



**THE REPUBLIC OF TÜRKİYE
SOCIAL SCIENCES UNIVERSITY OF ANKARA
THE GRADUATE SCHOOL OF SOCIAL SCIENCES**

**SOCIAL NETWORK ANALYSIS OF CLASS STRUCTURES: A STUDY CASE OF
BRAZIL, CHINA, GERMANY, RUSIA AND UNITED STATES**

Master's Thesis

DAVID ROJAS

Master of Science in Applied Social Research

June 2024



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I hope this work is of interest to those who are interested in the study of social classes and occupational and labor structures, and that it marks the beginning of my life as a researcher and academic.

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ABSTRACT

This thesis investigates the complex dynamics of social stratification in the context of contemporary globalized societies, with a particular focus on the interplay of class positions and occupational categories across five major countries: Brazil, China, Germany, Russia, and the United States. The study aims to offer a nuanced understanding of social hierarchies by integrating network analysis into the examination of socioeconomic structures, providing an innovative methodological approach to traditional class-based analysis.

Central to this research is the development of an analytical class scheme based on occupational categories, utilizing datasets from the World Values Survey. The study's objective is to provide a comprehensive alternative to identity-focused methodologies, which may oversimplify social dynamics by concentrating on categories such as race, gender, or nationality. By employing network analysis, this research seeks to map the intricate relationships and interactions within and between different social classes, offering deeper insights into the structural dynamics and connectivity that underpin contemporary socioeconomic systems.

Key research questions guiding this study include: the differences and similarities in social stratification structures among the countries analysed, the hierarchical relationships between occupational categories, the patterns characterizing these hierarchical arrangements, and the innovations brought by a social network approach compared to traditional methodologies.

The thesis is structured as follows: The first chapter introduces the theoretical and methodological framework, research problem, questions, and contributions to existing scholarship. The second chapter critiques the shift away from class-based analysis in sociological research, advocating for a return to structuralist and empirically grounded approaches. The third chapter reviews major theoretical perspectives on social stratification from classical to contemporary theories. The fourth chapter details the methodological approach, including network analysis, data sources, and operationalization of variables. The fifth chapter presents the comparative analysis of occupational category networks across the studied countries, uncovering structural characteristics and trends. The final chapter integrates findings with conceptual and theoretical discussions, addresses study limitations, and suggests potential future research directions.

The research finds that high-status roles are predominantly linked to professional and technical occupations, with a strong connection to higher administrative positions. Intermediate roles include clerical, service, and sales occupations, which exhibit significant affinities both among themselves and with other categories. Lower-tier roles, such as farm workers and unskilled or semi-skilled workers, cluster together with high levels of affinity within these lower categories.

The research concludes that most individuals across countries identify with working or middle classes, with fewer reaching higher classes, reflecting a consistent socioeconomic pattern of moderate education and income. Key differences include variations in gender distribution by country—e.g., high female representation in clerical roles in Russia, Brazil, and Germany, versus more women in farm and semi-skilled roles in China—and the strength of the correlation between class and education, which is strong in Brazil, weaker in China, and varied in Germany, Russia, and the U.S. Additionally, occupational linkages differ by country, with Brazil and China showing strong ties between professional and clerical roles, while the U.S. exhibits stronger connections between clerical and sales roles.

This research contributes to the field of social stratification by incorporating network analysis to reveal the multifaceted nature of social hierarchization. It emphasizes the importance of occupational categories in understanding socioeconomic hierarchies and offers a comparative perspective that enhances the discourse on social class in the modern world.

Keywords: Social Stratification, Network Analysis, Occupational Structure, Global Capitalism, Class-Based Analysis

ÖZET

Bu tez, günümüz küreselleşmiş toplumlarında sosyal tabakalaşmanın karmaşık dinamiklerini, özellikle Brezilya, Çin, Almanya, Rusya ve Amerika Birleşik Devletleri gibi beş büyük ülkedeki sınıf pozisyonları ve mesleki kategoriler arasındaki etkileşimi incelemektedir. Çalışma, ağ analizini sosyoekonomik yapıların incelenmesine entegre ederek sosyal hiyerarşileri daha ayrıntılı bir şekilde anlamayı amaçlamakta ve geleneksel sınıf temelli analizlere yenilikçi bir metodolojik yaklaşım sunmaktadır.

Bu araştırmanın merkezinde, Dünya Değerler Araştırması'ndan alınan veri setlerini kullanarak, mesleki kategorilere dayalı analitik bir sınıf şeması geliştirme yer almaktadır. Çalışmanın amacı, ırk, cinsiyet veya milliyet gibi kategorilere odaklanarak sosyal dinamikleri basitleştirme eğiliminde olan kimlik odaklı metodolojilere kapsamlı bir alternatif sunmaktır. Ağ analizi kullanarak, bu araştırma, farklı sosyal sınıflar arasındaki ve içindeki karmaşık ilişkileri ve etkileşimleri haritalamayı, günümüz sosyoekonomik sistemlerini destekleyen yapısal dinamikler ve bağlantılar hakkında daha derinlemesine içgörüler sunmayı amaçlamaktadır.

Bu çalışmayı yönlendiren temel araştırma soruları şunlardır: Analiz edilen ülkeler arasında sosyal tabakalaşma yapılarındaki farklar ve benzerlikler, mesleki kategoriler arasındaki hiyerarşik ilişkiler, bu hiyerarşik düzenlemeleri karakterize eden kalıplar ve geleneksel metodolojilerle karşılaştırıldığında sosyal ağ yaklaşımının getirdiği yenilikler.

Tez şu şekilde yapılandırılmıştır: Birinci bölüm, teorik ve metodolojik çerçeveyi, araştırma problemini, soruları ve mevcut literatüre katkılarını tanıtmaktadır. İkinci bölüm, sosyolojik araştırmalarda sınıf temelli analizden uzaklaşmayı eleştirerek, yapısalcı ve ampirik temelli yaklaşımlara dönüşü savunmaktadır. Üçüncü bölüm, klasik teorilerden çağdaş teorilere kadar sosyal tabakalaşma üzerine büyük teorik perspektifleri gözden geçirmektedir. Dördüncü bölüm, ağ analizi, veri kaynakları ve değişkenlerin operasyonelleştirilmesi de dahil olmak üzere metodolojik yaklaşımı detaylandırmaktadır. Beşinci bölüm, incelenen ülkelerdeki mesleki kategori ağlarının karşılaştırmalı analizini sunarak yapısal özellikler ve eğilimleri ortaya çıkarmaktadır. Son bölüm ise bulguları kavramsal ve teorik tartışmalarla bütünleştirmekte, çalışmanın sınırlamalarını ele almakta ve gelecekteki araştırma yönlerine dair öneriler sunmaktadır.

Araştırma, yüksek statüdeki rollerin ağırlıklı olarak profesyonel ve teknik mesleklerle ilişkili olduğunu ve bu rollerin yüksek yönetim pozisyonlarıyla güçlü bir bağlantıya sahip olduğunu ortaya koymaktadır. Orta düzey roller, kendi aralarında ve diğer kategorilerle önemli yakınlıklar gösteren memur, hizmet ve satış mesleklerini içermektedir. Çiftçi ve niteliksiz veya yarı nitelikli işçiler gibi alt düzey roller ise bu alt kategoriler içinde yüksek yakınlık seviyeleriyle birlikte gruplanmaktadır.

Araştırma, ülkeler arasında çoğu bireyin işçi veya orta sınıfla özdeşleştiğini, daha azının üst sınıflara ulaştığını ve bunun da orta düzeyde eğitim ve gelire sahip olma eğilimini yansıtan tutarlı bir sosyoekonomik kalıp olduğunu sonuçlandırmaktadır. Temel farklılıklar, ülkelere göre cinsiyet dağılımındaki varyasyonları içermektedir; örneğin, Rusya, Brezilya ve Almanya'da kadınların memur rollerinde yüksek temsil oranı bulunurken, Çin'de kadınlar daha çok çiftçi ve yarı nitelikli işlerde yer almaktadır. Ayrıca, Brezilya'da sınıf ve eğitim arasındaki güçlü korelasyon, Çin'de daha zayıfken, Almanya, Rusya ve ABD'de değişiklik göstermektedir. Mesleki bağlantılar da ülkelere göre farklılık göstermekte olup, Brezilya ve Çin'de profesyonel ve memur roller arasında güçlü bağlar varken, ABD'de memur ve satış roller arasında daha güçlü bağlantılar bulunmaktadır.

Bu araştırma, sosyal tabakalaşma alanına ağ analizi ekleyerek sosyal hiyerarşinin çok yönlü doğasını ortaya koymakta, sosyoekonomik hiyerarşilerin anlaşılmasında mesleki kategorilerin önemini vurgulamakta ve modern dünyada sosyal sınıf üzerine yapılan tartışmaları geliştiren karşılaştırmalı bir perspektif sunmaktadır.

Anahtar Kelimeler: Toplumsal Tabakalaşma, Ağ Analizi, Mesleki Yapı, Küresel Kapitalizm, Sınıf Temelli Analiz

1. INTRODUCTION

This chapter is divided into three sections. The first section provides an overview of the research problem, highlighting the objective and necessity of this study. The second section discusses the research questions and hypotheses, emphasizing the contributions this research makes to the existing literature. The final section offers a concise outline of the thesis structure.

1.1 Research problem and objective of the research

The study of social stratification lies at the very heart of sociology and is intrinsically linked to its central questions and concerns. By examining social stratification, it is possible to explore fundamental issues such as inequality, social mobility; it allows to analyse how different social classes are formed and maintained, and how these classes affect people's behavior, relationships, and opportunities. and overall to have a clear understanding of how our societies are structured.

Understanding social stratification also sheds light on the broader social structures and processes that underpin society. It prompts questions about the fairness and justice of societies, of the distribution of resources and the constraints that individuals face as a part of society. In this way, the study of social stratification is not just a theoretical exercise but a critical tool for addressing real-world issues and promoting social justice. It is through this lens that sociologists can contribute to a deeper understanding of social dynamics and work towards creating more equitable and inclusive societies.

However, due to the substantial change that sociology as a scientific discipline has experienced in the past thirty years, research regarding social stratification and social classes has moved into a direction in which, not only the development of general theoretical schemes are the main concern, but it is also the development of interpretative methodologies and theoretical conceptualizations deeply linked with the recognition of the existence a multiplicity of identities that do not emerge from objective social positions but from intersubjectivity, self-awareness, marginalization, oppression and sociocultural dynamics understood to operate independently from the material objective social substructure.

Therefore, the increasing complexity of societies in our times in terms of interconnectivity of its economical mechanisms, demands from us innovative ways to deal with the study of social structures. In today's world, societies have evolved into intricate and multifaceted systems where traditional boundaries of social stratification are continuously shifting. The rapid globalization, technological advancements, and the profound interdependence of economic and social systems have resulted in a complexity that challenges conventional methods of analysis. As economic mechanisms and social structures become increasingly intertwined, the traditional approaches to studying social stratification often fall short in capturing the nuanced and dynamic interactions that define modern societies. This complexity necessitates innovative methodologies that can account for the interconnectedness of various social dimensions, providing deeper insights into how occupational categories and social networks shape and are shaped by the broader socioeconomic landscape.

The rise of digital technologies and the globalized economy has fundamentally transformed how individuals and groups interact within societies. Economic activities are no longer confined within national borders but are part of a vast, interconnected global network. This interconnectedness has given rise to new forms of social structures that are more fluid and less predictable than in the past. The traditional markers of social stratification, such as occupation, income, and education, are increasingly influenced by transnational flows of capital, information, and labor, creating a more complex social fabric that demands new approaches to study and understand.

Moreover, the rapid pace of change in contemporary societies, driven by technological innovations and shifting economic paradigms, has led to the emergence of new social classes and occupational categories that did not exist in previous generations. For instance, the rise of the gig economy, remote work, and digital entrepreneurship has redefined the nature of work and employment, challenging the conventional distinctions between different social strata. These changes underscore the need for research methodologies that can adapt to the evolving nature of social stratification, capturing the fluidity and interconnectedness of modern social structures.

Having said this, the goal of this research is to develop a Social Network approach to the study of social stratification based on occupational categories, using datasets from the World Values Survey for Brazil, China, Germany, Russia, and the United States. These countries are major global and regional powers, significantly influencing the structuring of contemporary socioeconomic dynamics worldwide. The key objective of this research is to capture and analyse the interconnectedness and relationships within these occupational categories as revealed by datasets in a way that can be both alternative and complementary to more traditional approaches to the study of social stratification.

Additionally, this research aims to explore alternative methodological approaches to those commonly used in sociological research. In this context, network analysis serves as the methodological core of this work, representing a novel approach to understanding and mapping the intricate relationships and interactions within and between different social classes. By employing network analysis, this study seeks to provide deeper insights into the structural dynamics and connectivity that underpin contemporary socioeconomic systems.

1.2 Research questions

Social stratification research occupies a prominent position within the field of sociology, serving as a cornerstone of its epistemological foundation. This area of inquiry traces its roots back to the seminal works of classical sociologists and continues to be relevant across the globe. Yet, despite its rich historical lineage and contemporary relevance, the exploration of social class complexities often unfolds through two primary avenues of inquiry.

Firstly, researchers commonly engage in the construction of theoretical frameworks aimed at comprehensively understanding the dynamics of social class. These frameworks typically involve the integration of diverse sets of variables, meticulously crafted to capture the multifaceted dimensions of social stratification. Through this lens, researchers endeavour to uncover the underlying structures and mechanisms that shape individuals' positions within the social hierarchy by developing their own class schemes proposals.

Secondly, social class issues are frequently approached as classification problems, wherein scholars seek to delineate and categorize individuals into distinct socioeconomic strata. This classification process relies on the identification and analysis of various characteristics, such as occupation, income, education, and wealth among others. By employing these characteristics as proxies for social class, researchers aim to develop nuanced classifications that reflect the intricate nuances of societal stratification, relying primarily on

inferential statistics and increasingly in supervised and non-supervised classification models (Białowolski, 2015; Hening & Liao, 2010).

This research seeks to contribute to the existing scholarship by incorporating network analysis as a pivotal methodological component. By introducing network analysis into the research on social stratification, this study aims to provide a novel perspective that can be further investigated by scholars interested in understanding stratification dynamics from an alternative perspective. Additionally, this research proposes the utilization of occupational categories as indicators of socioeconomic hierarchies and structures.

In addition to the contributions outlined above, this research also aims to address the evolving nature of social stratification in contemporary societies, this is the reason why this research it is, in essence, a comparative study among different countries than although different between them, collectively share a prominent position within their respective contexts and on a global scale. Furthermore, as globalization, technological advancements, and shifting economic landscapes continue to reshape social dynamics, there is a growing recognition of the need to adapt traditional conceptualizations of social class to account for these changes. By integrating insights from network analysis with the utilization of occupational categories, this research seeks to offer a comprehensive understanding of the multifaceted nature of contemporary social stratification. Moreover, by engaging with interdisciplinary perspectives and drawing from diverse theoretical frameworks, this study aspires to contribute to a more nuanced and inclusive discourse on social class that reflects the complexities of the modern world.

In this sense, the research questions guiding this research are the following:

- What are the differences and similarities in terms of the stratification of the occupational categories in the countries investigated?
- What patterns characterize the hierarchical arrangements of occupational categories within the countries investigated?
- What aggregated value does a social network approach brings to social stratification research compared to more traditional methodological approaches?

1.3 Thesis Report Structure

The first chapter of this study encompasses a brief introduction, outlining theoretical and methodological approaches, and detailing the research problem, research questions, and contributions to the current scholarship.

The second chapter explores the significant shift in the focus of sociological research, moving away from class-based analysis and towards a broader examination of social differentiation, particularly in its structuralist form. This section critically examines the impact of postmodernism on sociological research, particularly its influence on research methodologies and theoretical frameworks and also discusses contributions and limitations of proposals coming from the methodological individualism tradition. It advocates for a return to structuralist and empirically based sociological analysis, emphasizing its importance in addressing social stratification issues and on sociological research as a whole.

The third chapter introduces the main theoretical perspectives on social stratification, spanning from classical sociological theories to contemporary contributions from analytical sociology. By discussing these diverse perspectives, the chapter provides a comprehensive understanding of the major conceptual frameworks employed in the study of social classes.

The fifth chapter explain in dept the methodological approach adopted for the research is discussed. This encompasses a detailed exploration of the network analysis approach, the characteristics of the World Value Survey which is the main source of information for this study, and the operationalization of variables. Additionally, the chapter offers insights into the data collection process, including the research population and sample, participant selection criteria, data collection tools employed, and the profile of participants involved in the research.

The sixth chapter presents the findings and results of the study, with a particular emphasis on comparing the networks of occupational categories and their mathematical properties. Through this comparative analysis, the chapter aims to uncover the differences and similarities among the countries under study. By scrutinizing the structural characteristics and dynamics of these networks, the chapter seeks to provide a deeper understanding of the socio-economic landscapes within each country and identify any overarching patterns or trends that may emerge.

The final chapter the research objective, findings, and discussions by integrating conceptual and theoretical perspectives. It also addresses the limitations encountered during the study and potential new research lines that can be followed by researchers interested in the social stratification problems.

This research contributes to the field of social stratification by incorporating network analysis to reveal the multifaceted nature of social hierarchization. It emphasizes the importance of occupational categories in understanding socioeconomic hierarchies and offers a comparative perspective that enhances the discourse on social class in the modern world.



2. LITERATURE REVIEW: THEORETICAL APPROACHES TO SOCIAL STRATIFICATION AND METHODOLOGICAL TENDENCIES

This section critically examines the centrality of social class as a category within sociology, aiming to underscore its analytical relevance. It explores various theoretical perspectives on social class and their contributions. Subsequently, it discusses the impact of intersectionality and identity frameworks on social stratification research. Finally, advocating for innovation in this field, it proposes the implementation of social network analysis as a novel approach to studying social stratification.

2.1 From classical theories to analytical approaches: class-based theories in contemporary sociology

Social stratification and the functioning of class structures are central elements in sociological analysis is a core element of sociology as a scientific field. Their nature is closely tied to the theoretical and epistemological foundations of sociology, and they are directly or indirectly examined in most sociological research (Grusky D, 2019) and (Ollin Wright, 2017). This key idea regarding the process of social differentiation can be traced to the seminal works of Emile Durkheim and his concepts of organic and mechanical solidarity that are pivotal elements of structural functionalism and of more contemporary analytical proposals such as Weeden & Grusky (2005) and Tilly (1998).

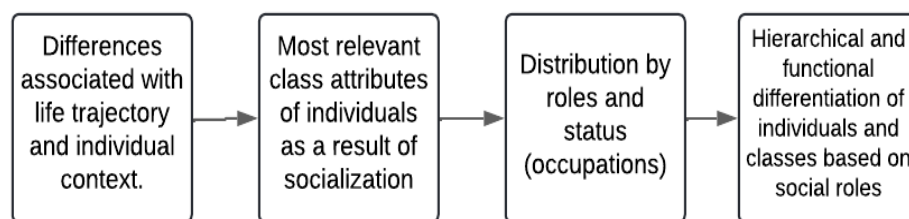
Given sociology's multiparadigmatic nature, the approach to these issues, as well as the focus on specific aspects of class dynamics and their structural composition, varies depending on the theoretical perspective adopted, therefore, it is important to discuss the different major theoretical approaches that led sociological research in this matter. In general terms, stratification theories align with the three major theoretical standpoints of sociology: Structural functionalism, Marxism and Weberian approaches which will be discussed across this section.

From the perspective of functionalism, the stratification system is shaped according to the hierarchies existing among specific individual attributes (income, prestige, kinship, etc) in synchrony with the dominant cultural goals of the social system. In this case, social stratification is a process in which the population of a given society is divided into strata or segments composed by individuals who have both similar sociodemographic and economic attributes and a synergic relationship between them in terms of the roles that they have in society, according to the particular social division of labor of a society in a concrete moment of

history ¹, leading to a general differentiation of social and class positions that at the same time operate internally according to interstratification dynamics that are mutually synergic and through constant feedback structure the positions and roles than an individual occupies in society (Merton, 2002; Lizón, 2007).

