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Determinants of the Economic Performance of Agricultural Cooperatives (ACs) in the West Bank

محددات الأداء الاقتصادي للتعاونيات الزراعية في الضفة الغربية

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Feb 1, 2025

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Dedication

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Abstract

The purpose of this research is to provide insights into the economic situation of agricultural cooperatives (ACs) in the oPt, with a particular focus on the West Bank, through exploring the determinants of their economic performance as measured by their net surplus (defined as surplus remaining after deduction of all reserves and allocations[1]). Therefore, helping ACs to enhance their economic contribution towards community economic empowerment, which in turn, enhances their social and political role as a base for a resistance economy.

The research utilized secondary data of 81 Palestinian ACs in the West Bank listed by the Cooperation Work Agency (CWA). The analysis of these ACs' net surplus was carried out using multiple regression analysis that utilized panel data technique with random effect model for 3 years period (2021-2023). Extensive econometric techniques were applied to tackle missing data issues related to the dependent variable, which utilized the multiple imputations (MI) process, which relied on both (MICE) technique and (PMM) option that were deemed appropriate for the nature of models' variables.

The analysis was conducted based on the statistical significance level of variables, which included; total assets, size of managing committees, and cash to assets ratio. All these variables exhibited positive effects on ACs' net surplus. On the other hand, the ACs' location in the central region of the West Bank significantly decreases its net surplus, it also causes an additional significant effect that diminish the impact of ACs' assets on the net surplus through an interaction term. However, ACs' age which reflects the years of operation does not seem to have a significant effect unless the ACs receive any grant in the years (t-2 and earlier). Thus, the ACs' age has a slight negative effect on its net surplus. This result indicates the importance of exercising caution when receiving grants by ACs; as it may harm the primary cooperatives' principle of self-financing indicate inefficient investment of these grants, by using these for bridging deficits or in a way that does not guarantee long-term investment which therefore guarantee long-term revenues and maximized net surplus.

Keywords: Palestinian agricultural cooperatives, multiple imputation, MICE, Predictive Mean Matching (PMM), resistance economy.

[1] Reserves and allocations are defined by clause no. 47 of Cooperation Law no. 20 & will be elaborated later on.

الملخّص

تهدف هذه الورقة البحثية إلى دراسة الأداء الاقتصادي للتعاونيات الزراعية في الضفة الغربية وسياقاتها الخاصة من ناحية، ومن ناحية أخرى، تهدف إلى معرفة العوامل التي توثر في كفاءتها الاقتصادية التي قيست بمستوى صافي الفائض الناتج (بعد توزيع الاحتياطات القانونية والمخصصات[2])، والتي بدورها ترشد إدارة هذه التعاونيات إلى النقاط التي يمكنهم من خلالها تحسين الكفاءة الاقتصادية للتعاونيات، وبالتالي ضمان استمرارية عملها وزيادة جدواها الاقتصادية لكل من أعضائها الأفراد وكذلك المجتمع، ما يمكّنها من لعب دورها الاجتماعي والسياسي كقاعدة هامّة لبناء اقتصاد مقاوم. ولتحقيق هذه الأهداف قام هذا البحث بتحليل العوامل المؤثرة في صافي الفائض لـ 81 تعاونية زراعية في الضفة الغربية، تمّ الحصول على بيانات ثانوية لها من قبل هيئة العمل التعاوني الفلسطيني كبيانات طولية (ذات بعدين مقطعي وزمني) لثلاث سنوات (2021–2023)، تم التحليل من خلال نموذج انحدار متعدد اعتمد على التأثيرات العشوائية للبيانات الطولية. ولكن قبل ذلك، تعامل البحث مع البيانات المفقودة في المتغير التابع، وقام بحل المشكلة باستخدام منهجية الاستكمال المتعدد للقيم (Multiple Imputations)، وذلك بتوظيف تقنيات (Multiple Imputations by Chained Equations)، والتي تمّ تنفيذها مع استخدام خيار (Predictive Mean Matching) المناسبتين لهيكل البيانات الطولية ولطبيعة المتغيرات المستخدمة في النموذج.

