which comprise family farmers, as also includes people who work in the farms of relatives, but also involves a series of work relations without kinship ties with the landowner under a less protective position. Nonetheless, the data about wider work relations can only be obtained from the agricultural census which is only carried out in each 10 years which create some difficulties to time series econometric analysis. But the census data can be used to face the estimations obtained in the formal workers time series regression and support some achievements. Table 3 compares the total people under some work relations and the ones under formal contracts.

Table 3: Workers in the Agriculture (1995, 2006 and 2017)

YEAR	REGION	FORMAL WORKERS	TOTAL QUANTITY OF WORKERS	PROPORTION OF FORMAL EMPLOYMENT
1995	Açú-Mossoró	9,276	27,163	34%
	Rio GrandedoNorte*	3,145	187,59	1.7%
	Petrolina-Juazeiro	10,946	90,928	12%
	Bahia and Pernambuco**	96,150	2,585,001	3.7%
2006	Açú-Mossoró	8,669	24,582	35%
	Rio GrandedoNorte*	9,129	191,353	4.8%
	Petrolina-Juazeiro	24,034	276,787	8.7%
	Bahia and Pernambuco**	116,82	4,850,594	2.4%
2017	Açú-Mossoró	7,147	18,218	39%
	RioGrandedoNorte*	7,603	156,463	4.9%
	Polo Petrolina-Juazeiro	28,836	136,142	21%
	Bahia and Pernambuco**	117,04	2,537,091	4.6%

*The data for Rio Grande do Norte excludes data from municipalities that integrates the Açú-Mossoró Area.

**The data from Bahia and Pernambuco excludes data from municipalities that integrates Petrolina-Juazeiro Area.

Analysing the data in the table is relevant highlighting three aspects. First, the areas have always had a larger quantity of formal rural workers than the average of their states. Second, there was a generalized increase in the percentage of formal workers when comparing 2017 with 1995 which entails a possibility of wide transition beyond of the global chains, such as the enforcement of the labour legislation in all Brazilian territory. Third, it is possible to perceive a reduction in the number of both formal and occupied workers over the years in the Açú-Mossoró Area. In turn, this process is not so evident in the Petrolina-Juazeiro Area, since there is an increase in the number of formal workers insofar as the occupied workers oscillated, presenting an increase in 2006 compared to 1995, but presented a reduction in 2017. Thus, the dynamics of the labour market of the regions has particularities of the type of product, as well as socioeconomic factors that have an impact on the labour market.

5 Conclusion

This paper intended to analyse the impact on social upgrading by the insertion of the areas of Petrolina-Juazeiro and Açú-Mossoró in the fruit agrifood value chains. These two regions became important players in international trade and consolidated themselves in the middle of important changes in the institutional environment, as pointed out by the literature presented in previous sections.

Adopting the theoretical background of the decent work deficit to measure the social upgrading in value chains, this paper analysed the hypothesis presented by Mehdi et al. (2021) that the improvement in working conditions in the two areas here investigated has been possible due to the enforcement of the labour legislation together with certifications demanding a better work environment, and the larger presence of the trade unions.

Applying the methodological approach of structural breaks analysis for time series it was found that indeed there is relevant evidence that during the period (1996-2019) some transformations happened in the two regions which changed the trend of the demand for the formal workers in the fruit production.

Also, using the Bai and Perron test, the exact point of the breaks in the series was computed. The Petrolina-Juazeiro area presented one structural change in the year of 1998. On other hand, the Açú-Mossoró area had three structural breaks. Also, it is important to highlight the opposite trends, once the demand for worker per hectare in Petrolina-Juazeiro area decreases. Otherwise, the Açú-Mossoró area showed an increase in the quantity of workers per hectare. This result implies two important points of analysis. First, besides different quantities of breaks in the two series analysed, the specific year of 1998 is a common point of a break for both regions, which could be related to some generalized fact that impacted the region regardless of the direction of the change. Second, despite these two regions being under a similar value chain, probably some intrinsic aspects of the crops and also the features of the farms have effects on the demand for formal workers.