Aligned with the previous description, stratification is essentially viewed as a process of hierarchical functional differentiation that tends to balance and efficiency due to the cohesive effect of the division of social labour. Individuals occupy specific positions based on their ascribed roles, which develop in them particular psychosocial characteristics linked to their place in the stratification system (Wright, 2015), influencing their behavior and their relation to others. The fundamental theoretical framework of the functionalist approach to social stratification can be summarized by the following scheme:

Graphic 2.1.1: General Functionalist Mechanism of Social Stratification



Source: elaborated by author based on (Grusky, 2019) and (Rojas Ospina, 2020)

There are as well contemporary proposals stemming from the critical review of functionalism and inscribed into the theoretical developments of analytical sociology aiming at similar purposes as those of classical structural functionalism, inscribed in the approach of , greatly influenced by the postulates of middle-range theories developed by (Merton, 2002), as a strategy to deal with the potential risk of diminishing the weight of individual action as a major explanatory element.

In this sense, several proposals have focussed its attention into occupational categories as a strategy to inquiry empirically for the effect of social differentiation in social and individual outcomes. The logic behind this apparently subtle yet significant change in scope relies on the fact that it is at the level of occupations in which solidarity, differentiation and interdependence emerge among the members of a given society, therefore, contrary to the formulation of macro

¹ This key idea regarding the process of social differentiation can be traced to the seminal works of Emile Durkheim and its concepts of organic and mechanical solidarity that are pivotal elements of structural functionalism and of more contemporary analytical proposals such (Weeden & Grusky, 2005) and (Tilly, 1998).

groups or classes, the most efficient explanatory mechanism both for differences in individual behavior and those associated with social conditions resulting from the position in the stratification system, are associated with what has been described as microclass, which is empirically equivalent to a particular occupational position (Jonsson et al., 2009). This approach has been considered neo-Durkheimian (Wright, 2015; Weeden and Grusky, 2005), because the performance of labor activity in a society generates levels of solidarity and functional interdependence necessary for the sustenance of the social system, in line with the contributions made by Durkheim from his reflection on the division of social labor.

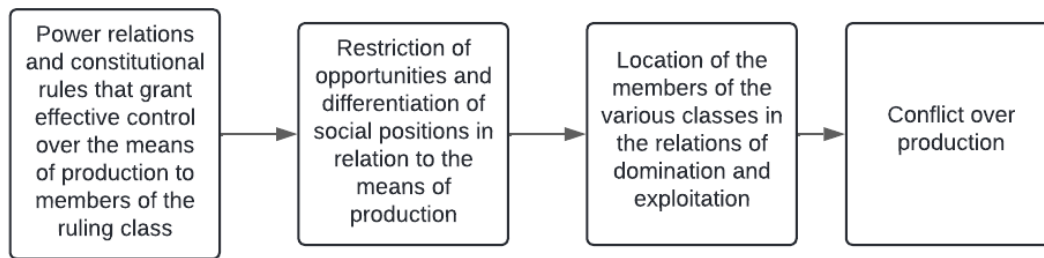
Occupational categories define an individual's role in relation to a certain production system, which generates both a specific type of behavior and differentiated social conditions based on the performance of labor activity; therefore, each occupational category constitutes a particular microclass (Jonsson et al., 2009). While this perspective substantially increases the number of classes existing in a society, with as many of them as there are occupations in a specific economy, which prevents a general structural characterization of the stratification system, empirical evidence collected has allowed the identification of verified differences in individual behavior based on microclasses instead of macroclasses, in aspects such as cultural consumption, distribution in urban areas, and material conditions of existence (Wright, 2015; Weeden and Grusky, 2005).

By contrast, from the Marxist point of view, the given state of any social structure is determined by the results in a particular frame of time of the struggles between the dominant classes and the dominated classed and its disbalanced distribution of the attributes and assets that emerge from the production process and that lead to the formation of differentiated and antagonistic class positions with opposed interests. In this sense, belonging of an individual to a particular social class is defined based on a shared position with other individuals in relation to the means of production, which is the major factor in the shaping of a class structure and its respective relationships, which is anchored in the level of control over the means of production exercised by one class over another one (Elster, 2005; Wright, 2000).

Furthermore, the relationships among the different social classes are sustained through dynamics of accumulation and exploitation, therefore the nature of these relationships are conflictive and do not tend to a state of general equilibrium and synergy (Elster, 2009). This antagonism of class positions is reflected in the functioning of the production process, in the sense that production within the context of a market economy relies on the accumulation of surplus by the dominant classes which is only possible due to the fact that workers must sell

their workforce in the market in order to participate in the production process and satisfy their own needs. This mechanism of extraction of value is what ultimately led to polarizing positions in the class structure. In general terms, the Marxist perspective on social stratification can be summarized by the following mechanism:

Graphic 2.1.2 : General Marxist Mechanism of Social Stratification



Source: elaborated by author based on (Grusky, 2019) and (Rojas Ospina, 2020)

Contemporary developments on this matter have drawn attention towards Marxist based stratification theories that propose alternative approaches such as a bigger commitment with middle range theoretical developments and analytical sociology (Rojas Ospina, 2020). From this perspective, the categories of exploitation and domination, central to Marxist analysis, serve as mechanisms to explain the maintenance, reproduction, and intensification of antagonistic class relationships within the polarizing structure of the stratification system. As explanatory mechanisms, they structure various forms of inequality arising from the interactions, both voluntary or due to structural contingencies, between the antagonistic classes and its members. (Wright, 2015).

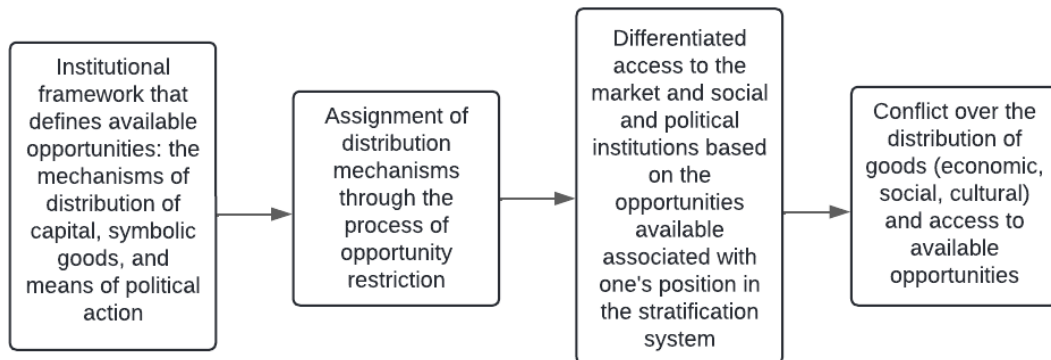
This allows for an effective explanation of phenomena that similarly affect the members of the same classes, based on the dynamics of consumption and production in capitalist economies, relying on the mechanisms of exploitation and domination inherent in the process of capital accumulation from the private ownership of the means of production (Wright, 2015; Sørensen, 2000). Additionally, in order to ensure the inclusion of individual action in Marxist analysis, since analytical currents place special emphasis on its importance for understanding both the class structure and the capitalist mode of production, analytical Marxism has made extensive use of game theory as a means to understand the differences in individual behavior within the context of competition and class struggle, resulting both from positions in the stratification system and their relationship with the market (Sørensen, 2000; Elster, 2005; Wright, 2000; Boudon, 1974).

Finally, from the Weberian point of view, the nominal divisions among social positions constrain and allow human action oriented to specific goals that on the long run tend to generate differences in terms of each of the individuals' comparative advantages, differentiating them into classes and group of interests (political parties, associations, etc). In general terms, the intention of this approach is to provide causal explanations for individual action through the analysis of the social conditions that effectively shape action, as are the three main categories of social stratification previously outlined. In accordance with Weberian theory, the dynamics of modern societies are made possible by the rationalization process of the social spheres that compose them; therefore, the categories of social stratification represent clearly differentiated dimensions of social life in relation to social spheres and, therefore, constitute the basis upon which rational action is founded (Rojas Ospina, 2020).

The emphasis of this theoretical proposal lies in the institutional conditions that allow for individual action and explain its differences, a phenomenon referred to by the concept of opportunity constraint (Goldthorpe, 2004), as well as the role that class, party, and status groups play in the articulation of behavior. In this sense, differentiated access to such opportunities is due to the hierarchically institutionalized restriction of the positions to be occupied, as certain socially legitimized credentials are required to occupy these positions, such as economic capital, professional qualification, or the exercise of an institutionally differentiated labor position (Wright, 2015).

Therefore, individuals' access to such opportunities is possible due to the restrictions that other individuals face in accessing them, as they lack the socially accepted credentials as indispensable for occupying certain positions in the social structure. The institutionalized legitimation of the various positions that individuals occupy in the class structure has as much influence on their existence, reproduction, and differentiation as do economic dynamics (Goldthorpe, 2004). At the same time, and in accordance with Weberian postulates, the term opportunities also refer to the institutionalized means and legitimized by a certain social order as effective mechanisms and socially validated as appropriate for the achievement of individual objectives (Rojas Ospina, 2020). The following scheme provides a general summary of this theoretical approach:

Graphic 2.1.3: General Weberian Mechanism of Social Stratification



Source: elaborated by author based on (Grusky, 2019) and (Rojas Ospina, 2020)

Contemporary developments of this approach have emphasised the roles of the restriction of opportunities individuals face as members of a particular class. In this sense, the opportunity constraint approach tends to consider the existing institutional framework as the most important mechanism when explaining differences associated with the distribution of capital and the allocation of positions in the market related to labor activity, the distribution of prestige and reputation, and organized political actions, components that, as already mentioned, characterize class, status groups, and parties, respectively, as bases of rational action (Wright, 2015; North, 1996).

The institutionalization of private property in a market economy constitutes the most decisive opportunity constraint mechanism for explaining class differences, as the possession of the means of production by members of a class implies the exclusion of workers from participating in the ownership of the same. A similar phenomenon is experienced in the distribution of socially valued symbolic goods, both subjective and objective, in relation to status groups and membership in political organizations (Wright, 2015).

The theoretical classification of the different class and social stratification schemes presented throughout this text helps to clarify conceptual differences between each theoretical approach, which strengthens our understanding that empirical research related to the problems of class structure and the hierarchical social position of individuals is characterized by its theoretical and methodological plurality. Based on the theoretical proposals previously described, empirical research has been developed in different contexts with the intention of demonstrating the effect of position in the social stratification system and on individual

behavior, which generally makes extensive use of inferential statistical methods with the goal of identifying the underlying structure to the dynamics of class.

Furthermore, the dissemination of these theoretical schemes enriches the empirical knowledge of contemporary societies according to appropriate criteria of scientific and methodological rigor, as they are epistemologically constructed with a view to the empirical verification of their postulates, which constitutes a minority scientific stance in Latin American sociology but whose dissemination could allow significant advances in the understanding of our own societies from a sociological viewpoint. As a final point, it's important to highlight that the class structure is far from being a morphological description of the composition of a given society at a specific moment; rather, it expresses a dynamic and changing system of relations among individuals through the functions they have and the positions they occupy. Overall, the matter regarding the development towards theoretical proposals to study social stratification remain as an open field which is in constant development by sociologist worldwide.

2.2 Challenging Social Class Analysis: Exploring Intersectionality and interpretative approaches

The problem of social stratification, and in general, classical sociological problems associated with structuralist standpoints have been somehow displaced from the main focus of attention due to the emerging prevalence of research orientated towards identity and intersubjectivity topics. This major epistemological change in sociology has been described by (Susen, 2015) as the *postmodern turn* and is deeply linked with the development of contemporary critical studies, decoloniality, intersectionality, among others. In this context, the category of identity is conceived as a *sui generis* social reality that is therefore irreducible.

It is fundamentally self-referential, rejecting any historically constituted structure as a source of explanation for general social phenomena and opposing the possibility of finding empirical regularities and causal relationships in the social world. Under its guise, the study of the social world is fundamentally limited to the description of social experience as an extrapolation of individual subjectivities that, projected through narratives and representations with equal validity and legitimacy, end up crystallizing into collective identities amalgamated with one another². In this sense, microsociological intersubjectivity becomes the main object

² The critique made by (Dirlik, 2003) of postmodern and decolonial epistemologies is extremely relevant to the discussion of this issue, particularly his observations regarding the tension within these paradigms of thought between explanation and legitimation, where the use of universalist categories is in some way equivalent to accepting the domination relations characteristic of Eurocentric modernity and colonial order. In addition, the

of study, in contrast to structural visions that attempt to understand the objective relationships of the social world.

Therefore, this position generally tends towards rejecting meta-narratives and macro theories as adequate sources for explaining the social world as these grand theories are viewed as inadequate tools for unveiling the multiplicity of social realities, standing in contrast to the modernist approach that often seeks universal explanations (Akers, 2022). The possibility of objectivity is critically examined, as the position and perspective of the researcher are seen as significantly influencing their understanding of social dynamics, which cannot and should not be addressed from a neutral or passive position. In this view, the emphasis shifts from the development of general theories of society to a meta-critique of both social theory and the research process itself (Spector-Mersel, 2010). This involves questioning the foundational assumptions of social theories and scrutinizing the methodologies used in social research and is fully compromised with the political and cultural revindication of marginalized groups.

Therefore, there has been a tendency towards the displacement of class as a central sociological category or its direct withdrawal in favour of the establishment of the intersection and overlapping of social identities and experiences as the main point of focus, in the sense that it allows to raise awareness about the multiplicity of oppressions experienced by an individual not only due to its social trajectory but also because of aspects linked to its sociocultural identity, fulfilling both the purpose of a better comprehension of social dynamics and of political emancipation. However, as it will be elaborated in this chapter, an approach in which the analysis of social hierarchies, inequalities and power dynamics among others is linked to a systematic class-based theoretical frame suitable for empirical validation in synchrony with the principles of scientific research and that includes the main worries of intersectionality as well can be mutually beneficial for both frameworks and for the development of more powerful frameworks in sociological research

In this sense, it is important to discuss the contributions and limitations of intersectionality since it constitutes the most prominent theoretical development of an identitarian based theory of social differentiation and hierarchization and its influence has transcended the frontiers of feminist studies and critical race theory, becoming a major theoretical standpoint in virtually all social sciences (Dill & Kohlman, 2012) (Rice, et al.,

blurring of the boundaries between the concrete and its representation that characterizes postmodern and decolonial thought ends up subordinating historical evidence to narratives and representations that may well be mere fictions.

2019). Particularly in sociology, intersectionality has become a major approach to understand social hierarchization and social differentiation, replacing till certain extend the adoption of class-based theoretical schemes in sociological research. Undoubtedly, intersectionality has raised legit and valuable concerns about the multiple facets that oppression and marginalization can take, and its compromise with the recognition and revindication of the experiences of marginalized subjects has contribute to the comprehension of the multidimensionality of discrimination and exclusion, therefore its contributions must be discussed systematically.

The origins of intersectionality can be traced to the field of critical race theory and black feminism by scholars such as Patricia Hill Collins and Kimberlé Crenshaw. It refers to the ways in which different social identities, such as race, gender, class, sexuality, and ability, intersect and interact with one another to create unique experiences of oppression and privilege (Collins, 2015; Crenshaw, 1989). According to Hill Collins (2015), intersectionality highlights the interconnectedness of various social identities and the ways in which these identities intersect and interact to shape experiences of inequality and oppression. Intersectionality allows to understand the complexity of social hierarchies and to identify the ways in which multiple forms of oppression can compound and reinforce one another. Crenshaw (1989), on the other hand, emphasizes the legal and political implications of intersectionality, arguing that understanding and addressing intersectionality is crucial for developing more effective and equitable legal and policy frameworks that consider the ways in which different forms of oppression interact configures social reality and intersubjectivity.

The reasoning which states that the meanings and interpretations of each aspect of identity are informed by the others and are configured concordantly to the dynamics of power and domination of a given society is a pivotal idea for intersectionality (Romero, 2017). For instance, the classical example in intersubjectivity in which a woman is perceived by others not only according to her gender identity, but also as a racialized woman; this specific reality creates radically different social experiences in comparison, for example to a non-racialized woman. This practical example resembles the general idea of intersectionality, which is the unravelling of the dynamics of domination that shape a continuum of differentiated intersubjectivities based on the experience of subjects with multiple marginalized identities. The following scheme presents a synthesis of this reasoning:

Intersectionality cannot be understood outside of its emancipatory goals and particularly without the core concept of epistemic resistance, which till certain extend challenges the idea itself of science which is perceived as a process of homogenization that is

sustained by the invisibilization of marginalized subjects, as investigative dynamics operate as a mechanism for legitimizing power and exclusionary structures (Yassine, 2019) (Berenstain et al., 2022). Hence, intersectionality is not only a critical social theory but a meta-critique of the social production of knowledge³. The project of developing a social theory it is within this frame, compromised with the addressing of the concerns and experiences to those who are understood to be subordinated to capitalism, colonialism, sexism among others. The logic of theorizing refers to the critical inquiry of the recursive relationship between knowledge and power ruled by standardized methodological and epistemological conditions that will evaluate what is valid and what is not, what will count and what will not count (Collins, 2019),

In this framework, the project of academic research and in general terms to theorize about the social world, is a constant tension between hegemonic epistemologies that neglect the knowledge and testimonies of marginalized subjects in order to reproduce the dynamics of domination that oppress them in the first place, and the academic compromise with the recognition of dissident voices in order to decolonize academic knowledge from Westernized validations that discredit testimonial authority, which are strategies of epistemic violence to suppress the voices of those who are subordinated (Dotson, 2011). The consideration of the standpoint of the academicians talks more about the development and pretensions of their research than the fictitious neutrality and objectivity of the mechanisms of evaluation and validation adopted by mainstream academia. Therefore, to position intersectionality in the dominant spaces of production and diffusion of knowledge is to give voice and validity to the voices of those who have been systematically marginalized and left behind by the ruling elites by disputing and challenging their own narratives thus driving all forms of emancipation.

It is important though, to understand the reasons behind the compromise of intersectionality with a particular epistemological standpoint to understand social hierarchization, inequality and segregation as well as the debates regarding different ways to approach empirically intersectionality problems. The dominant position states that since it is in everyday life where inequality and power relations are structured, the emphasis must be on the individual experiences of those marginalized subjects following the majority-inclusive principle, which is the inclusion of every single possible social category where power relations

³ The critical analysis of the relation between power structures and intellectual production has a longstanding tradition that parallels the development of scientific inquiry itself. However, in the context of the present discussion, it is pertinent to elucidate the perspectives of (Hill Collins, 2019), (Crenshaw, 2005) and (Foucault, 1977).

may rest when analysing social phenomena with the intention of identifying juxtaposition and intersections of these social categories, which makes qualitative analysis of daily life practices the predilected methodological to address intersectionality research (Christensen & Jensen, 2012). Additionally, intersectionality cannot succumb to an additive understanding of power relations. This claim posits that an individual's intersectional identity can have a greater impact on their life than what would be apparent when considering each identity category separately, therefore it is a major concern among intersectionality scholars to address power relations from a nonadditive intersectionality perspective (Bright et al., 2016).

The question about if it is possible or not to understand social relations outside of a qualitative methodological frame is currently a strong point of debate among intersectionality scholars in the sense that the predominant view regarding quantitative methods among intersectionality scholars but in general of those who belong to the field of sociology, is that social scientific methodological approaches and in particular mathematical and statistical techniques will systematically oversimplify the complex nature of social relations, since everything that may seem to be odd or unexpected will necessarily be treated as a deviance or anomaly, hence quantitative research but overall, traditional scientific reasoning will always contradict the goal of avoiding additive reasonings, since measurement as understood within a standard scientific approach is somehow contradictory to nonadditive intersectionality and the most relevant elements that must be addressed to understand the social world are related to the unmeasurable dimensions of social experiences (Bowleg, 2008).

It is necessary to recognize the fact that as research framework and theoretical standpoint, intersectionality has gained an important place in contemporary sociological academia and comparatively, academic production is linked to a bigger extend to intersectionality than for example analytical or structuralist approaches (Lizón, 2007). The impacts of the widespread of intersectionality as a leading paradigm has led to the growing awareness and scientific interest towards important sociological and social problems, but also has diminished in some way the interest for more traditional and structurally based sociological methodologies and approaches. Therefore, the possibility to integrate intersectionality with analytical epistemology and advance quantitative methodologies is a fertile land to develop better and more insightful sociological research (Gross & Goldan, 2023).