أمّا عن نتائج الدراسة، فقد أظهرت النتائج أن المتغيرات التي تلعب دوراً هاماً في تحقيق الكفاءة الاقتصادية للتعاونيات تشمل مجموع الأصول، وعدد أعضاء لجنة الإدارة الخاصة بكل تعاونية زراعية، فضلاً عن نسبة النقد إلى مجموع الأصول، وجميعها تؤثر بشكل إيجابي على صافي الفائض الناتج للتعاونية الزراعية. أما وجود التعاونية الزراعية في المنطقة الوسطى من الضفة الغربية، فكان له أثر سلبي مباشر على كفاءتها الاقتصادية، فضلاً عن تأثير آخر غير مباشر يظهر من خلال عوائد متناقصة للأصول على صافي الفائض في حال كانت التعاونية في المنطقة الوسطى من الضفة الغربية (يتم التعبير عنه في النموذج من خلال معامل تفاعل بين الأصول والموقع الجغرافي للتعاونية الزراعية).

أما عمر التعاونية ممثلا بسنوات عملها الفعلية، فلم يكن له تأثير مباشر قوي، لكنّ التأثير القوي يظهر فقط إن حصلت التعاونية الزراعية على أي منحة قبل سنتين أو أكثر، وهو ما ينبّه إلى ضرورة التروّي عند أخذ المنح وعدم الاعتماد عليها

[2] تم تعريف الاحتياطات القانونية والمخصصات في بند (47) من قانون التعاون رقم (20) والصادر عام 2017، سيتم شرحه لاحقاً.

بشكل عشوائي دون دراسة عميقة لعواقبها؛ حيث أنها، بكل حال، تطيح بمبدأ رئيس للتعاونيات وهو ضرورة اعتمادها على تمويل أعضائها الذاتي، هذا المبدأ الذي يضمن استقلاليتها عن أي جهة كانت. وقد يشير ذلك أيضاً إلى عدم التوظيف الكفؤ لخبرة التعاونية الممتدة على سنوات عمرها في حسن استغلال هذه المنح بما يضمن توليد عوائد طويلة المدى، والتي تشمل بطبيعة الحال، توليد صافي فائض بعد سنتين أو أكثر من أخذ هذه المنح.

كلمات مفتاحية: التعاونيات الزراعية الفلسطينية، الاستكمال المتعدد للقيم، الاقتصاد المقاوم، صافي الفائض، مبادئ التعاونيات.

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List of Symbols and Abbreviations

ACs	Agricultural Cooperatives
CWA	Cooperation Work Agency in Palestine
FMI	Fraction of Missing Information
ICA	International Cooperative Alliance
IOFs	Investor-Oriented-Firms
JOD	Jordanian Dinar
MI	Multiple Imputation
MICE	Multiple Imputation by Chained Equations
oPt	Occupied Palestinian Territory
PMM	Predictive Mean Matching
PNA	Palestinian National Authority
RE	Relative Efficiency
RMSE	The Root Mean Squared Error
RVI	Relative Increase in Variance
WB	West Bank

Chapter One: Introduction

Over the past few decades, there has been an increasing tendency around the world towards forming cooperatives that are initiated by individuals hoping to escape rising unemployment rates, but also by governments as a developmental strategy aiming to bolster GDP growth. Capitalist hegemony over the world's economic systems, which is considered at odds with the culture of cooperatives, has been blamed by many economists for over utilization of agricultural raw materials and resources. This has prompted much debate regarding the management of agricultural resources and the need to introduce adjustments in order to prolong the life of agricultural inputs to assure continuation of agricultural production. The overutilization of resources has also been worsened by growing populations as well as repeated cycles of economic crisis. (Dauncey, 2017) In the face of these economic problems, one of the solutions suggested to better manage economic resources with more equitable outcomes is to revive and strengthen the cooperatives model as a mode of production. (Samara, 2018)

Classical economic theory as the overarching intellectual grounds of the capitalist system explains and takes the assumption of scarcity of resources as a foundational core, in order to optimize benefits gained by operating these resources, and find the best combinations of usage by analogy with only optimum returns. (Merrett & Walzer, 2016) Yet over the centuries, because of exploitation of these resources along the lines of optimum basis, these resources started to dwindle, which raises the intensity of competition that makes it difficult for producers in general to survive. (Emelianoff, 1948)

Moreover, access to input resources under capitalism has many limitations and is likely to be skewed in favor of the wealthy. (Cheng et al., 2022) The former may occur for a number of reasons; including high input prices, and/or the unreliability of their supply. In addition to weak

agricultural marketing infrastructures in rural areas that prevent low-income individual farmers from reaching markets within the broader capitalist system. (Venugopal et al., 2016)