This paper attempted to affirm that there is some evidence to show that the insertion in the global value chains impacted the trend of formal workers in the respective areas, since the percentage of formal workers in the areas is higher than in other places in the same region; also, in contrast with the census data it is evident that the percentage of formal workers generally have increased. Therefore, considering the information of a common break point that indicates a general process, which affected the two regions, and the increase of formal workers though in a less intensity than the fruit-producing areas analysed here, it is possible to support the hypothesis by Mehdi et al. (2021) that the confluence of factors had impacted the performance of the formal labour market in the Brazilian Northeast. However, further work needs to be undertaken considering comparisons with different countries that had different labour legislations and deeper studies are necessary to evaluate the precise aspects that influenced the structural breaks in the series. Finally, it is important to consider the limitation of this work as it analysed the formal labour market with the long time series due to inexistent database, which did not encompass formal workers. So other methodologies need to be developed to reach this side of the labour market in the regions.

References

- **Apolinário, V., Penha, T., Matos Filho, J., and Amaral, L. (2018).** Working Conditions, Gender, and Decent Work: Brazil's Açu/Mossoró Region. Em C. Scherrer, and S. Verma (Eds.), *Decent Work Deficits in Southern Agriculture: Measurements, Drivers and Strategies* (pp. 34-58). Augsburg: Rainer Hampp Verlag.
- **Asfaw, S., Mithöfer, D., and Waibel, H. (2010).** Agrifood Supply Chain, Private Sector Standards, and Farmers' Health: Evidence from Kenya. *Agricultural Economics*, 251-263.
- **Bai, J., and Perron, P. (1998).** Estimating and testing linear models with multiple structural changes. *Econometrica*, pp. 47-78.
- **Bai, J., and Perron, P. (2003).** Computation and analysis of multiple structural change models. *Journal of Applied Econometrics*, 18(1), 1-22, .
- **Bain, C. (2010).** Structuring the Flexible and Feminized Labour Market: GlobalG.A.P. Standards for Agricultural Labour in Chile. *Journal of Women in Culture and Society*.
- **Buanain, A. M., and Garcia, J. R. (2015).** Polos de Irrigação no Nordeste do Brasil. desenvolvimento recente e perspectivas. *Confins. Revue franco-brésilienne de géographie/Revista franco-brasileira de geografia*(23).
- **Da Silva, R. P., and Vian, C. E. (2021).** Fatores de modernização agropecuária nos municípios brasileiros em 2006. *Análise Econômica*, 80, 39.
- **Da Silveira Bueno, R. D. (2008).** *Econometria de Séries Temporais* (1 ed.). Cengage Learning.
- **Enders, W. (2008).** *Applied econometric time series*. John Wiley and Sons.
- **Ferraro, T., Dos Santos, N. R., Pais, L., and Mónico, L. (2016).** Historical landmarks of decent work. *European Journal of Applied Business and Management*, pp. 77-96.
- **Food and Agriculture Organization (FAO). (2010).** *Guidance on how to address decent rural employment in FAO countries activities*. Rome: FAO.
- **Hatanaka, Maki; Bain, Carmen; Busch, Lawrence (2005).** Third-party certification in the global agrifood system. *Food policy*, v. 30, n. 3, p. 354-369.
- **Hespanhol, A. N. (2015).** A fruticultura irrigada no Polo de Desenvolvimento Integrado Assu-Mossoró-Estado do Rio Grande do Norte-Brasil. Buenos Aires: IX Jornadas Interdisciplinarias de Estudios Agrarios y Agroindustriales Argentinos y Latinoamericanos.
- **Kleiber, C., and Zeileis, A. (2008).** *Applied econometrics with R*. Springer Science and Business Media.
- **Krein, J. D., and Stravinski, B. (2008).** Relações de trabalho, regulação e conflitos. Em A. M. BUAINAIN, and C. S. DEDECCA, *Emprego e trabalho na agricultura brasileira*. Brasília: IICA.
- **Lee, J., Gereffi, G., and Beauvais, J. (2012).** Global value chains and agrifood standards: Challenges and possibilities for smallholders in developing countries. *Proceedings of the National Academy of Sciences*, 109(31), 12326-12331.
- **Marcato, M., and Baltar, C. T. (2017).** *Economic and social upgrading in global value chains: concepts and metrics*. Campinas: Instituto de Economia Unicamp.
- **Mehdi, M., Ahmad, B., Penha, T., Belik, W., Apolinário, V., and Karatepe, I. (2021).** Economic and social upgrading in global agro-food VCs: Mango in Brazil and Pakistan. Em C. Scherrer, and I. Karatepe (Eds.), *The Phantom of Upgrading in Agricultural Supply Chains* (pp. 174-226). Rainer Hampp Verlag.