In this sense, a growing proportion of intersectionality scholars have attempted to integrate the principles of intersectionality with quantitative research and causality while remaining true to the non-additive and majority-inclusive principles (Dubrow, 2008; Hinze et

al., 2012; Bright et al., 2016). These efforts have resulted in significant analytical insights to develop epistemological frameworks that aim to reconcile the objectives and needs of intersectionality with causal reasoning within the realm of quantitative research pointing out the potential of quantitative techniques such as Causal Graphical Modelling and Causal Bayesian Networks to be empirically consistent with the requirements of intersectionality and its suitability to be applied to intersectionality problems, among many other scopes that are currently being explored by multiple academicians worldwide. Notably, (Bright et al., 2016), offers a logical framework of interpretation of intersectionality where non additive intersectionality phenomena can be modelled in terms of causality, as it is exemplified up next for a hypothetical case in which social class and gender are modelled following the proposal of (Bright et al., 2016), for the sake of simplicity, variables will be treated as binary:

Let S represents social class where $S = 0 = \text{Lower Class}$ and $S = 1 = \text{Upper Class}$

Let G represents gender where $G = 0 = \text{Female}$ and $G = 1 = \text{Male}$

The causal effect of the variable S on the dependent variable *political representation* P defined as the probability to occupying a political position in the State can be written as:

$$\beta_S = E [P | (S = 1)] - E [P | (S = 0)]$$

Which is the difference with respect to the variable P when members of a population are classified as upper class against those classified as lower class. Similarly, for the variable G

$$\beta_G = E [P | (G = 1)] - E [P | (G = 0)]$$

Which is the difference with respect to the variable P when members of a population are classified as female against those classified as male. Consequently, the expected effect if been lower class and woman against been upper class and male can be expressed as:

$$\beta_{SG} = E [P | (S = 1) \text{ and } (G = 1)] - E [P | (S = 0) \text{ and } (G = 0)]$$

So according to the proposal of (Bright et al., 2016), the way in which intersectionality hypothesis can be formulated for the case of this hypothetical example without violating the nonadditive principle is:

$$\beta_{SG} \neq \beta_S + \beta_G$$

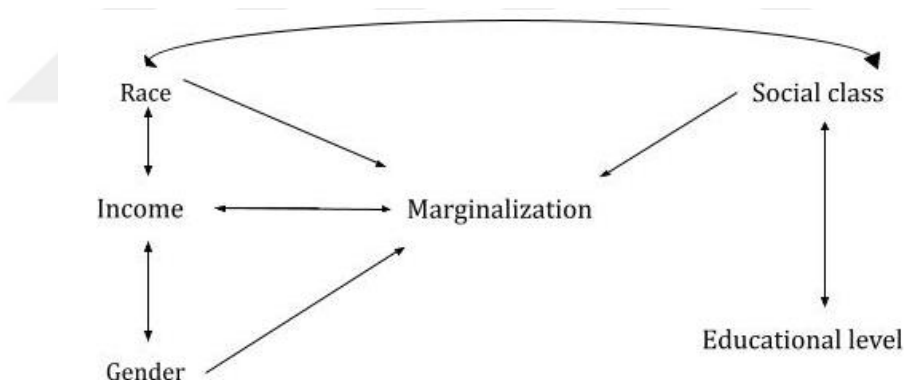
Although these attempts to model intersectionality approach to social stratification, these representations assume that social class (S) functions as a random variable when calculating its causal effect on the dependent variable, political representation (P). However, this assumption presents a significant limitation, as it is often challenging to argue that social class is genuinely random or exogenous. Social class is typically influenced by various other factors, such as education, income, and family background, which means it is intertwined with other characteristics that are relevant to its determination. As a result, treating social class as a random variable might oversimplify the complex, interconnected factors that contribute to social stratification and could lead to potential biases in the analysis.

Moreover, the assumption of social class as a random or exogenous variable overlooks the deeply rooted social and structural factors that shape class status. These factors include systemic inequalities, access to resources, and historical contexts that influence an individual's social class over time. By treating social class as random, the model may fail to account for the cumulative and intersecting disadvantages that individuals from lower social classes often experience. This could lead to an incomplete or skewed understanding of the causal relationships between social class, gender, and political representation, potentially underestimating the true impact of social class on these outcomes. Therefore, while the framework proposed by Bright et al. (2016) provides a useful starting point for modelling intersectionality in terms of causality, it is essential to consider the endogenous nature of social class to ensure a more accurate and comprehensive analysis.

In the case of gender, the causal effect on political representation is more straightforward and likely to hold as a significant factor. However, it's important to recognize that gender itself is not an isolated variable; it is accompanied by various other social, cultural, and economic factors that can also influence political representation. For instance, societal norms, gender roles, access to education, and professional opportunities are all intricately linked to gender and can significantly impact an individual's chances of attaining political positions. These additional factors mean that the observed effect of gender on political representation may not solely be due to gender itself, but rather the broader context and experiences associated with being male or female in society. Therefore, while gender remains a crucial variable, the model should account for the complex, multifaceted nature of gender-related influences to provide a more nuanced and accurate analysis of its effect on political representation.

Alternatively, probabilistic graphical methods have been proposed as conceptual approach for intersectionality problems, in particular causal graphical models, causal Bayesian networks (CBNs) and structural equation models (SEMs) among others (Bright et al., 2016). In the realm of sociological research, probabilistic graphical models often utilize a graphical representation to encode a distribution across a multi-dimensional space, which in spirit, resemble the network analysis that will conduct the methodological objectives of this research. In this case, the graph works as a factorized representation of a set of independent relationships that exist within a specific distribution, which are typically associated with variables of interest for social inquiry. These relationships may involve direct and indirect causality, as well as feedback loops between the variables as it is shown in the following graph for a hypothetical case in which marginalization is understood as a product of indirect, direct and feedback relations between social class, race, income, gender, and educational level:

Graphic 2.2.1:
Hypothetical marginalization causal directed graphical model.



Source: elaborated by author

Albeit the efforts of scholars to link intersectionality with scientific epistemology are remarkable, ultimately the approaches explored are somehow common to those used in analytical sociology and economics to approach multidimensional social problems, which supports empirically the case in favour of common goals and analytical integration of analytical frameworks and intersectionality (Gross & Goldan, 2023). However, it is important to deal carefully with the methodological and technical aspects of a potential integration between both frameworks since, bibliometric studies have found considerable difficulties when quantitative methods are applied in intersectionality research as well as an inadequate theoretical treatment

synchronized with the demands of scientific inquiry such as a clear definition of the concepts involved, references to foundational scholars in the field and either inconsistencies or direct omissions of formulating a detailed methodological strategy (Bauer et al.,2021).

This existing and potential methodological and theoretical underperformances is not standing a case against the integration of analytical approaches with intersectionality, but it indicates the necessity to challenge strong conceptions deeply rooted in academia such as the understanding of traditional qualitative methodologies to be the default methodological frame in a significant portion of contemporary sociological research, which has hindered the progress of methodological innovation and the integration of novel tools and techniques in social research. This has also contributed to the lack of formal education in mathematics and statistics among sociologist, which are fundamental requirements in any scientific discipline, and to the fostering of hostile epistemological standpoints towards the scientific method (Lizón, 2007).

The distinction between qualitative and quantitative methodologies is relatively well established among social scientist, although the line that separates both is becoming somehow blurry and diffuse, for example: can Natural Language Processing methods be strictly classified as qualitative or quantitative? Undoubtedly its mathematical and computational dimensions are fundamental, however its applications are mostly associated in social sciences with traditionally qualitative approaches, such as discourse analysis, content analysis, and narrative analysis.

However, the growing complexity of social phenomena, coupled with advancements in analytical tools that transcend traditional methodological distinctions in social science ⁴, offer promising avenues for advancing social inquiry. In this sense, the claim in favour of social hierarchies to be the product of the interconnected nature of social categories such as race, gender, class, and sexuality, among others, that interact and overlap to create unique contextual dynamics of oppression and privilege, where situations of exclusion and inequality can only be properly understood by assuming the unicity of intricate combinations of sociocultural categories that cannot be generalized and that are only restrained to specific contexts must be overcome ⁵.

⁵ “I shall be arguing that, paradoxically precisely the vagueness and open-endedness of intersectionality may be the very secret to its success” (Davis, 2008). It is important to note that the author takes a stand in the defence of intersectionality from a sociology of science perspective.

Through fostering an integration that combines logical multicausal consistency with non-additive reasoning, respecting both the principles of intersectionality and analytical sociology, it becomes feasible to develop integral frameworks for studying social stratification. This approach acknowledges the complex interplay of multiple factors shaping social hierarchization, moving beyond simplistic additive models but also from the tendency towards the lack of systematicity and analytical inconsistencies and can cope with the complex challenges of contemporary societies .

2.3 Supervised and non-supervised classification methods in social stratification research

A proper integration of different theoretical perspectives in the study of social stratification and hierarchization that although may come from different epistemological origins but share its major points of interest can only be possible if its theoretical objectives are linked to concrete methodologies that are both empirically and logically consistent and that are suitable to sociological inquiry. In this sense, there has been a general tendency towards the study of social stratification to understand it as a problem of classification. However, an increasing number of scholars have opted to integrate relational methodological approaches in order to address in innovative ways the complexities of class relations (Rosenelli, 2013; Rawolle & Lingard, 2022) as well as a way to integrate the strong points and social concerns of approaches as diverse as intersectionality or analytical sociology.

In its classification form, the class structure can be deduced from underlying patterns that, while not immediately observable, can be elucidated through statistical modelling and classification algorithms. The classification of individuals based on their official work status has emerged as a predominant methodological strategy in contemporary sociological research as a way to approach the problem of social stratification (Rojas Ospina, 2023). These classifications, often derived from governmental or institutional employment categories, are employed as proxy variables in models designed to infer a wide range of social properties. This approach leverages the assumption that one's occupation or official work status can serve as a reliable indicator of various socio-economic factors, including income level, social class, education, and even lifestyle preferences.

To some extent, theoretical inconsistencies might originate from the epistemological complexities tied to the study of social classes. The absence of a singular, universally acknowledged definition of social class, coupled with the lack of a consistent approach for its operationalization, are issues that naturally emerge from the fundamental character of social

science research itself (Hening & Liao, 2010), Therefore, the prevalent reliance on proxy variables or indicators, such as occupational categories, to represent social class persists and is likely to remain a useful methodological resource for sociologists in the future.

Notably, there is a common approach among scholars to address both analytically and empirically the study social stratification: to understand it as a problem of clustering or unsupervised classification (Hening & Liao, 2010). The exploration of systematic methods for the classification of social groups has been a cornerstone in the evolution of sociology since its inception. This interest is exemplified in the development of social class schemes, stratification systems, and the delineation of socio-demographic structures, highlighting a theoretical commitment that dates back to the foundational periods of the discipline (Rojas Ospina, 2023). In recent empirical studies, the utilization of cluster analysis, alongside other dimensional reduction, and classification techniques, has seen a notable increase. This surge is predominantly due to advancements in computational technology, which have made it possible to explore sociological constructs with greater depth and subtlety (Białowolski, 2015). Such technological progress not only facilitates more complex analyses but also broadens the academic community's understanding and application of these methodologies.

Cluster analysis stands as a pivotal methodological framework in the study of social stratification. It systematically organizes elements or variables within a dataset into subsets or clusters, based on the similarity of characteristics. This technique has gained widespread adoption among researchers seeking to dissect and understand the nuanced layers of social stratification empirically (Fachelli & Roldán, 2012). The endeavour to achieve optimal classification within these clusters unfolds as a complex, multifaceted task. It navigates through a spectrum of algorithms, each with its unique operational logic and suitability to different types of data. These algorithms depend on various metrics and assumptions to yield consistent and reliable outcomes, underscoring that the definition of a cluster is inherently dynamic and may vary based on the chosen algorithm and the theoretical underpinnings of the research at hand (Fonesca, 2013).

At the core of this classification challenge lies the bifurcation between probabilistic and non-probabilistic approaches to address clustering or classification problems (Hening & Liao, 2010). Probabilistic methods, such as Latent Class Analysis (LCA), rely on statistical models to estimate the probability that a given data point belongs to a specific cluster. These methods assume that data points are generated by a mix of underlying probability distributions, making them particularly adept at handling ambiguity and overlapping clusters where

membership is not strictly defined. Non-probabilistic approaches, on the other hand, such as Hierarchical Cluster Analysis (LCA), operate on a principle of minimizing variance within clusters without assuming any underlying statistical distribution. These techniques define cluster membership based on the closest centroid or other deterministic criteria, making them straightforward but potentially less flexible in dealing with data that naturally form non-spherical clusters or when the clusters have varying sizes and densities.

Though these methods are favoured for addressing social stratification due to their theoretical soundness and the enhanced accessibility of advanced computational tools, there often lacks a preliminary discussion on the rationale for choosing a specific clustering technique. However, to justify one's selection of a particular method does not mean claiming it as the sole and correct approach to such problems, as theoretical perspectives will always influence the empirical choices made by researchers.

The diversity of approaches inevitably leads to the acknowledgment that, from both a sociological and computational standpoint, there are no perfect methods for clustering. Yet, it is crucial to justify the choice of a method, considering the analytical requirements and objectives of the research. Generally, two primary assumptions are made when selecting a classification or clustering method in social class analysis: the aprioristic notions of class structure reflected in the researcher's preconceived composition of a finite set of clusters; or a tendency to overlook theoretical distinctions, viewing clustering solely through a statistical lens, where different clusters emerge merely as outcomes of varying distributions or density modes (Hening & Liao, 2010).

2.4 Multinomial estimation methods in social stratification research

Furthermore estimation methods are also widely used in the study of social stratification, although the theoretical purposes are sometimes not so explicit in the sense that contrary to the objective of developing class schemes that represent the social structure, researches dedicate their efforts to test the existence of statistically significant relations between variables that may be associated with the socioeconomic origin of individuals with desirable social outcomes (for example, income levels in relation to academic achievements), relying on well-established estimation methods such as econometric modelling and multinomial regression analysis (Kilne & Tamer, 2020), but without going further into analytical developments of general class models.

In this sense, multinomial logistic regression (MLR) and more advance methods of supervised classification and estimation that are based on MLR, are useful techniques to approach stratification problems. MLR is an advanced statistical technique that extends binary logistic regression to accommodate dependent variables with more than two categories. This approach is particularly well-suited for modelling categorical outcomes where the categories are nominal, although it is possible to run these types of models for ordinal data. For example, it can be used to predict the likelihood of individuals falling into various occupational categories (e.g., professional, managerial, technical, and manual jobs) based on a series of variables considered to be theoretically and causally relevant (gender, education level, etc) (Lestari & Playford, 2023) or to predict its belonging to a particular social class if training data for the model is available.

On a broader sense, by employing MLR or methods similar to it, such as more advanced techniques based on machine learning or neural networks, researchers can account for multiple factors simultaneously, controlling for variables such as age, gender, geographic location, and so on, which may be related to a particular outcome that is of their particular interest. This allows for a more nuanced understanding of how socioeconomic background impacts various aspects of social life. Moreover, MLR provides insights into the relative importance of specific predictors and helps identify which factors are more critically associated with particular social outcomes.

While these statistical techniques are powerful and their used is extended to a variety of research problems that include social stratification ones, they are typically used more for testing hypotheses or establishing correlations rather than developing overarching theoretical frameworks of social class. This distinction highlights a pragmatic approach in some of the social stratification research, where the emphasis is on empirical findings and their implications rather than on theoretical advancements. This should not be considered to be a flaw or an inconsistency in this type of research, since its pragmatic nature is precisely why it has been so intensively adopted.

2.5 Paths to integration: relational thinking and network analysis in social stratification research

In addition to this type of methods, network analysis, has emerged as a promising approach in the study of social stratification and overall, it has become one of the major developments in quantitative research since it is suitable for the modelling of interdependent

relationships in a variety of contexts in a different way than the traditional probabilistic and inferential statistical approaches. Furthermore, in the past decade, network analysis has been widely adopted as a methodological strategy in the study of communication patterns, power and kinship dynamics and epidemiology among others (McLevey, 2022) and its potential as an empirical strategy to approach social stratification problems has been growing as well (Ferrand, et al., 2018).

Network analysis is a methodological framework used to study the structure, dynamics, and properties of complex systems represented as networks. A network consists of a collection of nodes (representing entities such as individuals, organizations, or social positions) and edges (representing relationships or interactions between these entities). It examines the patterns of connections within these networks, aiming to uncover underlying structures and patterns of interaction, identify key nodes or groups, and understanding the flow of information, influence, positions, or resources studied.

Network analysis is also referred to as graph theory. However, more precisely, graph theory refers to the mathematical theory that deals with graphs as mathematical objects with particular properties and theorems. On the other hand, network analysis refers more to the empirical applications of graph theory principles to concrete research problems, which is the term used in this work.

By applying mathematical and computational techniques, network analysis enables researchers to quantify and analyse various network properties. This approach finds applications across diverse domains, including sociology, biology, computer science, and economics, where understanding the relational structure of complex systems is essential for gaining insights into their functioning and behavior.

There are several distinct advantages and innovative insights in the study of social stratification when the problem is approached as a social network one. One key aspect is its ability to highlight the interconnectedness of individuals or groups within a society, showing how relationships and interactions contribute to social hierarchies. This interconnectedness can reveal emergent properties of social structures, such as the presence of tightly knit communities, influential individuals, or bridging nodes that connect otherwise separate groups. Furthermore, the visual nature of network analysis aids in understanding complex relationships and patterns that might be difficult to discern through numerical or tabular data alone.

Network analysis allows for the exploration of dynamic and non-linear relationships, making it particularly effective in identifying emergent patterns and interactions that SEM might overlook. This capability is essential in contexts where the relationships themselves are the focal point of the study, rather than merely the variables involved. For instance, SNA can reveal central nodes or influential actors within a network, capture the flow of resources or information, and provide insights into the overall structure of the network, which SEM does not typically address.

Furthermore, over the past decade, network analysis has been widely adopted as a methodological strategy in the study of communication patterns, power and kinship dynamics, and epidemiology, among others (McLevey, 2022). Its potential as an empirical strategy to approach social stratification problems has also been growing (Ferrand et al., 2018). By focusing on the relational aspects of social phenomena, network analysis offers a unique lens through which the complexity of social stratification can be understood, making it a superior choice for this study.

Network analysis, as a methodological framework, studies the structure, dynamics, and properties of complex systems represented as networks. A network consists of nodes (representing entities such as individuals, organizations, or social positions) and edges (representing relationships or interactions between these entities). The analysis examines the patterns of connections within these networks, aiming to uncover underlying structures and patterns of interaction, identify key nodes or groups, and understand the flow of information, influence, positions, or resources within the studied network.

In this sense, Network analysis can be viewed both as an alternative and as a complement to more extended approaches in the study of social stratification such as cluster analysis or inferential approaches like econometric models or multinomial regression models. Through network analysis, researchers can uncover emergent properties and structural features that may not be apparent at first sight, similar to what is done through approaches like Principal Component Analysis (PCA) or Latent Class Analysis (LCA) but with a bigger emphasis in the relations shared by the variables studied and the properties of a social stratification structure as a whole (Lambert & Griffiths, 2018). In the following section, details about Network Analysis will be discussed extensively.

The thesis operates on a fundamental assumption that an individual's occupation or employment status can serve as a reliable indicator of broader socio-economic factors, such as income level, social class, and educational attainment. This assumption is well-supported in the literature, where occupational status has long been used as a proxy for socio-economic position due to its strong correlation with these factors.

For example, Ganzeboom, De Graaf, and Treiman (1992) have demonstrated that occupations are systematically linked to income levels and educational requirements, making them an effective measure for assessing social class. Additionally, Goldthorpe (2007) highlights that occupational classifications remain one of the most robust methods for analyzing social stratification and mobility, as they capture the hierarchical structure of labor markets and the associated socio-economic outcomes.

The thesis operates on a fundamental assumption that an individual's occupation or employment status can serve as a reliable indicator of broader socio-economic factors, such as income level, social class, and educational attainment. This assumption is well-supported in the literature, where occupational status is frequently used as a proxy for socio-economic position due to its strong correlation with these factors.