At the same time, capitalism may enhance the greed of investors to gain more and more profits for their own individual interest, which also enforces individualistic tendencies and enforces consumerism. (Emelianoff, 1948)

While Blanc (1848, as cited in Emelianoff, 1948) saw that competition is the basic problem, not capitalism itself, as it is the source of poverty and unacquaintance which ruins interests for both workers and bourgeoisie' prospects. Yet Oppenheimer (1896, as cited in Wolz et al., 2020) saw that monopolism of production and profits for specific individuals is one of the negative aspects of capitalism that may be solved through cooperatives by the distribution of profits to a larger number of persons. He thinks that especially agricultural cooperatives have the basic role of equality, as agricultural workers are the most marginal class in most societies.

Moreover, over the past few decades, greed lead has led to stealing resources in order to maximize production, the exploitation of both labor and raw materials resources has increased, this shaped another disastrous level of compound exploitation, which pushed first world countries to colonize other counties to fulfill their greed. In some cases such as the Palestinian context, the colonial system also increased the intensity of consumerism, coupled with Palestinian National Authority's (henceforth PNA) monetary policies of facilitating all sorts of consumer loans, including non-productive ones, that are used for buying cars and apartments, thus overburdening people and locking them into a cycle of loan commitments, rather than resisting colonialism. (Samara, 2018)

On the other hand, pursuing individual "rational" interests (gain more profits) under capitalism rather than collective interests has dominated modes of production around the world. (Dauncey, 2017) This also was reflected strongly in the Palestinian case, as the economic reality has direct

repercussions for the social and political contexts. (Franke & Chasin, 2013) Within this context, pure 'rational' choices within some economic domains may lead decision makers to choose options that deepens the dependency on colonialism and harm community's solidarity.

Some attempts at dealing with the negative repercussions of capitalism is to come up with a different style of production organization, including cooperatives. (Phillips, 1953) Cooperatives were suggested by economists as a form of economic organization that may solve part of the problems emerging from capitalist production; including rising unemployment, inequality and social isolation. Economists have also shown that cooperatives came as a solution to economic downturns during recessions, as well as in the transitional periods, as cooperatives have the tendency to be more flexible with higher survival rates due to their governing values and social commitment to the collective. Global examples also show that cooperatives ensure a more beneficial implementation of development processes on both the individual and society levels, as it considers all people in development processes, regardless of their social ranks. (Franke & Chasin, 2013; Singh et al., 2019)

Cooperatives may also offer a solution for the problem of allocation and unfair distribution of resources, (Emelianoff, 1948) while others believe that cooperatives also can be used as liberating tool from economic oppression, collectively and individually. (Samara, 2018)

Moreover, agricultural cooperatives (thereafter, ACs), may gain more profits with fewer resources and subsequently with less costs. This is due to the fact that ACs utilize varieties sourced locally which may reduce the usage of pesticides and fertilizers, and also retain the consistency of production. (Cheng et al., 2022) The former may be found within Palestinian ACs, which plant different types of crops that may strengthen the crops' resistance against diseases and weather fluctuations, thus increasing production with less costs. (Falco et al.,

2008) Therefore, ACs provide its members with certain degree of competition closer to commercial institutions because of reducing costs. (Abu AlQasem, 2014)

Subsequently, cooperatives considered as liberating tool from exploitation and consequences of capitalism such as consumerism and even colonialism, Therefore, this research comes to consider the determinants of agricultural cooperatives performance in terms of achieved net surplus, as will be shortly explained, to enhance its role and guarantee its survival by economic effectiveness.

1.1 Problem Statement

The compounded exploitation within the Palestinian economy resulting from capitalist modes of production and colonialism have had grave repercussions for people's lives and livelihoods. (Hamed, 2012) While modes of production along capitalist lines may have resulted in dwindling agricultural inputs, as has been the case around the world; Zionist colonialism complicated reality by confiscating lands during wars 1948 and 1967, and still does. This is in addition to seizure of most water resources in Palestine. (LRC, 2020) Moreover, Israel has total control over secondary agricultural inputs including, pesticides and fertilizers, which are either imported or sourced from the Israeli market (Sharabati, interview, Dec 28, 2024). Under these circumstances, agricultural cooperatives (ACs), by their unique structural characteristics and principles, may introduce a solution to these compounded problems. This is so because ACs are expected to have a better ability to adapt to adverse conditions, in addition to their potential role in mitigating the impact of layered exploitation. Furthermore, ACs may generate individual and community solidarity against the colonial reality.