- **Nunes, E. M. (2009).** Reestruturação agrícola, instituições e desenvolvimento rural no nordeste: as dinâmicas regionais e a diversificação da agricultura familiar no polo Assu-Mossoró (RN). Porto Alegre: UFRGS.
- **Organização Internacional do Trabalho. (2017).** Decent work in the rural economy. Genebra: ILO.
- **Penha, T. (2018).** Estrutura e Dinâmica do Sistema Agroalimentar Mundial Uma Análise dos Mercados de Fruticultura dos Pólos Irrigados de Açú-Mossoró e Petrolina-Juazeiro. Novas Edições Acadêmicas.
- **Penha, T. A., Belik, W., João Matos, F., and Oliveira, G. M. (2018).** Measuring value capture along the Brazilian melon value chain. Em C. Scherrer, and S. Verma, Decent work deficits in southern agriculture: Measurements, drivers and strategies (pp. 106-132). Augsburg: Rainer Hampp.
- **Penha, T., and Belik, W. (2019).** The Impact of Quality Certifications on Working Conditions in the Context of Fresh Fruit Global Value Chain: The Case of Melon Production in Rio Grande do Norte, Brazil. Em C. Scherrer, and K. Radon, Occupational Safety and Health Challenges in Southern Agriculture (pp. 132-155). Augsburg: Rainer Hampp.
- **Sakamoto, C. S., and Maia, A. G. (2022).** Mercado de trabalho agrícola no Brasil: Evolução e características dos ocupados nas áreas rurais (1991-2010). RBEST Revista Brasileira de Economia Social e do Trabalho.
- **Santos, G. R., and Vieira Filho, J. E. (2012).** Heterogeneidade produtiva na agricultura brasileira: elementos estruturais e dinâmicos da trajetória produtiva recente. Brasília: Texto de Discussão (TD) 1740: IPEA.
- **Scherrer, C., and Verma, S. (2018).** Introdução. Em C. SCHERRER, and S. VERMA (Eds.), Decent work deficits in Southern agriculture (pp. 1-11). Augsburg: Rainer Hampp Verlag.
- **Selwyn, B. (2008).** Institutions, upgrading and development: evidence from north east Brazilian export horticulture. . Competition and change, pp. 377-396.
- **Selwyn, B. (2014).** Capital–Labour and State Dynamics in Export Horticulture in North-east Brazil. Development and Change, 1-18.
- **Shikida, C., Paiva, G. L., and Junior, A. F. (2016).** Análise de quebras estruturais na série do preço do boi gordo no Estado de São Paulo. Economia Aplicada, 20(2), 265.
- **Silva, G. J. (2016).** Os frutos da resistência: sindicalismo e luta dos assalariados da fruticultura irrigada no submédio São Francisco. Campina Grande: Dissertação de Mestrado defendida na UFCG.
- **Silva, P. C. (2001).** G. Articulação do interesse público e privado no Polo Petrolina-PE / Juazeiro-BA. Em busca de espaço no mercado globalizado de frutas frescas. . Campinas: Unicamp.
- **Sobel, T., and Ortega, A. C. (2010).** DESENVOLVIMENTO TERRITORIAL E PERÍMETROS IRRIGADOS: AVALIAÇÃO DAS POLÍTICAS GOVERNAMENTAIS IMPLANTADAS NOS PERÍMETROS IRRIGADOS BEBEDOURO E NILO COELHO EM PETROLINA (PE). Planejamento e Políticas Públicas.