Grusky and Sørensen (1998) have extensively discussed how occupational categories can reflect social class distinctions, arguing that occupations not only signify an individual's place in the labor market but also mirror broader socio-economic inequalities. Similarly, Erik Olin Wright (1997) emphasizes the role of occupational classifications in understanding social class structures, illustrating how different employment statuses correlate with varying levels of access to resources, power, and social capital.

Network analysis has become a major development in quantitative research due to its ability to model interdependent relationships in a variety of contexts, offering a unique approach distinct from traditional probabilistic and inferential statistical methods. Beyond social stratification, Social Network Analysis has been applied to a wide range of topics within the social sciences, demonstrating its versatility and broad utility.

For instance, in the study of communication patterns, social network analysis has been used to map and analyse the flow of information within organizations, helping to identify key communicators or bottlenecks that may affect efficiency (Monge & Contractor, 2003). In power dynamics, Social Network Analysis has been instrumental in examining how power is

distributed and exercised within networks, such as in political or organizational settings, where the structure of connections can influence decision-making processes (Brass & Burkhardt, 1993).

In the field of kinship studies, Social Network Analysis has been employed to explore the structure of family ties and the impact of these relationships on social support systems, inheritance patterns, and social mobility (White & Johansen, 2005). Similarly, in epidemiology, SNA has proven invaluable for understanding how diseases spread through populations by mapping the network of interactions through which infections are transmitted, thereby aiding in the design of more effective intervention strategies (Morris, 2004).

In the field of epidemiology, Social Network Analysis has proven invaluable for understanding the transmission dynamics of infectious diseases. By mapping the interactions and connections through which diseases spread, public health officials can identify high-risk groups, understand the role of super-spreaders, and design targeted intervention strategies to curb outbreaks. The work of Morris (2004) in this area demonstrated how Social Network Analysis could be used to model the spread of HIV/AIDS, leading to more effective public health campaigns and policies.

Furthermore, Social Network Analysis has been increasingly utilized in the study of collaborative networks and innovation. Researchers have used Social Network Analysis to analyze how networks of collaboration, such as those among scientists or within industries, influence the development and diffusion of new ideas and technologies. By identifying key collaborative hubs or particularly innovative clusters within these networks, Social Network Analysis can help foster environments that are conducive to innovation (Uzzi & Spiro, 2005).

These examples underscore the widespread use and applicability of social network analysis across various domains within the social sciences, illustrating its fundamental role as a methodological strategy in contemporary research. By highlighting these diverse applications, the thesis not only emphasizes the relevance of Social Network Analysis to the study of social stratification but also demonstrates its broader significance as a tool for understanding complex social phenomena.

3 METHODOLOGY

This chapter of the thesis discusses the methodological framework of the research. It begins with an in-depth description of network analysis methods as well as the approach implemented to analyse the data and to draw conclusions based on the recollected evidence followed by the description of data sources and selection variables for the analysis 22⁶.

3.1 Network modelling and analysis.

In general terms, a network or graph is composed of two main elements: vertices (also known as nodes) and edges. Formally speaking although from a slightly restricted perspective, a graph is defined as an ordered pair $G=(V,E)$ where:

- V is a set of vertices (also referred as nodes or points)
- $E \subseteq \{\{x,y\} \mid x,y \in V \text{ and } x \neq y\}$

The second expression refers to E as the set of the edges, which is a subset of all unordered pairs of vertices x and y , where x and y are in the set of vertices V and x is not equal to y . In other words, the expression is saying that the set of edges E consists of pairs of vertices from V , where each pair represents an edge connecting two distinct vertices in the network. The core idea behind a network is to represent relationships or connections between units of analysis. At its essence, a network simplifies complex systems into a collection of points (vertices or nodes) and lines (edges) connecting them.

In this context, the nodes in the networks represent occupational positions, while edges illustrate the strength of relationships between these positions, determined by the normalized proportions of educational level, self-identified class, and income scale variables. Weights were constructed using affinity scores derived from these normalized proportions. For each occupational position, nodes were added, and edges were established based on the Euclidean distances between affinity profiles, with weights inversely correlated to these distances. Formally:

- Let's denote the affinity score between an occupational position i and a value of a variable of analysis j as A_{ij} .

⁶ A virtual annex was created in a GitHub repository for the reader to consult the technical information, notebooks, databases and code that, for space reasons, cannot be included here: [methodological annex](#).

- Let D_{ij} represent the Euclidean distance between the affinity profiles of an occupational position i and a value of a variable of analysis j . The Euclidean distance is defined as:

$$D_{ij} = \sqrt{\sum_{k=1}^n (p_{ik} - p_{jk})^2}$$

Where P_{ik} and P_{jk} are the k th components of the occupational categories i and a value of a variable of analysis j , respectively.

- Therefore, weights W can be expressed as the inverse of the Euclidean distance between the affinity profiles of an occupational position i and a value of a variable of analysis j , as it follows:

$$W_{ij} = \frac{1}{D_{ij}}$$

- So, the network can be expressed as a weighted network $G=(V, E, W)$ where

V is the set of nodes representing occupational positions.

E is the set of edges representing connections between occupational positions.

W is the set of weights on the edges, where W_{ij} represents the weight of the edge between an occupational position i and a value of a variable of analysis j .

After the definition of the methodology and the cleaning and adjustments required in the datasets, the NetworkX library in Python (Hagberg & Conway, 2020) was employed to initialize three undirected graphs by relating the target variable of occupational level with the three variables of analysis described earlier. This facilitated the representation and analysis of complex networks, pivotal for examining the subjects of this research. Nodes were then added to the graph, with each node representing a distinct occupational category. All data was normalized to produce scales between 0 and 1.

Following this, for every pair of occupational positions, the Euclidean distance between their profiles was computed as it was explained earlier. Edges were introduced between pairs where the index of the first position was less than that of the second. The weight of each edge was determined as the reciprocal of the Euclidean distance, signifying the strength of affinity between the respective positions in terms of the three variables of analysis respectively. To optimize the visual representation of the graph, the spring layout algorithm

provided by NetworkX (nx.spring_layout) was utilized. This algorithm automatically positioned the nodes and provided an accurate visualization of the network.

Network visualization was facilitated through Matplotlib (Han & Kwak, 2023). Nodes were rendered as circles, while edges were depicted as lines connecting the nodes. The colour and width of each edge corresponded to the strength of affinity between the connected occupational positions. To enhance interpretability, labels representing the corresponding job positions were affixed adjacent to each node. Careful attention was paid to label positioning to prevent overlap with the nodes, ensuring clarity in the visualization. This methodological approach facilitated a comprehensive analysis and visualization of the relationships between various job positions, providing valuable insights into workforce structures or dynamics within the job market.

After the construction of the networks, a series of metrics were calculated in order not only to understand the inherent characteristics of each network but also to facilitate a comparative analysis of their structures. Such an analysis sought to uncover sociological patterns embedded within the networks, offering valuable insights. For this endeavour a series of structural metrics for each network were computed. These metrics included the number of nodes (occupational positions), the number of edges (connections), average degree (indicating overall connectivity), and density (reflecting compactness or sparsity of connections).

Density of a network serves as a measure of connectivity within a graph. It quantifies the extent to which the actual edges present in the graph approach the maximum possible number of edges. Mathematically, it is computed as the ratio of the number of existing edges to the total number of possible edges. A higher density indicates a greater proportion of realized connections among nodes, while a lower density suggests a sparser network with fewer interconnections (McLevey, 2022). This metric provides insights into the level of cohesion and complexity within the graph, informing analyses of its structural integrity and potential functional implications. Formally, density is defined as:

Let's consider the network G with nodes n and m edges, then the density D of G is calculated as:

$$D = \frac{2m}{n(n-1)}$$

Where:

- m is the number of edges

- n is the number of nodes

The average degree of a network is a metric that characterizes the centrality and connectivity of its constituent nodes. Defined as the mean degree across all nodes in the network, it reflects the average number of edges incident upon each node. A higher average degree signifies a denser network structure, indicative of a greater degree of interconnectivity among nodes. Conversely, a lower average degree implies a sparser distribution of edges and potentially a more decentralized topology. Formally, it is defined as:

$$k_{avg} = \frac{2m}{n}$$

Where:

- m is the number of edges
- n is the number of nodes

Additionally, a series of analyses were conducted to compare the structures of the networks and identify potential isomorphism. This exploration aimed to discern both similarities and differences in the networks structure. The primary objective was to identify variations in the network structures of occupational categories based on the selected variables used to construct the weights and edges. Specifically, this approach aimed to explore the network structures when considering different variables: income, self-identified class, and educational level. This approach allowed for an examination of potential disparities in the hierarchical organization of occupational positions across various dimensions.

This first measure utilized to compare the structure of the networks was the Structural Similarity Coefficient (NSS) between the three networks analysed. This coefficient is derived from three distinct components: degree distribution similarity, clustering coefficient similarity, and average shortest path similarity. Degree distribution similarity measures the absolute difference in the degree of each node in the union of nodes between the two graphs. Clustering coefficient similarity quantifies the absolute difference in the average clustering coefficient of the two graphs. Average shortest path similarity, if applicable, calculates the absolute difference in the average shortest path length normalized by the number of nodes. The NSS provides a holistic assessment of the structural similarity between the compared graphs (Gross et al., 2018).

The second metric utilized in the analysis was community detection using the Louvain algorithm. This algorithm identifies communities within a graph by maximizing modularity, a measure of the strength of division of a network into modules. The Louvain algorithm operates in two main phases: modularity optimization and community aggregation (McLevey, 2022). In the first phase, each node starts in its own community, and nodes are moved between communities to achieve the maximum possible gain in modularity. This process is repeated iteratively until no further improvement is possible. In the second phase, communities are treated as nodes, and the process is repeated, leading to a hierarchical community structure.

Following community detection, the modularity of the detected community structure was calculated for each graph. Modularity quantifies the quality of the division of a network into communities by measuring the density of links inside communities compared to links between communities. Modularity is defined as the fraction of the edges that fall within the given groups minus the expected fraction if edges were distributed at random. It can be mathematically expressed as:

$$Q = \frac{1}{2m} \sum_{ij} [A_{ij} - \frac{k_i k_j}{2m}] \delta(c_i, c_j)$$

Where:

- A_{ij} is the adjacency matrix of the graph (1 if there is an edge between nodes i and j , and 0 otherwise).
- k_i and k_j are the degrees of nodes i and j respectively.
- m is the total number of edges in the graph.
- $\delta(c_i, c_j)$ is a delta function that equals 1 if nodes i and j are in the same community and 0 otherwise.
- c_i and c_j are the communities of nodes i and j .

Together, The NSS Coefficient and the community detection with modularity calculation provide a comprehensive analysis of network structures. The NSS offers a quantitative comparison of the overall structure of different networks, while the Louvain algorithm and modularity provide insights into the community structure within each network. This dual approach allows for a thorough understanding of both the global and modular

characteristics of the networks under study. For the case of this research Louvain algorithm was selected as the community detection method.

The third metric utilized in the analysis was the k-core decomposition of the networks. A k-core is a maximal subgraph in which each node has at least k neighbours. This decomposition helps identify the core structure of the network, highlighting nodes that are more connected and thus more central to the network's cohesion. This decomposition helps identify the core structure of the network, highlighting nodes that are more connected and thus more central to the network's cohesion.

The fourth metric used in the analysis was Bonacich power centrality. This measure considers not only the number of connections a node has but also the centrality of its neighbours, thus capturing the influence of nodes within the network. Bonacich power centrality is particularly useful for identifying influential nodes in networks and it was implemented to identify hierarchization patterns within the networks. Finally, eigenvector centrality was calculated. This measure assigns relative scores to all nodes in the network based on the principle that connections to high-scoring nodes contribute more to the score of the node in question. It identifies the most influential nodes in terms of both their direct and indirect connections. This function is applied each network, and the results are displayed for each node. Eigenvector centrality is crucial for understanding the influence and importance of nodes within the network, highlighting key players based on their network position.

3.2 Sources and sample

The World Values Survey (WVS) is a global research initiative dedicated to the scholarly examination of social, political, economic, religious, and cultural values across the world. The project aims to evaluate the influence of values' stability or evolution over time on the social, political, and economic development of countries and societies. The primary research tool employed by the project is a representative comparative social survey, conducted globally every five years. The WVS boasts an extensive geographical and thematic scope, and the free availability of survey data, along with project findings accessible to the general public, has elevated it to become one of the most authoritative and widely utilized cross-national surveys in the field of social sciences. Currently, the WVS stands as the largest non-commercial cross-national empirical time-series investigation of human beliefs and values ever undertaken (Haerpfer et al., 2022).

The World Values Survey (WVS) currently comprises seven waves spanning from 1981 to 2022, with an eighth wave planned for 2024-2026. This research is based on data collected during the seventh wave, covering the period between 2017 and 2022 and includes data for 80 different countries. The preferred sample type for the World Values Survey is a full probability sample of the population aged 18 years and older. In cases where a full probability sample is impractical due to inaccuracies or the absence of census data, WVS allows for the application of a national representative random sample based on multi-stage territorial stratified selection.

For WVS-7, the sample model applied in a country adhered to the following criteria:

- WVS surveys should encompass all residents (not just citizens) in a country aged 18 years and older.
- Principal Investigators (PIs) have the flexibility to lower the minimum age limit while ensuring the minimum required sample size for the 18+ population is met.
- The obtained sample should be representative, reflecting key distributions observed in the country's population (gender, age groups, urban/rural population, etc.).

WVS-7 categorizes countries into three main groups based on their sample size:

- The minimum acceptable sample size, typically 1200 completed interviews, is applicable to the majority of countries.
- For countries with populations of less than 2 million, a sample size of 1000 respondents are considered acceptable.
- Countries with larger populations and more extensive distribution, such as Russia, China, Brazil, USA, etc., are encouraged to aim for a larger sample size of at least 1500 respondents.

The WVS has been utilized in a diverse array of research, spanning from investigations into social cohesion and values to cross-cultural studies (Muthukrishna, 2020), as well as economic development inquiries (Inglehart, 2020). Although the pre-designed data in the World Values Survey may lack the flexibility required to formulate more sophisticated class-oriented measurements beyond those of occupational status, income levels, or educational attainment, it is still feasible to establish social class-based models suitable for cross-country comparisons. Furthermore, the WVS has been applied in research on social class and stratification (Amoranto et al., 2010), albeit to a lesser extent than in other areas.

By utilizing socio-demographic, occupational, and income-related data sourced from the World Value Survey, it becomes possible to develop proxy models for examining social class. As previously discussed, research into social class can draw upon various theoretical frameworks; thus, the choice of empirical approach is inherently linked to the theoretical perspective adopted. In this study, two distinct models are introduced, each rooted in a separate theoretical viewpoint. The first is termed the structural latent class model within this research, whereas the second is referred to as the self-identification class model. Broadly, the latter encompasses the overarching themes of social stratification studies within the field of sociology.

For the purpose of this research five countries were selected: Brazil, China, Germany, United States and Russia. The countries selected for this analysis were chosen due to several key factors. First, each of these nations represents the largest economy within its respective region and it plays a pivotal role in the regional dynamics of their respective contexts, thereby by analysing their class and occupational structure it is possible to acquire a comprehensive view of the potential differences and similarities of societies commonly understood to differ between them both on a socioeconomic and cultural scale but that are highly relevant on a global scale. Up next, samples sizes are presented for each of the countries selected.

However, it is important to acknowledge the limitations of this selection. While these five countries provide a diverse and significant sample, there are other nations with unique socioeconomic structures and regional influences that are also worth studying. These countries may present different patterns of social stratification and occupational dynamics that could further enrich the understanding of global social structures. As such, the findings of this research, while comprehensive, are not exhaustive and should be viewed as part of a larger, ongoing exploration of social stratification in the global context. Future research could benefit from including a wider range of cases to capture the full spectrum of socioeconomic diversity across different regions and cultural settings.

Table 3.1.1: Sample sizes per selected countries

Country	Sample size
Brazil	1,762
China	3,036
Germany	1,528
Russia	1,810
United States	2,596

Source: elaborated by author with data from (WVS, 2023).

Furthermore, there is a significant interest in understanding the class structure and occupational hierarchies within these countries. By examining these aspects, the research aims to uncover insights into social stratification, economic opportunities, and the distribution of wealth and power in some of the world's most influential and diverse nations. This combination of economic prominence, demographic importance, and social structure analysis provides a robust foundation for understanding broader global patterns and regional specificities.

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3.3 Data Preparation and Cleaning

The analysis commenced with the selection and preparation of variables from the World Value Survey dataset for the selected countries. Key variables were chosen to explore various demographic and socio-economic dimensions, including immigration status, household

size, education levels, and income scales. Initial data cleaning involved filtering out entries with negative values, which in the context of the WVS refers to answers missing values or not answered questions in these variables to ensure the integrity of the analysis. Finally, the sample was calibrated using the weighted factors of the WVS to allow comparisons among countries with different population sizes.

Variable selection was based on a correlation analysis aimed at identifying significant relationships between the occupational position variable and other variables within the dataset. The variables were categorized into those requiring contingency coefficients (for nominal data) and Spearman coefficients (for ordinal data). The basic purpose of this preliminary analysis is to define criterion of selection of the variables, previously identified from a theoretical point of view as relevant, that would be used afterwards in the construction of graph models.

The Contingency Coefficient is a measure of association between two categorical variables in a contingency table. It quantifies the strength of the relationship between two nominal variables, ranging from 0 to 1, where 0 indicates no association and 1 indicates a perfect association. This coefficient is calculated based on the chi-squared statistic obtained from a chi-squared test on the contingency table.

For ordinal data, such as household size and income scale, Spearman's rank correlation coefficient was employed to assess the strength of relationships. Spearman's Rank Correlation Coefficient is a non-parametric measure of the strength and direction of association between two ordinal variables. It assesses the monotonic relationship between the variables, meaning it measures how well the relationship can be described using a monotonic function (increasing or decreasing). The coefficient ranges from -1 to 1, where -1 indicates a perfect negative monotonic relationship, 1 indicates a perfect positive monotonic relationship, and 0 indicates no monotonic relationship. It is calculated based on the ranks of the observations rather than their actual values, making it robust to outliers and non-normality.

By conducting this analysis, it was possible to identify and prioritize variables that exhibit significant relationships with the target variable or variables of interest for every country analysed. This process involved assessing the strength and nature of associations between various variables within the dataset. Ultimately, the selected variables would serve as the building blocks for constructing graph models, enabling us to explore and analyse the underlying structure and dynamics of the data in a meaningful manner. In the following table, it is possible to observe the results for each one of the five countries selected for the analysis.

Table 3.2.1: Significance Analysis (occupational position vs selected variables) for Graph Model Construction in selected countries

Variable	Test	Brazil	China	Germany	Russia	United States
Occupational group (father)	Contingency coefficient	0.012	0.034	0.025	0.018	0.027
Gender	Contingency coefficient	0.046	0.038	0.019	0.031	0.022
Income scale	Spearman coefficient	0.009	0.023	0.015	0.012	0.041

Variable	Test*	Brazil	China	Germany	Rusia	United States
Occupational group (father)	Contingency coefficient	Significant	Significant	Significant	Significant	Significant
Gender	Contingency coefficient	Significant	Significant	Significant	Significant	Significant
Income scale	Spearman coefficient	Significant	Significant	Significant	Significant	Significant

*Significance p-value < 0.005

Source: elaborated by author with data from (WVS, 2023).