However, there is a need to better understand the potential of Palestinian ACs as well as the economic factors underling their performance particularly in light of the importance of the

agricultural sector at the forefront of resisting colonialism. Most Palestinian researches just speculate on the performance of Palestinian ACs, or solely discuss the ideological grounds behind the workings of cooperatives. Thus, there is a huge gap in economic research around the performance of ACs within the Palestinian context, including their strengths and weaknesses. Therefore, the purpose of this thesis is to explore and study the determinants underlying the performance of Palestinian ACs in order to further enhance their capacity and potential contribution towards more equitable and just modes of production.

1.2 Research Questions

This research main question is: what are the economic/financial and structural determinants that affect the performance of Agricultural Cooperatives (ACs) in the West Bank as measured by their net surplus? In other words, what is the determinants of the economic performance of ACs in the West Bank.

While the secondary questions include:

- 1) How do we understand the role of ACs within economies in general and what is the situation of ACs in the oPt and specifically in the WB, what are their number, location and governing structures?

- Economic/ financial determinants:

    2) How do total assets, cash flows and grants affect ACs' economic performance (net surplus)?

- Structural determinants:

    3) How do the ACs' age and level of managers committees affect its net surplus?

4) What is the impact of geographical location of ACs within the WB on their net surplus?

1.3 Research Objectives

The purpose of this research is to explore the determinants of Palestinian agricultural cooperatives' (ACs') performance in the WB as measured by their profitability or net surplus (the surplus that left after deduction all allocations and reserves). These determinants include economic/financial factors, encompassing ACs' total assets, cash to assets ratio, and whether the ACs have accessed grants, as well as structural determinants consisting of ACs' age (years in operation), the size of their managing committees, in addition to their geographical location.

The aim is to better understand these determinants in order to bridge the gap in knowledge about ACs performance but also to be able to suggest policy recommendations towards optimum exploitation and usage of available agricultural cooperatives' resources and competencies. This becomes particularly pressing in light of colonialism in the oPt, which focuses on the land and places the agricultural sector at the forefront of resistance to capitalism and colonialism.

1.4 Significance of the Research

The importance of this study arises from the need to econometrically analyze the performance of Palestinian ACs under its context and conditions of Zionist colonialism to inspect the effects of both economic/financial and structural determinants, which point out the gaps and help in bridging it. This will guarantee best usage of Palestinian ACs' resources and competencies, which in turn, guarantee ACs' continuation by enhancing its economic performance, thus, its ability to efficiently play its intended social and political roles.

1.5 Research Methodology

This research uses both descriptive statistics to illustrate the general status of cooperatives and specifically, ACs in the WB. This will be followed by analytical statistics for a multiple regression model by conducting panel data analysis with random effect model for 3 years (2021-2023) to define and analyze the determinants of Palestinian AC's net surplus (after deducting all allocations and reserves) within this interval.

The data that the research relies upon is secondary data that has been taken from Cooperation Work Agency (CWA) and covers 81 ACs that are located in the West Bank.

1.6 Research Organization

Following the introduction, the second chapter covers the theoretical part, which defines related concepts, in addition to social and economic theories that are used to interpret cooperatives' behavior, as well as the empirical related aspects on cooperatives performance around the world. The third chapter then discusses the Palestinian context of cooperatives and ACs. While the fourth chapter will explain the research's theoretical framework and methodology. Then, the econometric analysis and results, will be presented in the fifth chapter. While the final chapter will represent the conclusion.