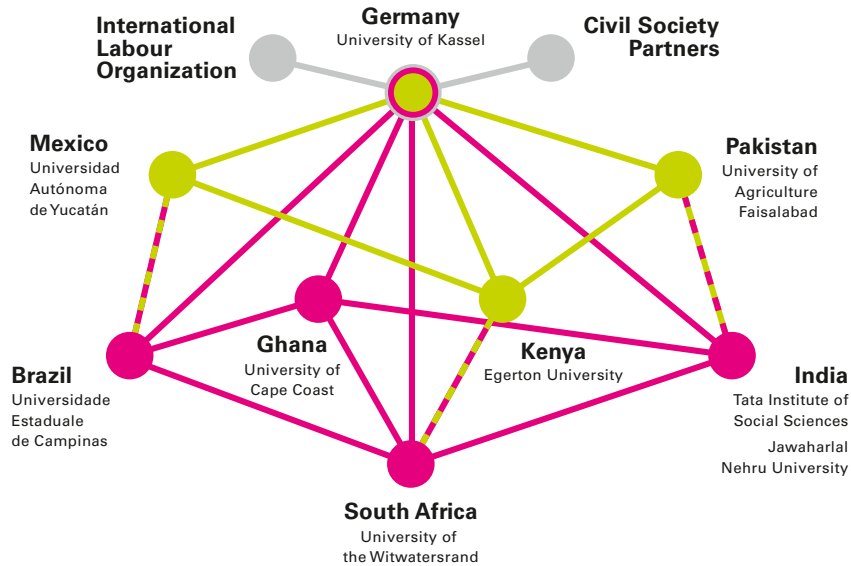
ICDD Working Paper Series

- **Vol. 1: Webster, Edward:** Work and Economic Security in the 21st century. What Can We Learn from Ela Bhatt?, 17 pages
- **Vol. 2: Hagmann, Jonas:** Opportunities and Constraints of Peri-urban Buffalo and Dairy Cattle Systems in Faisalabad, Punjab, Pakistan, 48 pages
- **Vol. 3: Marchetti, Sabrina:** Together? On the Not-so-easy Relationship between Italian Labour Organisations and Migrant Domestic Workers' Groups, 23 pages
- **Vol. 4: Sinaga, Hariati / Scherrer, Christoph:** Core Labor Rights: Competitive Pressures and Non-Compliance, 29 pages
- **Vol. 5: Burchardt, Hans-Jürgen / Weinmann, Nico:** Social Inequality and Social Policy outside the OECD: A New Research Perspective on Latin America, 39 pages
- **Vol. 6: Beck, Stefan:** Sozial verantwortliche Beschaffung von Informationstechnik. Socially Responsible Public Procurement of Information Technology, ISBN 978-3-944090-08-5, 40 pages
- **Vol. 7: Aufderheide, Mareike / Voigts, Clemens / Hülsebusch, Christian / Kaufmann, Brigitte:** Decent Work? How Self-employed Pastoralists and Employed Herders on Ranches Perceive their Working Conditions, ISBN 978-3-944090-05-4, 28 pages
- **Vol. 8: Bhattacharjee, Manojit / Rajeev, Meenakshi:** Credit Exclusion of the Poor: A Study of Cultivator Households in India, ISBN 978-3-944090-09-2, 22 pages
- **Vol. 9: Younas, Muhammad:** The Dairy Value Chain: A Promoter of Development and Employment in Pakistan, ISBN 978-3-944090-06-1, 22 pages
- **Vol. 10: Erbach, Juliane:** The Decency of Women's Working Conditions in Peri-urban Buffalo Production Systems in the District Faisalabad, Punjab, Pakistan, kassel university press, ISBN 978-3-86219-692-0, 45 pages
- **Vol. 11: Schützhofer, Timm B.:** Can Decent Work and Export Oriented Growth Strategies Go Together? Lessons from Nicaragua's Export Processing Zones, kassel university press, ISBN 978-3-86219-810-8, 52 pages
- **Vol. 12: Bhattacharya, Tulika / Rajeev, Meenakshi:** Identifying Employment Creating Sectors in India: An Analysis of Input-Output Linkages, kassel university press, ISBN 978-3-86219-852-8, 28 pages
- **Vol. 13: Withanachchi, Sisira Saddhamangala / Houdret, Annabelle / Nergui, Soninkhishig / Ejarque i Gonzalez, Elisabet / Tsogtbayar, Ankhbold / Ploeger, Angelika:** (Re) configuration of Water Resources Management in Mongolia: A Critical Geopolitical Analysis, kassel university press, ISBN 978-3-86219-860-3, 42 pages
- **Vol. 14: Gordana Kranjac-Berisavljevic:** Transformations of traditional landuse systems and their effects on development opportunities and people's livelihoods, kassel university press, ISBN 978-3-7376-0032-3, 24 pages