**Table 3.2.1: Significance Analysis for Graph Model Construction in selected countries
(continuation)**

Variable	Test	Brazil	China	Germany	Russia	United States
Class (self-declared)	Contingency coefficient	0.021	0.038	0.014	0.032	0.026
Immigrant	Contingency coefficient	0.047	0.128	0.039	0.023	0.092
Mother immigrant	Contingency coefficient	0.113	0.154	0.028	0.077	0.144
Father immigrant	Contingency coefficient	0.092	0.133	0.033	0.082	0.136
Household size	Spearman coefficient	0.024	0.095	0.118	0.019	0.031
Number of children	Spearman coefficient	0.017	0.011	0.028	0.023	0.074
Respondent education	Spearman coefficient	0.012	0.033	0.016	0.021	0.029
Mother education	Spearman coefficient	0.008	0.019	0.014	0.012	0.027
Father education	Spearman coefficient	0.015	0.029	0.011	0.013	0.022
Employment status	Contingency coefficient	0.035	0.042	0.037	0.024	0.033

Variable	Test*	Brazil	China	Germany	Rusia	United States
Class (self-declared)	Contingency coefficient	Significant	Significant	Significant	Significant	Significant
Immigrant	Contingency coefficient	Significant	Not significant	Significant	Significant	Not significant
Mother immigrant	Contingency coefficient	Not significant	Not significant	Significant	Not significant	Not significant
Father immigrant	Contingency coefficient	Not significant	Not significant	Significant	Not significant	Not significant
Household size	Spearman coefficient	Significant	Not significant	Not significant	Significant	Significant
Number of children	Spearman coefficient	Significant	Significant	Significant	Significant	Not significant
Respondent education	Spearman coefficient	Significant	Significant	Significant	Significant	Significant
Mother education	Spearman coefficient	Significant	Significant	Significant	Significant	Significant
Father education	Spearman coefficient	Significant	Significant	Significant	Significant	Significant
Employment status	Contingency coefficient	Significant	Significant	Significant	Significant	Significant

*Significance p-value < 0.005

Source: elaborated by author with data from (WVS, 2023).

After identifying variables that had a significant statistical relationship with the variable of occupational status and comparing the results across the different countries studied, the final selected variables for the graph analysis were educational level, gender, a self-identifying class variable, and an income scale. This selection was made to establish a unified criterion for comparing the cases of the five countries studied, to avoid problems of collinearity and redundancy, and to ensure the lowest number of missing data possible.

Although other variables in the World Values Survey (WVS) dataset, such as employment status, showed significant relationships with occupational status across all countries (as evidenced in Table 3.2.1), it was not included in the final analysis for several reasons. First, collinearity was a primary concern. The employment status variable is closely related to occupational status, and including both could introduce multicollinearity into the analysis. This issue arises because employment status, which captures whether an individual is employed, unemployed, or inactive, is inherently connected to occupational status, potentially leading to overlapping or redundant information that could obscure the distinct contributions of each variable.

Second, the decision was influenced by redundancy considerations. While employment status is significant, it may not provide additional unique insights beyond what is already captured by the occupational status variable. Occupational status inherently reflects an individual's position within the labor market, including aspects related to their employment situation. Therefore, adding employment status as a separate variable might duplicate information without significantly enhancing the analysis.

Finally, the need to minimize missing data played a crucial role in the variable selection process. Variables with higher rates of missing responses can weaken the robustness of the network analysis by leading to incomplete networks and less reliable comparisons across countries. The selected variables—educational level, gender, self-identifying class, and income scale—were chosen because they had relatively lower levels of missing data, ensuring that the analysis remained consistent and comparable across the different countries.

In summary, the exclusion of the employment status variable was a strategic decision aimed at maintaining the clarity, coherence, and comparability of the social network structures analyzed in the thesis. The chosen variables were selected to provide a comprehensive and methodologically sound approach to understanding social stratification across multiple countries, focusing on those variables that offered the most distinct and reliable insights.

However, before discussing the key methods and methodological concepts, it is essential to briefly address the logic behind utilizing occupational categories as the focal variable for modelling social network. The classification of individuals based on their official work status has emerged as a predominant methodological strategy in contemporary sociological research to address class and social stratification problems and it has been used extensively in empirical research, notably in the works of Erik Olin Wright, John Goldthorpe, David Grusky and Aage B. Sørensen, among others (Rojas Ospina, 2020), and its use as a proxy of class position can be traced even to the origins of sociology as well. These classifications, often derived from governmental or institutional employment categories, are employed as proxy variables in models designed to infer a wide range of social properties, such as class positions. This approach leverages the assumption that one's occupation or official work status can serve as a reliable indicator of various socio-economic factors, including income level, social class, education, and even lifestyle preferences.

Still, the reliance on official work-based classifications as a primary methodological approach remains as a matter of debate among researchers. The limitations of using these proxies for comprehensive social analysis have been a significant area of debate among scholars (Connelly et al., 2016; Savage et al., 2013). Key concerns include the potential for oversimplification of complex social realities and the risk of obscuring the nuanced ways in which individuals engage with and experience the labour market. To some extent, theoretical inconsistencies might originate from the epistemological complexities tied to the study of social classes. The absence of a singular, universally acknowledged definition of social class, coupled with the lack of a consistent approach for its operationalization, are issues that naturally emerge from the fundamental character of social science research itself (Hening & Liao, 2010). Therefore, the prevalent reliance on proxy variables or indicators, such as occupational categories, to represent social class persists and is likely to remain a useful methodological resource for sociologists in the future.

4. RESULTS: NETWORK ANALYSIS OF CLASS AND OCCUPATIONAL STRUCTURES

This chapter presents a descriptive analysis of the various variables examined for each of the countries studied. Following this, it shows the results of the network analysis, including an examination of the structure of each constructed network, correlation results, community detection, and analysis of its structural patterns.

4.1 Descriptive evidence

The socio-occupational structure of the five countries analysed exhibits both common and specific characteristics. While for each case, there are similarities in the types of occupations present within its workforce, the proportions and emphases placed on specific occupational categories vary significantly which resemble distinct hierarchization patterns of the studied population. Descriptive results for each country are summarized in the following table:

Table 4.1.1; Distribution of occupational categories per country

Occupational position	Brazil	China	Germany	Russia	United States
Clerical	16%	10%	23.70%	9.30%	11%
Farm owner, farm manager	0.10%	3.20%	1.20%	0.20%	0.20%
Farm worker	7.70%	12.30%	0.90%	3.60%	0.70%
Higher administrative	1.90%	2.80%	7.80%	3.10%	6.80%
Professional and technical	12.10%	14.30%	14.80%	22.50%	40.10%
Sales	16.70%	15.90%	10.70%	10.50%	9.40%
Semi-skilled worker	11.30%	10.60%	4.70%	17.70%	4.20%
Service	12.60%	11.30%	15%	13.60%	12.40%
Skilled worker	9.90%	13.80%	18.70%	13.20%	9.80%
Unskilled worker	11.80%	5.70%	2.50%	6.40%	5.30%
Total	100%	100%	100%	100%	100%

Source: elaborated by author with data from (WVS, 2023).

Firstly, it is possible to observe there are significant variations in the distribution of occupational categories among the listed countries. For instance, in Germany and Brazil, clerical work seems to be more prevalent compared to other countries, with Brazil leading at 16.0% and China following closely at 10.0%. In contrast, Germany has the highest percentage of clerical workers at 23.7%, Another notable observation is the disparity in the distribution of farm-related occupations. China has a relatively higher percentage of farm workers and owners compared to other nations. On the other hand, the United States and Germany have minimal representation in this category.

In terms of professional and technical roles, the United States stands out with a significant percentage of 40.1%, indicating a strong emphasis on specialized skills and expertise within its workforce. This is followed by Russia at 22.5%, suggesting a similar trend in prioritizing professions requiring higher levels of education and training. The distribution of skilled and unskilled workers also varies among the countries, with Germany having the highest percentage of skilled workers at 18.7%. Conversely, China has a lower percentage of skilled workers compared to its counterparts.

Table 4.1.2; Distribution of female occupied population per occupational categories and country

Country	Brazil	China	Germany	Rusia	United States
Clerical	59.9	59.7	66.5	81.5	72.6
Farm worker, manager	41.9	62.1	37.5	66.1	40.0
Higher administrative	53.7	30.3	38.3	52.1	36.3
Professional and technical	60.0	52.7	42.5	61.2	42.4
Sales	55.9	61.8	59.3	72.5	48.7
Semi-skilled worker	24.9	39.7	37.5	42.1	27.9
Service	56.2	61.6	79.7	75.7	50.3
Skilled worker	29.8	35.0	18.6	28.8	19.3
Unskilled worker	66.8	53.8	65.3	51.8	36.3

Source: elaborated by author with data from (WVS, 2023).

Furthermore, there seems to be clearly distinctive patterns in terms of gender distribution among countries and occupational groups. Russia consistently shows high percentages of women across a wide range of occupational positions. Notably, in clerical roles, Russia leads with 81.5% of women, highlighting a significant gender skew in this sector. Additionally, Russia exhibits a strong female presence in sales (72.5%) and service positions (75.7%), indicating a trend where women are highly represented in customer-facing and support roles. Even in traditionally male-dominated fields, such as professional and technical positions, Russia maintains a relatively high percentage of women (61.2%).

Brazil displays high percentages of women in unskilled worker roles (66.8%) and professional/technical positions (60.0%). The high percentage of women in unskilled positions may point to economic factors where women are a significant part of the labor force in less specialized jobs. Conversely, the substantial presence of women in professional and technical roles suggests that there are opportunities for women to advance in fields requiring higher education and specialized skills.

Germany shows particularly high percentages of women in clerical (66.5%) and service positions (79.7%). The high percentage in service positions is noteworthy, indicating that women are the majority in roles such as hospitality, healthcare, and personal services. This may suggest societal norms or labor market structures in Germany that channel women into these sectors. Similarly, the high percentage in clerical positions might reflect organizational hierarchies where women are prevalent in administrative support roles.

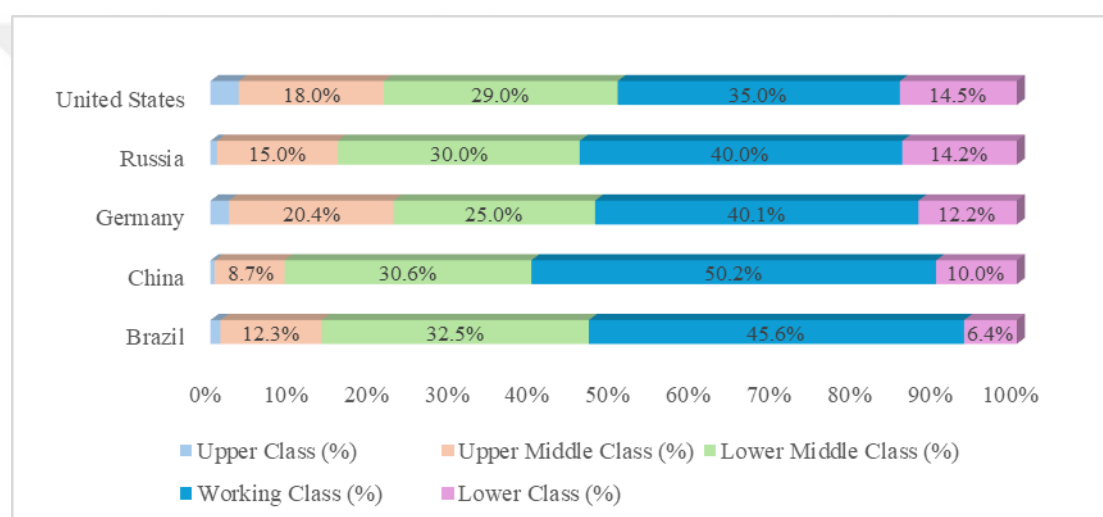
China has a high percentage of women in farm worker/manager roles (62.1%) and semi-skilled worker positions (39.7%). The significant female representation in agricultural roles could be attributed to China's large rural population and traditional agricultural practices where women play a crucial role. In semi-skilled positions, the presence of women points to their participation in manufacturing and other industries that require moderate levels of skill.

The United States tends to have lower percentages of women in several occupational categories compared to other countries. For instance, in skilled worker positions, the percentage of women is relatively low (19.3%), suggesting potential barriers to entry or advancement for women in these roles. Similarly, in professional and technical positions, the percentage of women (42.4%) is lower than in countries like Russia and Brazil. However, the United States shows a higher percentage of women in clerical positions (72.6%), indicating that administrative roles are more gender balanced. This mixed representation reflects the diverse

and complex nature of the U.S. labor market, where women have significant representation in some sectors but face challenges in others.

In terms of self-identification with a particular social class, the data reveals notable differences and similarities across five diverse countries: The survey respondents were asked to identify themselves within five social class categories: upper class, upper middle class, lower middle class, working class, and lower class. The resulting distribution provides insights into how individuals perceive their socio-economic status within these varied national contexts. This analysis helps to understand the prevailing socio-economic landscape and the proportion of the population that associates itself with each social class in these countries.

Graphic 4.1.3 : Percentage Distribution of Social Classes by Countr



Source: elaborated by author with data from (WVS, 2023).

In Brazil, the upper class comprises 1.2% of respondents, the upper middle class 12.3%, the lower middle class 32.5%, the working class 45.6%, and the lower class 6.4%. China shows a slightly different distribution, with 0.5% in the upper class, 8.7% in the upper middle class, 30.6% in the lower middle class, 50.2% in the working class, and 10.0% in the lower class. Germany has a higher percentage in the upper middle class, with 20.4%, while 2.3% of respondents identify as upper class, 25.0% as lower middle class, 40.1% as working class, and 12.2% as lower class.

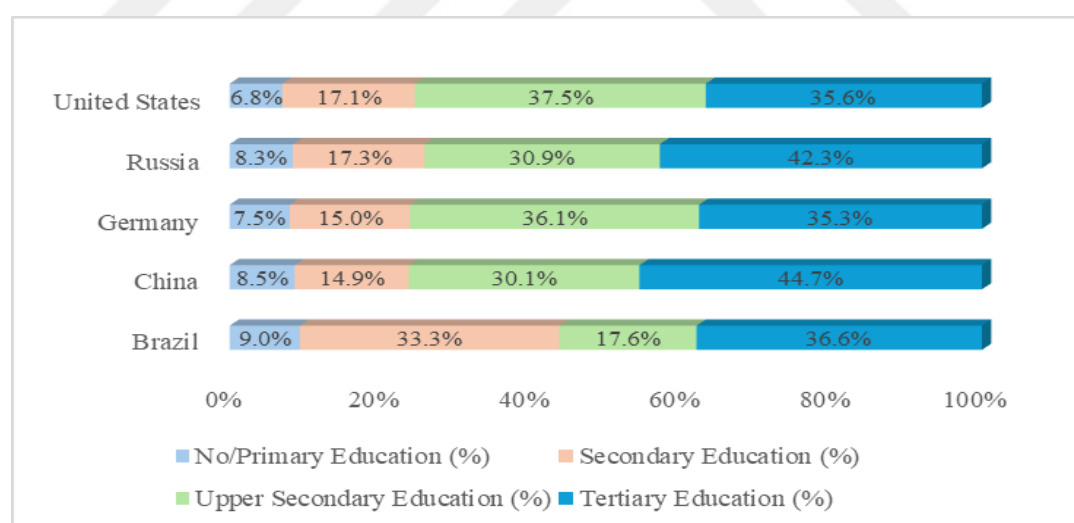
In Russia, 0.8% identify as upper class, 15.0% as upper middle class, 30.0% as lower middle class, 40.0% as working class, and 14.2% as lower class. Lastly, in the United States, the upper class represents 3.5% of respondents, the upper middle class 18.0%, the lower middle class 29.0%, the working class 35.0%, and the lower class 14.5%. These results indicate that

the majority of respondents in all five countries identify as belonging to the working or middle classes, with relatively smaller percentages identifying as upper or lower class. Notably, the United States has the highest percentage of respondents identifying as upper class, while China has the highest percentage of respondents identifying as working class.

The differences in occupational categories, which are objective socioeconomic characteristics to some extent, can lead to the identification of a broader stratification structure characterized by variations in education level, income, value systems, and self-assessment of one's position within the stratification, among other factors. These distinctions can have empirical effects on various aspects of social life, such as educational accomplishment and income distribution (Coradini, 2019) (Kim et al., 2019), self-identification with a particular social archetype or sociopsychological profile standing (Navarro-Carrillo et al., 2020) and even epidemiological implications (Wang et al., 2018) (Muscatell et al., 2018).

The next graph summarizes the results of educational level across the countries analysed, shedding light on the distribution of educational attainment among their respective populations.

Graphic 4.1.4 : Percentage Distribution of educational level by Country



Source: elaborated by author with data from (WVS, 2023).

Brazil exhibits a notable emphasis on tertiary education (36.6%) and upper secondary education (17.6%), trends that seem to be consistent with the recent trends of Brazilian economy towards its pursuit of becoming an industrialized economy. This trend suggests a growing recognition of the importance of advanced education in fostering skilled labor forces and driving innovation within the Brazilian economy. China, conversely, demonstrates an even

more pronounced focus on tertiary education (44.7%) and upper secondary education (30.1%). The substantial investment in tertiary education underscores China's commitment to cultivating a highly skilled workforce capable of fuelling its economic growth and technological advancements (Erro-Garcés & Aranaz – Nuñez, 2020).

Germany's educational landscape portrays a balanced distribution across educational categories, with significant proportions in tertiary education (35.3%) and upper secondary education (36.1%). This equilibrium reflects Germany's renowned vocational education system, which combines theoretical learning with practical training, fostering a highly skilled and adaptable workforce capable of meeting the demands of a dynamic global economy. Russia's educational profile mirrors Germany's in its balanced distribution, with substantial percentages in tertiary education (42.3%) and upper secondary education (30.9%).

This suggests a concerted effort to invest in both higher education and secondary schooling, aiming to equip the population with diverse skill sets and knowledge bases to thrive in an increasingly competitive global landscape. In contrast, the United States showcases a diverse educational distribution, with considerable percentages in tertiary education (35.6%) and upper secondary education (37.5%), as it is expected in a highly developed capitalistic economy. Overall, there is a shared recognition of the importance, among the analysed countries, of tertiary upper secondary education in fostering skilled labor forces and driving innovation. However, each country's emphasis varies, reflecting distinct economic and social goals, as well as different stages of development.

The income levels in the study were categorized into three distinct groups for analysis. Individuals with income levels ranging from 1 to 3 were classified as belonging to the "Lower Level," which generally represents the lower-income population, often associated with the working class or lower-middle class. Those with income levels from 4 to 7 were grouped under the "Middle Level," representing the middle-income population, which may include individuals with stable jobs and access to moderate resources.

In relation to the income levels there are also distinct patterns across the countries studied. In Brazil, a significant proportion of the population, approximately 40.68%, falls within the "Lower Level" income category. This suggests a sizable segment of the populace may belong to the working class or lower-middle class, facing economic challenges that could include limited access to resources and opportunities (Loureiro, 2019). Meanwhile, China exhibits a different distribution, with a substantial majority, around 60.50%, falling within the

"Middle Level" category. This may indicate a burgeoning middle class, reflective of China's rapid economic growth and urbanization, potentially enjoying improved standards of living and increased consumption (Yang et al., 2022).

Table 4.1.5: Distribution of income level per country

Country	Upper level	Middle level	Lower level	Total
Brazil	5.72%	53.59%	40.68%	100%
China	2.66%	60.50%	36.84%	100%
Germany	6.31%	77.07%	16.62%	100%
Russia	8.36%	64.17%	27.48%	100%
United States	8.23%	71.32%	20.45%	100%

Source: elaborated by author with data from (WVS, 2023).

In contrast, Germany portrays a markedly different scenario, with a considerable 77.07% of the population classified under the "Middle Level" income category. This reflects Germany's reputation for a robust social welfare system, equitable income distribution, and a thriving middle class, suggesting a society characterized by economic stability and a strong social safety net. Russia's income distribution shows a relatively balanced representation across the income categories, with around 64.17% in the "Middle Level" category. This suggests a moderate but significant middle class, likely influenced by Russia's transition from a centrally planned to a market-based economy, albeit with ongoing socioeconomic disparities (Bezpalov et al., 2020).

Lastly, the United States demonstrates a similar trend to Germany, albeit with a lower percentage, with approximately 71.32% falling within the "Middle Level" income category. Despite being a highly developed capitalist economy, the substantial middle-class representation underscores the American Dream narrative of upward mobility and economic prosperity. However, it's notable that a considerable proportion, around 20.45%, still falls within the "Lower Level" category, indicative of persistent income inequality and socioeconomic challenges (Saez & Zucman, 2020).

The descriptive evidence presented so far offers a preliminary look into the patterns and relationships among income, educational level, and self-perception of social class across the five countries studied. This analysis raises important discussions regarding how stratification patterns are structured within each country and highlights key elements that connect these variables to form distinct class identities.