Chapter Two: Literature review

2.1 Principal Concepts and Definitions

With regards to the definition of a cooperative, Kaswan (2014) considered as an independent institution in which members benefit through the redistribution of revenues and surplus. Other economists were more specific in their definition of cooperatives as they defined it as an institution owned and managed democratically by its members, who have collective ownership of economic resources, and engage in redistributing the surplus fairly according to usage and democratic management principles of resources. (Venugopal et al., 2016; Merrett & Walzer, 2016) Yet others have put forward another definition, which sees cooperatives as a group of members who gathered voluntary without any compulsion, seeking the same benefits from organizing production processes, and access to inputs, which empowers them in the market and reduces the cost of market entrance's pressure on them. (Falco et al., 2008) This is somehow consistent with its definition as institutional organizing that overcomes obstacles in the process of its evolution, (Cheng et al., 2022) or any other barrier that prevents individuals to pursue their economic interests due to factors such as lack of financial resources, amongst others. (Fairbairn, 1994)

The International Cooperatives Alliance (thereafter, ICA) definition emphasizes the non-economic benefits from establishing cooperatives, as it defines the cooperative as: "an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise". (Ortmann & King, 2007, p. 41)

Most definitions agree on the diversity of members' purposes of establishing a cooperative, starting from fulfilling members' economic, to social, and cultural needs. However, these definitions usually prioritize the economic side; as, without it, the cooperative may be

converted to a charity or voluntary institution, which will harm the structure of the cooperative. (Lamlum, 2010)

Cooperatives have more than one type or field of service; the first type is consumer cooperatives, which emerged after the Second World War in reaction to fierce competition, unfair distribution of resources among rich and poor. (Emelianoff, 1948) In addition to social care cooperatives that provide places for elderly to spend time, and give services for people with disabilities, and kindergarten. (Mohammed, 2022) Moreover, there are housing or residential cooperatives that are encouraged by governments in the face of housing deficits. This type of cooperatives has some advantages; ease of financing and providing guarantees, having prices with lower costs compared with the individual housing, and improve the quality of services. (Hamjik, 2015)

There are also services cooperatives that may serve health insurance, telecommunication, irrigation, and financial insurance. (Abu AlQasem, 2014) In addition to saving and credit cooperatives whose main purpose is to provide its members with loans, that are guaranteed through member's savings. The idea of this type of cooperatives is to facilitate credit services that will boost its member's wealth, (Gebrehiwet, 2022) or to give positive push for small farmers by offering them agricultural loans, therefore, it activate local resources; enhance community development, and sustains cooperatives projects. (Mohammed, 2022; Abu AlQasem, 2014)

There are also marketing cooperatives, (Reach & Lee, 2019) which gather small producers in one cooperative and manage their affairs in a way that enables them to face the competition from larger producers, or the exploitation of retailers. (Mahjoub & Akinza, 2019)

Moreover, there are also the industrial cooperatives, which specialize in a certain industry. This type of cooperatives differs from capitalist industrial companies in that workers in the non-

capitalist industrial cooperatives gain a return at the end of a certain period by virtue of association or membership in the cooperative, in addition to another amount due to distributed profits. While the worker in the capitalist cooperative just gain the salary at the end of each pay period. In addition to that, cooperatives' members have ownership and therefore, decision making powers. (Bonin, Derek, & Putterman , 1993) These intercept somehow with worker cooperatives that emerged after industrial revolution and gather themselves according to their expertise, and play vital work with labor movement. (Kaswan, 2014)

There are also, **agricultural cooperatives (ACs)**, which aim to develop the economic conditions for farmers by offering better chances in competition in the market, and promoting their agricultural techniques. Moreover, to improve their relations especially with agricultural developmental institutions and governments. (Reach & Lee, 2019)

Yet Oppenheimer (1913, cited in Wolz, Zhang & Ding, 2020) believes that vital part of defining ACs concentrate on liberating farmers; the most abandoned and oppressed class in most societies.

On the other hand there are additional ideological issues that rest behind cooperatives as a concept. These issues are strongly powerful in the **Palestinian case;** and may include refusal of any external control by colonialism or at least could not accept the idea of superiority of occupation or any social class to another, or even any gender to another. ACs, for example, prioritize the interests of farmers as a collective, while capitalist companies take the side of properties' owners. Moreover, the culture of exploitation caused by either capitalism or colonialism can be eradicated or at least challenged through implementing a cooperative style of production organization. (Dauncey, 2017; Samara, 2018)

2.2 Cooperatives' Organizational Structure and Principles

Cooperatives have a special economic structure that is different compared to capitalist firms. This unique structure is formed by certain social properties or principles that may seem difficult to comprehend based on classical economic theory, such as "elimination of profit" and “equality among a cooperative's members”. (Emelianoff, 1948)