- **Vol. 15: Meenakshi Rajeev, Manojit Bhattacharjee, B P Vani:** Crop Insurance and Risk Mitigation: Experiences from India, kassel university press, ISBN 978-3-7376-0066-8, 34 pages
- **Vol. 16: William Baah-Boateng (PhD):** Economic growth and employment generation nexus: Insight from Ghana, kassel university press, ISBN 978-3-7376-0068-2, 24 pages
- **Vol. 17: Madhushree Sekher / Suchandrima Chakraborty:** Politics of public policies in India: Explaining the institutional internalization of inequality in policy legislation, kassel university press, ISBN 978-3-7376-0248-8, 38 pages
- **Vol. 18: Tripti Kumari:** Microfinance through Women Self-Help Groups (SHGs) for Grass-root level Empowerment: An Empirical study of Varanasi, Uttar Pradesh, India, kassel university press, ISBN 978-3-7376-0256-3, 25 pages
- **Vol. 19: Meenakshi Rajeev, B.P. Vani and Veerashekarappa:** Self-help groups for India's financial inclusion: Do effective costs of borrowing limit their operation?, kassel university press, ISBN 978-3-7376-0384-3, 26 pages
- **Vol. 20: Praveen Jha: India's Macroeconomic Policy Regime and Challenges of Employment: Some Reflections on the Manufacturing Sector,** kassel university press, ISBN 978-3-7376-0440-6, 56 pages
- **Vol. 21: Meenakshi Rajeev, Pranav Nagendran:** Decency of primary occupations in the Indian fishing industry, kassel university press, ISBN 978-3-7376-0452-9, 35 pages
- **Vol. 22: Tolga Tören:** Documentation Report: Syrian Refugees in the Turkish Labour Market, kassel university press, ISBN 978-3-7376-0450-5, 67 pages
- **Vol. 23: Tulika Bhattacharya:** Farmers in Peri-Urban Regions: Socio-Economic Changes and Access to Finance Study for Indian Economy, ISBN 978-3-7376-0576-2, 51 pages
- **Vol. 24: Akua Opokua Britwum, Angela Dziedzom Akorsu, Loretta Baidoo:** Women's empowerment for sustainable rural livelihoods: Voices from selected communities in Ghana., ISBN 978-3-7376-0630-1, 33 pages
- **Vol. 25: Christa Wichterich:** Care Extractivism and the Reconfiguration of Social Reproduction in Post-Fordist Economies, ISBN 978-3-7376-0632-5, 27 pages
- **Vol. 26: Anjum Munir & Oliver Hensel:** Solar Thermal Energy Storage System using phase change material for uninterrupted on-farm agricultural processing and value addition, ISBN: 978-3-7376-0634-9, 50 pages
- **Vol. 27: Ismail Doga Karatepe, Christoph Scherrer, and Henrique Tizzot:** Mercosur-EU Agreement: Impact on Agriculture, Environment, and Consumers, ISBN: 978-3-7376-0863-3, 34 pages
- **Vol. 28: Aleksandra Draganic and Nazmul Arefin:** Social Sustainability Challenges and the Role of Middle Managers: Case of the Ready-Made Garment Industry in Bangladesh, ISBN: 978-3-7376-0766-7, 40 pages