Despite individuals having low levels of educational attainment or belonging to the lower levels of the income distribution in their respective countries, they tend to identify themselves more with the middle class than with the working or lower classes overall, while upper classes tend to have a more consistent and unified socioeconomical composition and a more stable class and status identity (Huang, 2021). This phenomenon can be attributed to several factors such as cultural and social aspirations, as well as the generalized amplification of consumption of goods to be considered as symbols of status. Furthermore, there is a shared set of cultural aspirations towards the middle class, which is often associated with stability, respectability, and upward mobility (Mac-Clure et al., 2020).

The evidence suggests that self-perception of social class is both dependent on objective measures and by a complex interplay of cultural norms, personal aspirations, and relative social comparisons in terms of position regarding the occupational structure and the stratification system overall. On one hand, the objective approach to class analysis emphasizes measurable criteria such as income, occupation, education level, and wealth. These objective indicators provide a quantitative framework for assessing individuals' socioeconomic status within society which may lead to a higher correspondence between objective socioeconomic characteristics and class identity. On the other hand, the subjective approach recognizes that individuals' perceptions of their own social position are influenced by cultural and social values, as well as by comparisons with others in their social environment. This perspective acknowledges the role of cultural norms, aspirations, and symbolic markers of status in shaping individuals' class identities. To go further into the evidence discussed so far it is necessary to study empirically connections and relationships through the application of network analysis.

4.2 Network analysis of occupational and class structures for selected countries

The use of network analysis its aim to explore the affinities between different occupational categories, providing insight into the socioeconomic similarities and differences that shape class. By calculating the affinity values as the inverse of the Euclidean distance between occupational class profiles, it is possible to quantitatively assess the closeness of various roles within the socioeconomic landscape. Higher affinity values indicate greater similarity between the profiles of two occupational classes, reflecting class perceptions among the members of a pair of occupational groups that as an aggregate constitute the network. This approach allows to understand how individuals in different occupations share similarities in terms of their identification with a particular position in the class structure. Ultimately, this analysis seeks to elucidate the relationships between occupational roles and social class,

offering a deeper understanding of the factors that contribute to class identity and stratification in society.

4.3 Affinity networks for occupational categories in Brazil

As it was explained in detail in the methodology section, the process of building networks began by calculating affinity scores for each occupational position. These scores were derived from the normalized proportions of three key variables: educational level, self-identified class, and income scale. These scores essentially measure how similar or related different occupational positions are to one another based on these factors.

To determine the strength of the relationships between different occupational positions, the Euclidean distance was calculated between their affinity profiles. This distance provides a measure of how different two positions are; the smaller the distance, the more similar the positions. The strength of the connection between two positions was then represented as a weight, which is inversely related to the distance—meaning that more similar positions (with smaller distances) have stronger connections (heavier weights).

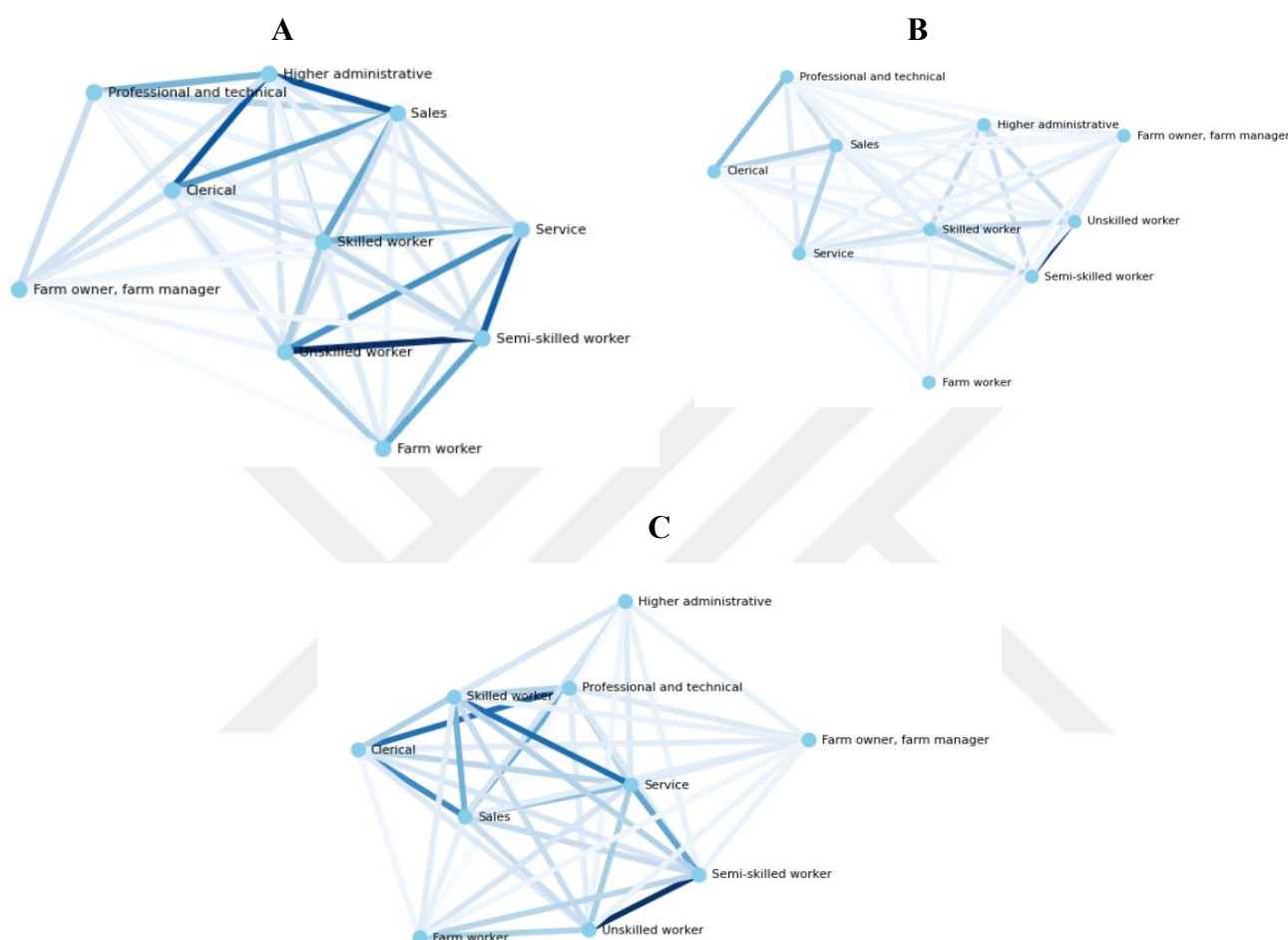
In Brazil, the affinity between "Professional and Technical" and "Clerical" occupations is notably high, with a value of 5.4⁷, suggesting that individuals in these roles share similar socioeconomic traits and class perceptions. In contrast, the affinity between "Professional and Technical" and "Service" occupations is much lower, at 1.4, indicating significant differences in their socioeconomic profiles. The "Professional and Technical" category also shows moderate affinities with "Skilled Worker" (1.9) and "Semi-skilled Worker" (1.4) categories, suggesting some level of similarity. However, the affinity with "Farm Worker" is lower, at 1.2, indicating a closer socioeconomic connection compared to service-related occupations.

Higher administrative roles in Brazil display a high affinity with clerical occupations, with a value of 7.3, indicating that these two categories share similar socioeconomic characteristics and class perceptions. However, the affinity with service occupations (2.0) and farm worker roles (1.3) is lower, reflecting more significant socioeconomic differences. Sales occupations exhibit a strong affinity with clerical roles (5.3), suggesting similar class perceptions and socioeconomic traits. However, their affinity with service roles is moderate

⁷ The list of normalized and non-normalized affinity scores can be consulted in the annex

(2.4), and with "Farm Owner, Farm Manager" roles, the affinity is higher at 1.8, indicating notable differences yet some level of socioeconomic overlap.

Graphic 4.3.1 : Self-Perception of Class (A), educational level (B) and income levels (C), affinity network for Occupational Categories Affinity Network in Brazil



Source: elaborated by author with data from (WVS, 2023).

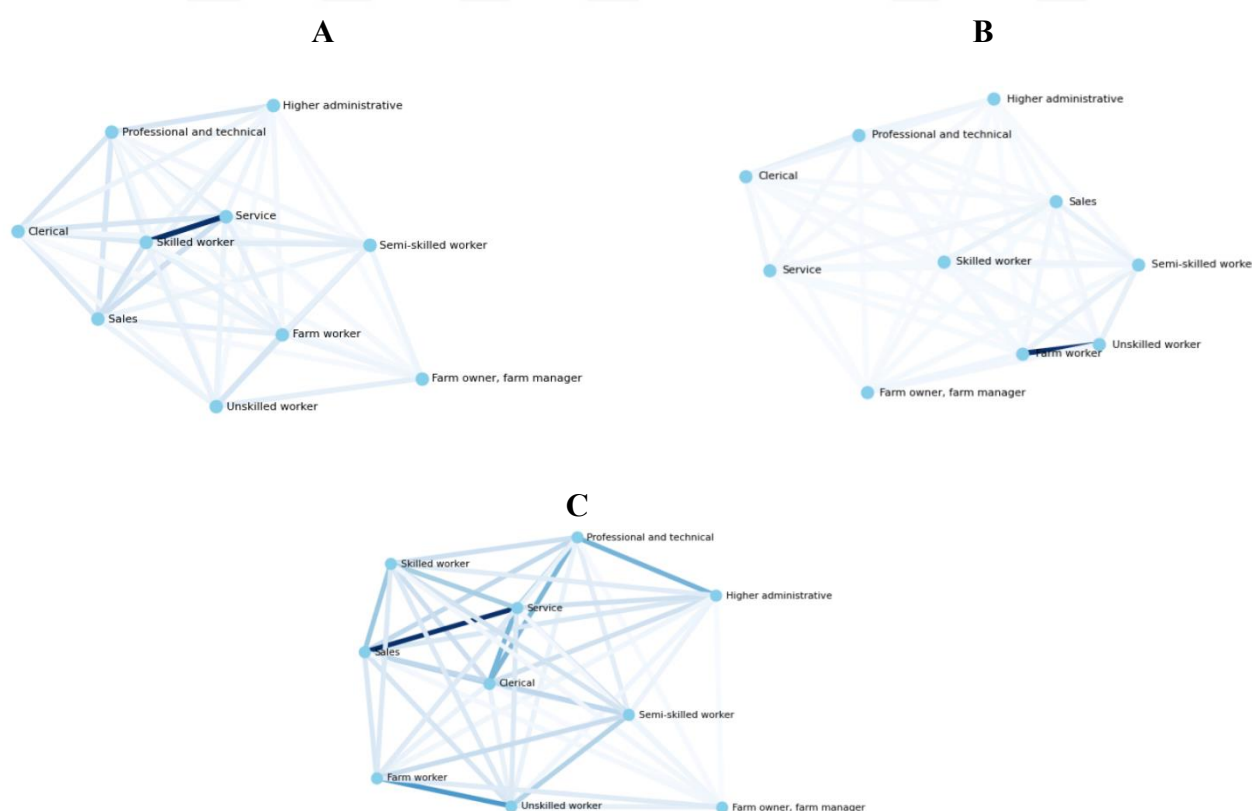
Furthermore, service occupations in Brazil have a moderate affinity with skilled workers (4.4) but a lower affinity with "Farm Owner, Farm Manager" (1.2), . Similarly, skilled workers show a moderate affinity with semi-skilled workers (3.0) but a lower affinity with farm workers (1.9). The highest affinity reflected in the network is between semi-skilled and unskilled workers, at 8.4, suggesting these categories are very similar in socioeconomic traits and class perceptions. Conversely, semi-skilled workers exhibit lower affinity with farm workers (4.9) and "Farm Owner, Farm Manager" (1.2), reflecting more considerable differences. Unskilled workers show moderate affinity with farm workers (3.5) and "Farm

Owner, Farm Manager" (1.4), indicating notable socioeconomic differences. Finally, the affinity between farm workers and "Farm Owner, Farm Manager" is relatively low at 1.1, reflecting significant differences in socioeconomic profiles despite both being related to agricultural work, a situation that may be explained by the different positions that these types of workers have regarding the means of production.

4.4 Affinity networks for occupational categories in China

In China, professional and technical occupations demonstrate a notably high affinity with higher administrative roles, with an affinity value of 4.9, suggesting shared socioeconomic traits and class perceptions between these two categories. Conversely, the affinity between professional and technical occupations and service roles is comparatively lower, at 3.3, indicating significant differences in their socioeconomic profiles and class perceptions. Additionally, professional and technical occupations show moderate affinities with skilled workers (3.1) and semi-skilled workers (1.7), implying some level of similarity, while their affinity with farm workers is notably higher, at 2.0, indicating a closer socioeconomic connection compared to service-related occupations.

Graphic 4.4.1 : Self-Perception of Class (A), educational level (B) and income levels (C), affinity network for Occupational Categories Affinity Network in China



Source: elaborated by author with data from (WVS, 2023).

Higher administrative roles in China exhibit a high affinity with clerical occupations, with a value of 2.4, indicating shared socioeconomic characteristics and class perceptions. However, the affinity with service occupations (2.1) and farm owner, farm manager roles (1.0) is lower, reflecting more significant socioeconomic differences. Clerical roles also demonstrate a strong affinity with sales occupations (4.4), suggesting similar class perceptions and socioeconomic traits. However, their affinity with service roles is notably higher, at 5.0, and with skilled worker roles, the affinity is 4.2, indicating some differences yet some level of socioeconomic overlap.

Sales occupations in China show a strong affinity with service roles (6.1), indicating shared socioeconomic characteristics and class perceptions. However, their affinity with skilled worker roles is slightly lower, at 5.7, and with farm owner, farm manager roles, the affinity is 1.4, indicating notable differences yet some level of socioeconomic overlap. Service occupations exhibit a remarkably high affinity with skilled worker roles, at 25.1, suggesting considerable closeness and tightness of the network between these occupational categories. However, their affinity with semi-skilled worker roles is 3.2, and with farm owner, farm manager roles, the affinity is 1.4, indicating notable differences in socioeconomic profiles.

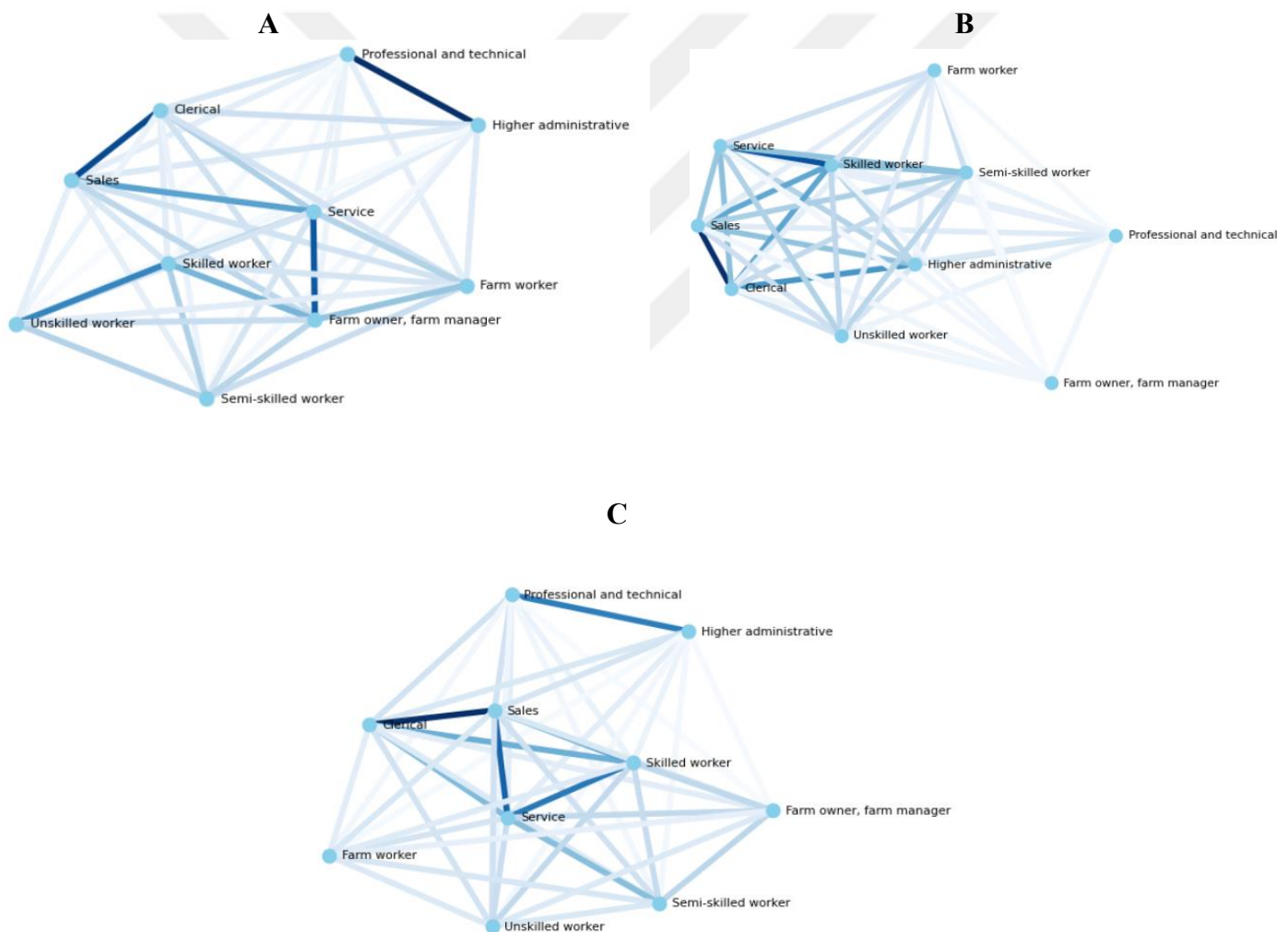
Skilled worker roles in China show moderate affinities with semi-skilled worker roles (3.5) but a lower affinity with farm worker roles (3.0), suggesting some similarities in socioeconomic traits with the former and notable differences with the latter. Semi-skilled worker roles demonstrate a remarkably high affinity with unskilled worker roles, at 4.7. However, their affinity with farm worker roles is lower, at 2.8, and with farm owner, farm manager roles, the affinity is 2.2, indicating notable differences. Unskilled worker roles show a moderate affinity with farm worker roles (4.9) and farm owner, farm manager roles (3.2). Finally, the affinity between farm worker roles and farm owner, farm manager roles is relatively low, at 2.2, reflecting significant differences in socioeconomic profiles despite both being related to agricultural work.

4.5 Affinity networks for occupational categories in Germany

Professional and technical occupations in Germany display a notably high affinity with higher administrative roles, with an affinity value of 8.5. This suggests a strong correlation in socioeconomic backgrounds and class identities between these two categories. In contrast, the affinity between professional and technical occupations and clerical roles is significantly lower, at 2.1, indicating substantial differences in their socioeconomic profiles and class perceptions. Additionally, professional and technical occupations demonstrate

relatively low affinities with sales (1.7) and service roles (1.5), suggesting distinct socioeconomic characteristics compared to these occupational categories. The affinity with skilled worker roles is even lower, at 1.0, indicating a notable divergence in class perceptions and socioeconomic traits between professional and technical occupations and skilled workers. Similarly, professional and technical occupations exhibit low affinities with semi-skilled (1.0), unskilled (0.9), and farm worker roles (1.7), further highlighting significant differences in class perceptions and socioeconomic backgrounds.

Graphic 4.5.1 : Self-Perception of Class (A), educational level (B) and income levels (C), affinity network for Occupational Categories Affinity Network in Germany



Source: elaborated by author with data from (WVS, 2023).

Higher administrative roles in Germany demonstrate a strong affinity with clerical occupations, with an affinity value of 2.5, indicating a shared socioeconomic background and class perceptions between these two categories. However, the affinity with service roles (1.7) and farm worker roles (1.3) is notably lower, indicating significant differences in socioeconomic profiles. Clerical roles exhibit a strong affinity with sales roles (7.8), suggesting similar class perceptions and socioeconomic traits. Additionally, clerical roles display moderate affinities with service (3.4) and farm owner, farm manager roles (2.4), indicating some differences yet some level of socioeconomic overlap.