- **Vol. 29: Gaurang Rami:** Determinants and Forecasting of Female Labour Force Participation Rate in India: Testing of Feminization U hypothesis, ISBN: 978-3-7376-0865-7, 42 pages
- **Vol. 30: Patricia Chong, Michelle LeBlanc, and Anna Liu:** Legal Aid Ontario lawyers organizing against the odds: A case study of professional workers unionizing, ISBN: 978-3-7376-0866-4, 42 pages
- **Vol. 31: Vishwas Satgar:** Worsening Climate Crises and the Challenge of Red-Green Alliances for Labour: Introducing the Climate Justice Charter Alternative in South Africa, ISBN: 978-3-7376-0904-3, 14 pages
- **Vol. 32: Pravin Sinha:** The Informal Economy and Collective Cooperation in India: Lessons from Ela Bhatt, ISBN: 978-3-7376-0905-0, 34 pages
- **Vol. 33: Martina Metzger and Jennifer Pédussel Wu:** Moving Minds and Money: The Political Economy of Migrant Transfers, ISBN: 978-3-7376-0921-0, 28 pages
- **Vol. 34: Eleonor Faur:** Inequalities in childcare strategies among domestic workers and teachers in Argentina, ISBN: 978-3-7376-0928-9, 40 pages
- **Vol. 35: Hansjörg Herr:** The rationale of minimum wages, ISBN: 978-3-7376-0929-6, 30 pages
- **Vol. 36: Francisco Iván Hernández-Cuevas, Norma Elena Pérez-Herrera, Javier Becerril-García, Javier Humberto Perera-Rios & Allan Sosa:** Footwear industry, and plastic recycling: a case of circular economy and green jobs in Yucatán, México, ISBN: 978-3-7376-0930-2, 34 pages
- **Vol. 37: Iqrar Ahmad Khan:** Rural-Urban Transition: A Challenge to Agricultural Productivity, Biodiversity and Food Security in Pakistan, DOI: <https://doi.org/10.17170/kobra-202110224933>, 32 pages
- **Vol. 38: Santosh Verma:** Impacts of Lockdown on Livelihood Conditions of Informal Workers in Bihar, India: A Case Study, <https://doi.org/10.17170/kobra-202111155080>, 34 pages
- **Vol. 39: Ajla Rizvan:** Right-Wing Politics in the Current Conjuncture. The “Kurz project” as an example of a mode of neoliberal crisis management, <https://doi.org/10.17170/kobra-202208156637>, 34 pages
- **Vol. 40: Muhammad Tariq:** Practices of Clean Milk Production, Management and Decent Work in Faisalabad, Punjab, Pakistan, <https://doi.org/10.17170/kobra-202209276898>, 36 pages
- **Vol. 41: Jahnvi Rao:** Explaining the Financial Exclusion of the Urban Poor through the Lens of Othering: A Case Study in Bengaluru, India, <https://doi.org/doi:10.17170/kobra-202211227143>, 30 pages

The Global ICDD Network



**International Center for
Development and Decent Work**
University of Kassel, Germany
Phone: + 49 (0) 561 804-7399
E-Mail: florian.doerr@icdd.uni-kassel.de

With financial support from the



Federal Ministry
for Economic Cooperation
and Development



Deutscher Akademischer Austauschdienst
German Academic Exchange Service

U N I K A S S E L
V E R S I T Ä T

ex|ceed
EXCELLENCE CENTERS
FOR EXCHANGE AND DEVELOPMENT

▶ ▶ ▶ www.icdd.uni-kassel.de