Sales roles in Germany show a strong affinity with service roles (5.1), indicating shared socioeconomic characteristics and class perceptions. However, their affinity with skilled worker roles is relatively low, at 2.0, indicating notable differences in socioeconomic profiles. The affinity with farm owner, farm manager roles is slightly higher, at 3.0, suggesting some socioeconomic overlap. Service roles exhibit a remarkably high affinity with farm owner, farm manager roles, at 7.3, suggesting considerable similarities in socioeconomic traits and class perceptions. However, their affinity with skilled worker roles is moderate (3.2), indicating some differences in socioeconomic profiles.

Skilled worker roles in Germany show moderate affinities with semi-skilled worker roles (3.4) but a notably higher affinity with unskilled worker roles (6.0), suggesting considerable similarities in socioeconomic traits and class perceptions with the latter. The affinity with farm worker roles is relatively low, at 2.2, indicating significant differences in socioeconomic profiles. Semi-skilled worker roles demonstrate a moderate affinity with unskilled worker roles (3.2) and farm worker roles (2.6), indicating some similarities in socioeconomic traits with both categories. However, their affinity with farm owner, farm manager roles is notably higher, at 3.1, suggesting notable socioeconomic overlap.

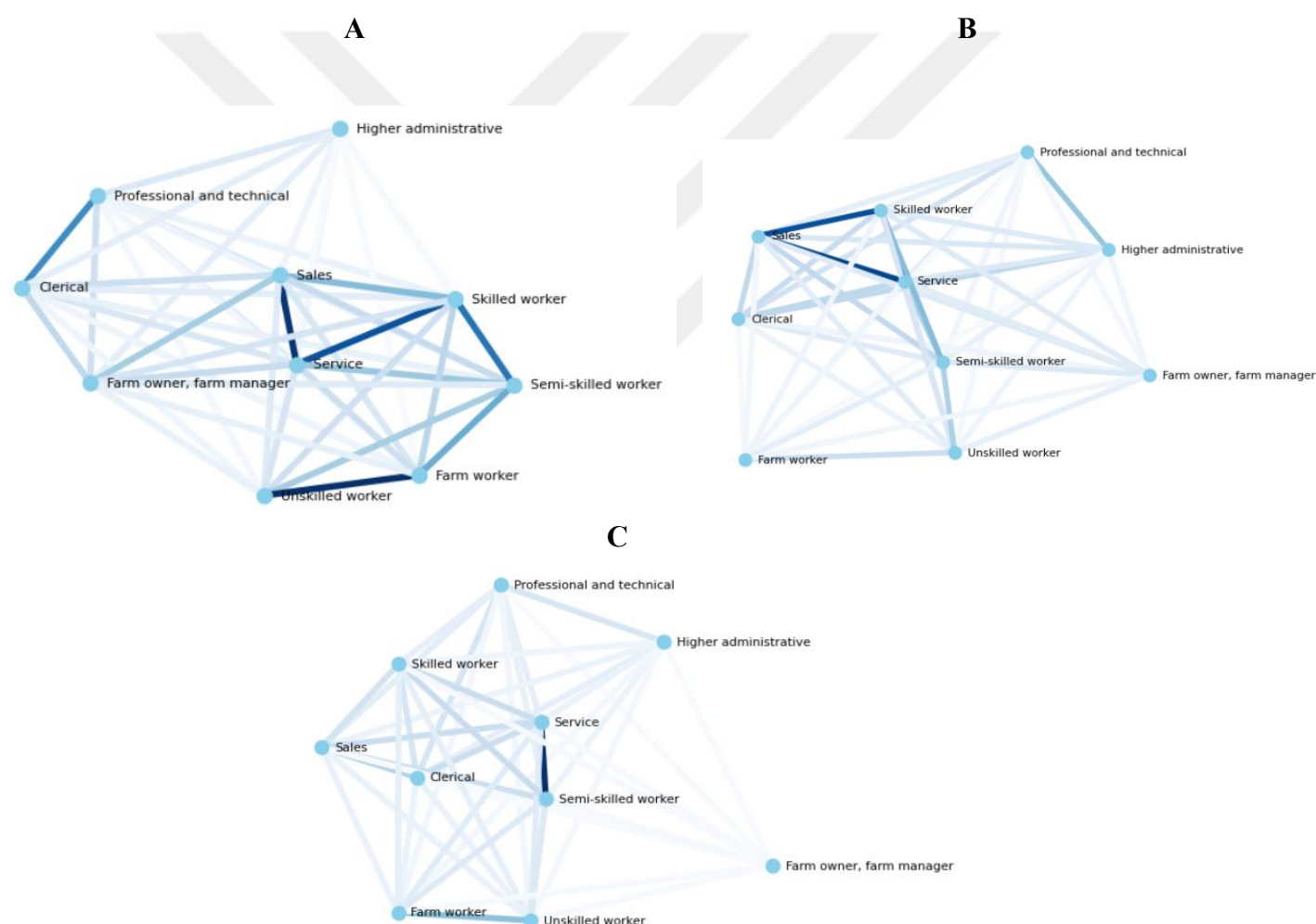
Unskilled worker roles in Germany show a moderate affinity with farm worker roles (1.7) and farm owner, farm manager roles (2.7), indicating some socioeconomic differences between these categories. The affinity between farm worker roles and farm owner, farm manager roles is relatively high, at 3.9, reflecting notable similarities in socioeconomic profiles despite differences in occupational roles.

4.6 Affinity networks for occupational categories in Russia

In Russia, higher administrative roles demonstrate a moderate affinity with clerical occupations, with an affinity value of 2.5, indicating a modest correlation in socioeconomic

backgrounds and class perceptions between these two categories. Conversely, the affinity with service roles (1.6) and farm worker roles (0.7) is notably lower, indicating significant differences in socioeconomic profiles. Professional and technical occupations exhibit a moderate affinity with higher administrative roles, with an affinity value of 3.3, suggesting a modest correlation in socioeconomic backgrounds and class perceptions between these two categories. Conversely, the affinity between professional and technical occupations and clerical roles is notably lower, at 1.9, indicating significant differences in their socioeconomic profiles and class perceptions.

Graphic 4.6.1 : Self-Perception of Class (A), educational level (B) and income levels (C), affinity network for Occupational Categories Affinity Network in in Russia



Source: elaborated by author with data from (WVS, 2023).

Sales roles in Russia show a strong affinity with service roles (6.8), indicating shared socioeconomic characteristics and class perceptions. However, their affinity with skilled

worker roles is relatively high, at 6.6, indicating some notable similarities in socioeconomic profiles. The affinity with farm owner, farm manager roles is slightly lower, at 1.5, suggesting some socioeconomic overlap. Clerical roles exhibit a moderate affinity with sales roles (2.4), suggesting some similarities in class perceptions and socioeconomic traits. Additionally, clerical roles display moderate affinities with service (2.5) and farm owner, farm manager roles (1.0), indicating some differences yet some level of socioeconomic overlap.

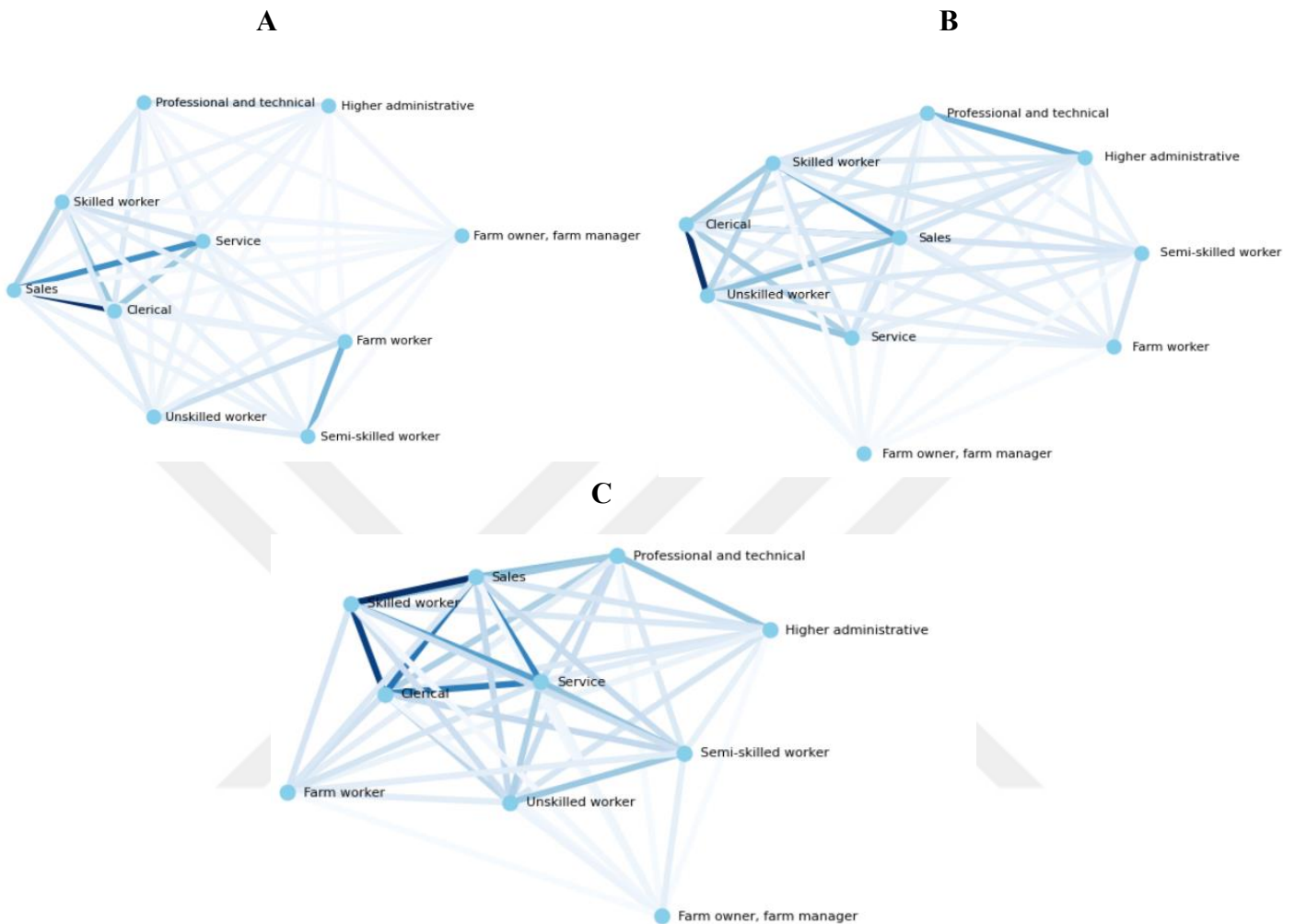
Service roles in Russia exhibit a remarkably high affinity with skilled worker roles, at 7.4, suggesting considerable similarities in socioeconomic traits and class perceptions. However, their affinity with semi-skilled worker roles is moderate (2.7), indicating some differences in socioeconomic profiles. Skilled worker roles show moderate affinities with semi-skilled worker roles (3.6) but a notably lower affinity with unskilled worker roles (1.7), suggesting considerable similarities in socioeconomic traits with the former and notable differences with the latter. The affinity with farm worker roles is relatively low, at 1.0, indicating significant differences in socioeconomic profiles. Semi-skilled worker roles demonstrate a moderate affinity with unskilled worker roles (2.9) and farm worker roles (1.3), indicating some similarities in socioeconomic traits with both categories. However, their affinity with farm owner, farm manager roles is slightly higher, at 1.6, suggesting some socioeconomic overlap.

Unskilled worker roles in Russia show a moderate affinity with farm worker roles (2.1) and farm owner, farm manager roles (1.2), indicating some socioeconomic differences between these categories. Finally, the affinity between farm worker roles and farm owner, farm manager roles is relatively low, at 0.9, reflecting notable differences in socioeconomic profiles despite both being related to agricultural work.

4.7 Affinity networks for occupational categories in United States

In the United States, clerical roles exhibit a remarkably high affinity with sales roles, boasting an affinity value of 13.6. This indicates strong similarities in class perceptions and socioeconomic traits between these two categories. Additionally, clerical roles show considerable affinities with service roles (5.6) and skilled worker roles (5.7), suggesting shared socioeconomic backgrounds and class perceptions. However, their affinities with semi-skilled worker roles (1.5), unskilled worker roles (1.7), farm worker roles (1.6), and farm owner, farm manager roles (1.1) are notably lower, indicating significant differences in socioeconomic profiles.

Graphic 4.7.1 : Self-Perception of Class (A), educational level (B) and income levels (C), affinity network for Occupational Categories Affinity Network in United States.



Source: elaborated by author with data from (WVS, 2023).

Sales roles in the United States demonstrate strong affinities with service roles (8.8) and skilled worker roles (5.0), reflecting shared socioeconomic characteristics and class perceptions. However, their affinities with semi-skilled worker roles (1.6), unskilled worker roles (1.7), farm worker roles (1.7), and farm owner, farm manager roles (1.0) are relatively lower, suggesting some differences in socioeconomic backgrounds. Service roles exhibit a remarkably high affinity with skilled worker roles, at 3.3, indicating considerable similarities in socioeconomic traits and class perceptions. However, their affinities with semi-skilled worker roles (1.6), unskilled worker roles (1.5), farm worker roles (1.6), and farm owner, farm manager roles (0.9) are notably lower, indicating significant differences in socioeconomic profiles.

Skilled worker roles in the United States demonstrate moderate affinities with semi-skilled worker roles (1.7) but a notably higher affinity with unskilled worker roles (2.3), suggesting considerable similarities in socioeconomic traits with the former and notable differences with the latter. The affinity with farm worker roles is relatively moderate, at 2.0, indicating significant differences in socioeconomic profiles. Semi-skilled worker roles exhibit a remarkably high affinity with farm worker roles, at 6.8, indicating considerable similarities in socioeconomic traits and class perceptions. However, their affinities with unskilled worker roles (2.4) and farm owner, farm manager roles (1.0) are relatively lower, suggesting some differences in socioeconomic profiles.

Unskilled worker roles in the United States show a moderate affinity with farm worker roles (3.5) and farm owner, farm manager roles (1.6), indicating some socioeconomic differences between these categories. Finally, the affinity between farm worker roles and farm owner, farm manager roles is relatively moderate, at 1.1, reflecting notable differences in socioeconomic profiles despite both being related to agricultural work.

4.8 Comparative Analysis of Network Structures: Identifying Isomorphism and Hierarchical Disparities

Comparing the social class affinities among various occupational categories across Brazil, China, Germany, Russia, and the United States reveals both intriguing differences and notable similarities. In Brazil, there's a pronounced affinity between professional and technical occupations and clerical roles, indicating shared socioeconomic backgrounds and class perceptions. This trend is echoed in China, where professional and technical roles exhibit high affinities with higher administrative positions, suggesting similar socioeconomic traits. However, in the United States, clerical roles show a remarkable affinity with sales occupations, indicating a unique pattern compared to other countries. Across all five countries, sales roles demonstrate strong affinities with service roles, reflecting shared socioeconomic characteristics and class perceptions in the service sector. Additionally, service roles exhibit a remarkably high affinity with skilled worker roles, indicating considerable similarities in socioeconomic traits across these occupational categories.

Interestingly, while semi-skilled worker roles in Brazil and Russia show a remarkably high affinity with farm worker roles, suggesting considerable similarities in socioeconomic traits, this trend is less prominent in China, Germany, and the United States. This divergence may stem from variations in industrial structures and agricultural practices among these countries. Furthermore, the affinity between clerical roles and sales occupations is notably high

in Brazil, China, and the United States, indicating similar class perceptions and socioeconomic backgrounds in these sectors. However, this trend is less pronounced in Germany and Russia, where clerical roles exhibit stronger affinities with skilled worker roles.

In terms of disparities, the affinity between professional and technical occupations and service roles is notably lower in China compared to other countries, suggesting significant differences in socioeconomic profiles between these occupational categories. Conversely, in Germany, clerical roles demonstrate a remarkably high affinity with sales occupations, indicating a unique socioeconomic pattern compared to the other countries analysed. Overall, while there are notable differences in social class affinities among occupational categories across Brazil, China, Germany, Russia, and the United States, there are also several common trends, particularly in the strong affinity between sales and service roles, as well as the correlations between professional and technical occupations with higher administrative or clerical roles. These comparisons provide valuable insights into the complex interplay between occupational structures, social class perceptions, and socioeconomic backgrounds across different countries.

It is possible to go further into the analysis by comparing the correlations between the adjacency matrices⁸ of the affinity networks of self-perception of social class, educational level, and income levels. By examining these correlations, it is possible to gain deeper insights into the similarities and differences in social structures across different countries by studying the relationships between the networks and not only as isolated structures. In the following table it is possible to see the results of the adjacency matrixes for each one of the networks built with the occupational categories taking by reference the affinity scores built with the three variables of analysis: income, social class and educational level:

Table 4.8.1: Pearson correlations for each occupational category's adjacency matrix per country

Adjacency matrix	Brazil	China	Germany	Russia	United States
Education vs Class	0.55415	0.123069	0.410771	0.720568	0.498
Education vs Income	0.74523	0.395324	0.79154	0.445838	0.66143
Class vs Income	0.76671	0.495975	0.736347	0.503944	0.71729

Source: elaborated by author with data from (WVS, 2023)

⁸ Full adjacency matrixes for each one of the networks per country can be consulted in the annex

By examining the correlation between education and social class across these nations, it is possible to find notable variations. Brazil exhibits a moderately positive correlation of 0.554 with social class, indicating that higher levels of education tend to correspond with a higher perception of social class. Conversely, China shows a weaker positive correlation of 0.123, suggesting a less pronounced relationship between education and social class. Germany demonstrates a moderate positive correlation of 0.411, while Russia and the United States display stronger correlations of 0.721 and 0.498 respectively, underscoring the significance of education in shaping social class dynamics in these countries.

When considering the association between education and income, a clearer trend emerges. Across all nations, there is a strong positive correlation between education and income. Brazil exhibits a robust correlation of 0.745, indicating a significant relationship between higher levels of education and increased income. Similarly, China, Germany, and the United States demonstrate correlations of 0.395, 0.792, and 0.661 respectively, highlighting the global trend of higher education correlating with higher income levels. Russia presents a somewhat lower correlation of 0.446, suggesting a slightly weaker relationship between education and income compared to other nations.

Exploring the relationship between social class and income, consistent patterns emerge. Across all nations, there is a strong positive correlation between social class and income. Brazil, China, Germany, Russia, and the United States display correlations of 0.767, 0.496, 0.736, 0.504, and 0.717 respectively, indicating that higher social class tends to correspond with higher income levels across diverse socio-economic contexts. These findings underscore the complex interplay between education, social class, and income across different countries, shedding light on the varying dynamics shaping socio-economic mobility and inequality on a global scale and give important relational information.

However, it is possible to gain further insights into the composition and structure of the occupational networks through the application of a community detection algorithm such as the Louvain algorithm to understand grouping dynamics along the occupational categories when a particular variable of analysis is chosen as an affinity indicator. By applying the Louvain algorithm to the occupational networks, we can identify clusters of occupational categories that exhibit similar characteristics or roles within in terms of class. Similarly, when using education or income as affinity indicators, the algorithm can reveal how individuals with similar levels of education or income tend to cluster together occupationally. Results for each of the countries studied are shown below:

Table 4.8.2: Community Structure Analysis of Occupational Networks by Affinity Indicators Across Countries

Country	Variable of affinity	Occupational Categories communities
Brazil	Class	Professional and technical, Higher administrative, Clerical, Sales, Farm owner, farm manager
		Service, Skilled worker, Semi-skilled worker, Unskilled worker, Farm worker
	Education	Professional and technical, Clerical, Sales, Service
		Higher administrative, Skilled worker, Semi-skilled worker, Unskilled worker, Farm worker, Farm owner, farm manager
	Income	Professional and technical, Higher administrative, Clerical, Sales, Farm owner, farm manager
		Service, Skilled worker, Semi-skilled worker, Unskilled worker, Farm worker
China	Class	Professional and technical, Higher administrative, Clerical, Sales
		Service, Skilled worker, Semi-skilled worker, Unskilled worker
		Farm owner, farm manager, Other
	Education	Professional and technical, Higher administrative, Clerical, Sales, Service, Skilled worker, Farm owner, farm manager
		Semi-skilled worker, Unskilled worker
	Income	Professional and technical, Higher administrative, Clerical, Sales, Service, Skilled worker
		Semi-skilled worker, Unskilled worker
Germany	Class	Professional and technical, Higher administrative
		Clerical, Sales, Service, Skilled worker, Semi-skilled worker, Unskilled worker, Farm worker, Farm owner, farm manager
	Education	Professional and technical, Higher administrative, Clerical, Sales
		Service, Skilled worker, Semi-skilled worker, Unskilled worker, Farm worker, Farm owner, farm manager
	Income	Professional and technical, Higher administrative
		Clerical, Sales, Service, Skilled worker, Semi-skilled worker, Unskilled worker, Farm worker, Farm owner, farm manager
Russia	Class	Clerical, Sales, Service, Farm worker, Farm owner, farm manager
		Professional and technical, Higher administrative, Skilled worker, Semi-skilled worker, Unskilled worker
	Education	Professional and technical, Higher administrative, Clerical
		Sales, Service, Skilled worker
		Farm worker, Farm owner, farm manager
	Income	Professional and technical, Higher administrative, Clerical, Sales, Skilled worker, Farm owner, farm manager
		Semi-skilled worker, Unskilled worker
		Service
United States	Class	Professional and technical, Higher administrative
		Clerical, Sales, Service, Skilled worker, Semi-skilled worker, Unskilled worker, Farm worker, Farm owner, farm manager
	Education	Professional and technical, Higher administrative, Farm owner, farm manager, Other

		Clerical, Sales, Service, Skilled worker, Semi-skilled worker, Unskilled worker
	Income	Professional and technical, Higher administrative, Farm owner, farm manager, Other
		Clerical, Sales, Service, Skilled worker, Semi-skilled worker, Unskilled worker

Source: elaborated by author with data from (WVS, 2023).

The results of the community detection analysis on occupational networks for Brazil, China, Germany, Russia, and the United States reveal interesting insights into the grouping dynamics within each country's workforce. In Brazil, regardless of the affinity indicator considered—whether it's class, education, or income—two main communities consistently emerge. One community comprises roles associated with professional and technical expertise, higher administrative positions, clerical work, sales, and farm ownership or management. Meanwhile, the other community encompasses service-oriented roles along with skilled, semi-skilled, and unskilled workers, including farm workers.

Moving to China, the community structures exhibit more diversity. When considering class affinity, three distinct communities' surface. The first community comprises professional and technical roles, higher administrative positions, clerical work, and sales. The second community primarily consists of service-oriented roles and various levels of workers, while the third community is characterized by farm owners or managers and other unique roles. Similarly, when education is the affinity indicator, two communities are identified. The first community overlaps with the professional and technical roles identified previously, while the second community includes semi-skilled and unskilled workers. In terms of income affinity, the community structures align closely with those observed under class affinity, with a notable division between higher-income and lower-income occupations.

The occupational networks in Germany exhibit a similar pattern across all three affinity indicators. Two main communities emerge consistently, with the first community representing professional and technical roles, higher administrative positions, clerical work, sales, and service-oriented roles. The second community encompasses a wider range of occupations, including skilled, semi-skilled, and unskilled workers, as well as farm workers and owners or managers.

Russia's occupational networks reveal a more fragmented community structure, particularly evident when considering class affinity. Three distinct communities emerge, with

the first community mirroring the professional and technical roles observed in other countries. The second community consists of clerical, sales, and service-oriented roles, while the third community includes farm owners or managers and other roles. This fragmentation is also observed under education and income affinity, albeit with slightly different compositions.

Finally, in the United States, the occupational networks exhibit a consistent pattern across all three affinity indicators. Two main communities consistently emerge, with the first community representing professional and technical roles, higher administrative positions, and various service-oriented roles. The second community encompasses a wide range of occupations, including clerical, sales, skilled, semi-skilled, and unskilled workers, as well as farm workers and owners or managers.

It is important to note that, the modularity scores for these networks range between 0.08 and 0.2, indicating a relatively low level of modularity across all countries. Modularity measures the strength of division of a network into communities, with higher values indicating a clearer separation between different groups. The observed range of modularity scores suggests that the occupational networks analysed may lack well-defined community structures or exhibit less pronounced divisions between occupational categories based on the chosen affinity indicators. This could imply that factors other than class, education, or income may also influence occupational clustering, leading to a more interconnected network with overlapping roles and occupations.

Furthermore, all networks of the five countries exhibit similar structural characteristics, with each network comprising 10 nodes and 45 edges, resulting in an average degree of 9 and a density of 1.0. Additionally, the k-core decomposition of each network reveals that all nodes belong to the 9-core, indicating a high level of connectivity and resilience within the networks. These structural metrics suggest a uniformity in the basic topology of the occupational networks across countries, characterized by a dense network of interconnected nodes with high average degree and density, as well as a robust core structure where all nodes are highly interconnected.

Despite this structural uniformity, the Bonacich Power Centrality scores reveal nuanced differences in the influence of specific occupational categories within each country's network. For instance, a high positive centrality score indicates that a particular occupational category is highly influential within the network, meaning that individuals or positions belonging to that category have a significant impact on the flow of information, resources, or

opportunities within the workforce. On the other hand, a negative centrality score suggests that the category has less influence or centrality within the network. The following table highlights the three most influential nodes of the occupational networks per country:

Table 4.8.3: Community Structure Analysis of Occupational Networks by Bonacich Power Centrality Across Countries

Country	Top 1	Top 2	Top 3
Brazil	Skilled worker	Service	Semi-skilled worker
China	Higher administrative	Professional and technical	Semi-skilled worker
Germany	Professional and technical	Higher administrative	Semi-skilled worker
Russia	Skilled worker	Service	Farm owner, farm manager
USA	Farm owner, farm manager	Farm worker	Professional and technical

In Brazil, where the networks delineate occupational categories, roles such as Professional and technical, alongside Higher administrative, emerge as pivotal nodes across all three networks. These roles wield considerable influence, as evidenced by their moderate positive centrality scores. This suggests that individuals occupying these positions play significant roles in shaping the network's connectivity and information flow. Conversely, in China, a more pronounced influence is observed within the Higher administrative, Clerical, and Sales categories. These roles exhibit high positive centrality scores across educational and income-based networks, underscoring their critical importance in the network's architecture. The prominence of these roles suggests a hierarchical structure where individuals in administrative and managerial positions exert substantial influence over the network's dynamics.

Germany's network portrays a unique landscape, characterized by a balanced distribution of influence across occupational categories. While roles such as Professional and technical and Higher administrative maintain moderate positive centrality scores, categories

like Sales and Service display negative centrality scores. This indicates a more distributed influence, where individuals across various occupational roles contribute to the network's cohesion and information dissemination, albeit to varying degrees.

In Russia, categories like Clerical and Sales emerge as central nodes, boasting high positive centrality scores across occupational, educational, and income-based networks. Meanwhile, roles within the Skilled worker and Unskilled worker categories exhibit lower negative centrality scores, suggesting a hierarchical structure where certain occupational roles hold greater influence over others.

Lastly, the United States' network showcases a diverse landscape, with notable positive centrality scores observed for categories such as Semi-skilled worker, Unskilled worker, and Farm worker. These roles play crucial roles in facilitating information flow and network connectivity, particularly within educational and income-based networks. Meanwhile, categories like Higher administrative and Professional and technical maintain moderate positive centrality scores, indicating their importance in shaping the network's structure and dynamics.

5. DISCUSSION AND CONCLUSION

The structure of occupational categories, serving as a foundation for socioeconomic characteristics, reveals a complex stratification within society marked by differences in education level, income, value systems, and self-assessment of social standing. This research utilizes network analysis to provide a novel perspective on social stratification, focusing on the intricate interplay between these factors and their manifestation across different national contexts.

Network analysis has emerged as a valuable method for studying social stratification and has become a significant development in quantitative research. Complementary to traditional probabilistic and inferential statistical approaches, network analysis focuses on the modelling of networks with particular mathematical properties that account for the nature of the studied relationships. Because of its explanatory potential, it has been widely adopted as a methodological strategy in a variety of multidisciplinary fields and in particular to social stratification research (Ferrand et al., 2018).

This approach enables to highlight the relational nature of sociological problems and to understand them not only in terms of causality or similarity but also in terms of its interconnectedness and interactivity that will led to the emergence of certain structural properties that can account for useful results in the study of social stratification such as segregation dynamics, knit communities or influence of individuals regarding their position in an specific network that can be both mathematically and graphically represented. In this sense, network analysis can be view as both and alternative and a complement to more extended approaches in the study of social stratification and in general, in sociological research.

Through the comparative analysis of Brazil, China, Germany, Russia, and the United States, the study demonstrates how self-identification with a social class, income, and educational level intertwine to form distinct occupational structures. These structures reflect the multifaceted and interconnected nature of social hierarchies, showing that higher education and prestigious occupations are often associated with higher income and self-identification with higher social classes. Conversely, lower educational attainment and occupations of lower prestige correlate with lower income and self-identification with lower social classes.

The network analysis approach reveals patterns and relationships within and between different social classes that traditional methodologies may overlook. By mapping the

interactions and connections among occupational categories, this research uncovers the structural dynamics that underpin contemporary socioeconomic systems. The findings highlight significant differences and similarities in social stratification structures across the five countries, providing insights into how these nations' unique historical, cultural, and economic contexts shape their social hierarchies.

The differences and similarities in social stratification structures across various nations become apparent when viewed through the lens of network analysis. This perspective provides a comparative understanding of how social classes are organized and interconnected, reflecting the broader social fabric of each society. Historical, cultural, and economic contexts significantly influence these structures, shaping the pathways of social mobility and reinforcing or challenging existing class boundaries.

Network analysis not only elucidates the static dimensions of social stratification but also captures the dynamic interactions that perpetuate or alter class structures. By mapping out relationships and flows between individuals and groups, this approach reveals how social capital and access to resources are distributed across different layers of society. For instance, in nations with more egalitarian social policies, network analysis may show more fluid connections between social classes, suggesting a more equitable distribution of opportunities and resources. Conversely, in societies with entrenched class systems, network analysis might highlight more rigid boundaries and less permeability between classes, reflecting a higher degree of social immobility.

Furthermore, network analysis allows researchers to uncover the role of institutions and organizations in shaping social hierarchies. Educational institutions, labor markets, and political entities often play a pivotal role in reinforcing or challenging class structures. By examining how individuals navigate these institutions and how institutional policies influence their social positions, network analysis provides insights into the mechanisms that sustain or disrupt social stratification. For example, the prevalence of elite networks within prestigious universities can perpetuate social advantages for certain groups, while access to vocational training and support services might facilitate upward mobility for others.

In addition, network analysis sheds light on the transnational dimensions of social stratification. In an increasingly globalized world, understanding how local social hierarchies intersect with global networks is crucial. Comparative studies across different countries can reveal how global economic trends, migration patterns, and international policies impact local

class structures. This perspective highlights the interconnectedness of global and local social dynamics, offering a comprehensive view of how social stratification operates across different scales.

In essence, network analysis facilitates a deeper understanding of social stratification by emphasizing the importance of connections and interactions within and between classes. This approach underscores the fluidity and complexity of social hierarchies, revealing how they are continuously constructed and redefined within the context of broader societal forces. It offers a nuanced view of social structure, one that accounts for both the enduring legacies of the past and the dynamic processes of the present.

The socio-occupational structures of the five analysed countries exhibit both similarities and differences: while each country shares common patterns of distribution in the types of occupations within their workforce, the proportions and emphases on specific occupational categories tend to differ. Gender distribution among occupational groups also varies across the countries. Russia shows high percentages of women in a wide range of occupational positions, Brazil and Germany also have high percentages of women in clerical and service positions. In contrast, China has significant female representation in farm and semi-skilled worker roles, while the United States shows a mixed representation with lower percentages of women in several occupational categories but a higher percentage in clerical positions.

Regarding self-identification with social class, the research reveals a common pattern in how individuals understand their position within the class structure. Most people tend to identify themselves with either the working or middle classes. By contrast, as the social class position increases, the number of individuals identifying with these higher classes decreases significantly. Likewise, educational attainment and income distribution follow a similar trend, with a larger portion of the population attaining moderate levels of education and income, while fewer individuals reach the highest levels of educational achievement and income. These socioeconomic patterns are common to all the countries studied and are deeply linked with the distribution among the different occupational categories which are at the same time correlated to objective socioeconomic characteristics such as educational accomplishment or income distribution (Coradini, 2019, Kim et al.,2019).

Overall, the analysis highlights how occupational categories, educational attainment, income distribution, and self-perception of social class contribute to distinct stratification

patterns within each country. These factors interplay with cultural norms, personal aspirations, and social comparisons, shaping unique class identities and influencing various aspects of social life as well as future social outcomes, therefore, further research focused on specific social and psychological consequences of class positions must be encouraged (Muthukrishna et al., 2020; Yang et al., 2022).

The results of the network analysis provided deeper insight into the stratification profiles of each country studied. The overall structure of the networks reveals a well-defined hierarchy within the occupational structures of these countries. Higher administrative occupations exhibit the highest affinity levels with professional and technical occupations. Clerical, service, and sales occupational categories serve as intermediate levels within the networks, showing a strong affinity with each other and with other occupations. In contrast, farm workers, unskilled workers, and semiskilled workers consistently occupy the lower tiers of the networks and show high levels of affinity between them. This can be understood as the general shared stratification structure of the countries studied, although there are some particularities for each one of the cases.

In Brazil and China, professional and technical occupations align closely with clerical roles, indicating shared socioeconomic backgrounds. In the U.S., clerical roles are more closely linked with sales occupations. Across all five countries, sales and service roles show strong affinities, reflecting common socioeconomic traits. Brazil and Russia also exhibit strong ties between semi-skilled and farm worker roles, a trend less prominent in China, Germany, and the U.S. Additionally, clerical and sales occupations share high affinities in Brazil, China, and the U.S., but in Germany and Russia, clerical roles are more aligned with skilled worker roles. China's professional and technical occupations have lower affinities with service roles compared to other countries, while Germany's clerical roles have a unique strong affinity with sales occupations.

A key element of the research was to compare the properties of the networks between them through different strategies, by exploring the interplay between self-perception of social class, educational level, and income from the perspective of the properties of the networks. This analysis reveals that the correlation between education and social class shows some difference depending on the country analysed. For instance, Brazil shows a strong positive relationship, indicating that higher education often aligns with higher social class perceptions. China, on the other hand, exhibits a weaker correlation, while Germany, Russia, and the U.S. show varying degrees of this relationship, while when it comes to education and income, a

general trend emerges where higher education is generally associated with higher income, though Russia displays a slightly weaker connection compared to other nations. Similarly, the relationship between social class and income is consistently strong across all countries, suggesting that higher social class correlates with higher income.

Furthermore, the community detection analysis reveals distinct patterns in the clustering of occupational categories across different countries, based on the affinity index for each variable. In general, countries exhibit a tendency to form two primary clusters within their occupational networks. For instance, Brazil and the United States consistently show two main communities: one comprising professional and technical roles, higher administrative positions, and service-oriented occupations, and another including a broader range of workers from skilled to unskilled roles, as well as farm-related positions. Germany follows a similar pattern, with these two communities also emerging, though the range of occupations in the second community is somewhat broader.

China's occupational networks display a greater degree of diversity. When class or income is used as an affinity indicator, three distinct communities are evident: one for higher-status roles, another for service and mid-level workers, and a third for farm-related or unique roles. This diversity is slightly less pronounced when education is the affinity indicator, which still reveals two main communities, but with a clearer distinction between professional and technical roles and semi-skilled to unskilled positions. By contrast, Russia's occupational networks are more fragmented, especially under class affinity, showing three separate communities that include professional roles, clerical and service-oriented positions, and farm-related roles.

These results highlight the existence of a hierarchical structure clearly defined by the communities and clusters generated in the networks and by the community detection analysis that show how occupational categories relate to each other giving the variables of analysis. It is possible to appreciate both structural similarities as consequence of globalization and in essence the existence of a single shared mode of production, but also unique characteristics of each of the countries studied. Additionally, it is possible to appreciate both the flexibility and explanatory potential of network analysis, particularly for the case of social stratification research as networks constitute objects that can be approached from multiple perspectives and that can give valuable insights complementary to traditional quantitative research methods.

Despite its contributions, this research has several limitations that constrain its scope. These limitations present opportunities for further inquiry and the development of improved methodological and epistemological approaches to studying social stratification. Firstly, the data source poses a significant limitation. The sample design of the World Values Survey (WVS) does not aim to gather objective socioeconomic characteristics as traditional national surveys or census data do. However, due to its unified questionnaire design, the WVS is suitable for cross-country comparisons. An alternative and promising path for future research would be to use household survey data or census data, which will allow to properly estimate populations sizes and overall will give a more accurate representation of network structures, similar to other cross-country studies about inequality and social stratification (Zaninotto et al., 2020) or labour market segmentation (Lukac et al., 2019) but from a network analysis perspective.

Furthermore, this research was conducted as a cross-sectional study, however, the possibility of using longitudinal data in the construction of social networks for studying social stratification, although it may be challenging from a computational point of view, can provide valuable insights and scientifically relevant results. Longitudinal data allows researchers to observe changes and developments in social networks over time, offering a dynamic perspective on how social connections evolve and influence social stratification. This approach allows to study the formation, maintenance, and transformation of social ties and to understand the mechanisms that trigger the reproduction of class and occupational hierarchies.

To approach social network analysis from a longitudinal perspective, can significantly enhance our understanding of the intricate mechanisms underlying social stratification. An analysis of this type can be further expanded to explore dimensions beyond educational achievement or income levels, such as epidemiological outcomes (Pivecka et al., 2023), psychological consequences (Kok et al., 2020) changes in family structure (O'Connell et al., 2021) and other factors of interest. This broader approach allows for a more comprehensive understanding of social stratification and its multifaceted impact on social life.

However, despite of the limitations described, the analyses conducted yielded interesting results that addressed the questions guiding this research. It was established that, in general, the countries studied share a similar hierarchy concerning their occupational structures. Furthermore, relationships among these categories, consistent across all countries studied, were identified in terms of income, educational attainment, and self-identification with a specific social class. Empirical evidence also confirmed the existence of a highly hierarchical

occupational structure. Manual, unskilled, and semi-skilled labor is associated with lower average income and educational attainment levels, with individuals tending to identify as members of the lower or working classes. Conversely, managerial and highly skilled occupations exhibited the opposite patterns: high levels of income and educational attainment and a tendency to identify with the more privileged classes. Additionally, there are intermediate or bridging occupational categories, often linked to the service sector and clerical work.

Additionally, specific characteristics were identified through the application of social network analysis, such as levels of feminization within occupational groups and a greater class affinity related to the particular occupational groups studied. The detection of communities within social networks elucidated differences in how occupational groups relate to educational attainment, income levels, and social class identification across the countries studied. This analysis allowed for the determination of specific patterns of relationship dynamics.

Overall, this research aimed to contribute to the exploration of alternative approaches in sociological research, specifically addressing the problems of inequality and social stratification. It also sought to reconcile and integrate theoretical elements from different traditions that aimed at the same goal: deepening the understanding of the social and economic structures of our time. Through the application of network analysis it was possible to study objective properties of class and occupational structures although from a relational point of view, that differs slightly but also complements the mainstream tendencies in the study of social stratification.

In conclusion, this research contributes to the field of social stratification by integrating network analysis to reveal the complex dynamics of social hierarchization. It emphasizes the importance of occupational categories in understanding socioeconomic hierarchies and offers a comparative perspective that enhances the discourse on social class in the modern world. By addressing the interconnected factors of education, income, and occupational status, this study provides valuable insights for fostering a more inclusive and equitable society.

The potential integration of identity-based categories into an analysis of this type, along with the possibility of incorporating synthetic metrics that account for objective socioeconomic properties, is compatible with the epistemological spirit of the proposed methodology. This research and its methodological approach, aims to provide a route to overcome the lack of communication and synergy often experienced in sociological research

between identity-based approaches and analytical quantitative sociology. The constant feedback between both approaches can only be beneficial both for scientific inquiry and for a better comprehension of complex social realities.



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