Cooperatives have been studied and analyzed from various perspectives throughout time. At the beginning of their emergence, cooperatives were studied through the lens of ***social sciences.*** Yet, thereafter, the ‘theory of cooperation’ emerged, which defines the cooperative as an entity in which a number of persons gather to achieve common interest that cannot be executed individually. While some researchers refuse the generality of this theory; as they saw it nebulous, and do not identify the cooperative as an economic entity, either did not specify the structure of cooperative or its features. The definition –with its generality- may include charity organizations or voluntary works, which results in a huge confusion in analysis. (Merrett & Walzer , 2016)

Other theories have been adapted to interpret the ***organizational structure*** of cooperatives, such as property rights theory, which focuses on four main aspects; ownership rights, decision-making rights, delivery and purchasing rights, in addition to residual claim rights. (Merrett & Walzer , 2016)

The generality of previous theories has emerged out of the need to define the nature and properties of unique organizational structure for cooperatives. The first initiative to set up cooperatives was credited to Rochdale's Society that were built by early cooperation's pioneers in England, who were poor textile workers that do not have any party to defend their rights and interests. Therefore, they decided to "help themselves by helping each other", (Fairbairn, 1994,

p. 2) in order to improve their economic situation, they aligned themselves with the working class ideological visions. (Fairbairn, 1994)

Various analysis of cooperatives considered these as entities that represent a more socialist/communist than capitalist form of economic establishment. In this respect, the Venezuelan president describes cooperatives as "the socialism of 21 century". (Franke & Chasin, 2013)

Interestingly, the communist Robert Owen, the leader of restoring communist movement after industrial revolution, considered the cooperative a tool that enables the collective ownership and communal living as a substitute for individualistic tendencies and competition within the capitalism, in order to mitigate the impact of the negative sides of capitalism. (Emelianoff, 1948) This is what Mohammed (2022) also agreed on when noting that productive cooperatives couldn't isolate themselves from capitalist influences, except if it had a guaranteed permanent market or devoted customers, which is rarely achieved. This also suggests that cooperatives cannot live in isolation from capitalism. (Mohammed, 2022)

Emelianoff (1948) also considered cooperatives as entities that are built within capitalist environment, and accept the reality and dominance of capitalism, in alignment with believing that cooperatives have different purposes in contrast with capitalist firms. However, again, it conducts its economic role under capitalism, so we must interpret and assess its performance using capitalist rules, but with making slight alterations by using special terms, such as returns for each member rather than profits, this is exactly what meant by Owen's elimination of profit principle.

Subsequently, the evolution of Canadian ACs enhanced the belief in the principle of ‘educational responsibility’ of cooperatives. (Fairbairn, 1994) It includes educating members about cooperative thoughts, (Hamed, 2012) or to educate them about uprooting consumption

voracity. (Samara, 2018) while others believe that cooperatives should also provide technical education and training systems according to their sectors or specializations. (Franke & Chasin, 2013)

To elaborate, the parallelism of members' interests in cooperatives and the importance of each member's voice and contribution, which in turn provide cooperatives with its ingrained democratic nature. (Kaswan, 2014) Democracy in cooperative system also means independence in choosing the inputs according to availability and adaptability to circumstances. (Dana, 2020) Cooperatives also give independence in controlling the production stage according to local community's needs, with fewer costs (fewer pesticides, more consistency in production, more adaptable with weather fluctuation due to the diversity in crops used in most agricultural cooperatives). This may result in better quality products, higher productivity and better market performance, as the owners of the cooperative can control the production process. (Falco et al., 2008) Moreover, cooperatives may enable the emerging Palestinian economy to operate independently from the dominant Israeli economy, which enforces the capacity of the Palestinian economy to overcome colonialism. (El-Zein, 2017)

In addition to the analysis of cooperatives along the lines of social systems, organizational structure, and principles, cooperatives also analyzed through the lens of ***development***. In this context, cooperatives are seen as a way to exit poverty. The governments of developing countries usually do not invest in services for the poor within their societies, thus the solution is to establish cooperatives as a vehicle to long-term development. This may raise the political and economic equality and enhance social and political capital building. (Kaswan, 2014)

Given these intense debates over the years, the ICA approved the Rochdale's seven principles that define the workings of cooperatives, which include: open and voluntary membership, democratic member control, member economic participation, autonomy and independence,

education, training, and information, cooperation among cooperatives, lastly, concern for community. (Ranville, 2018; Fairbairn, 1994; Merrett & Walzer , 2016)

To conclude, this section has considered the social and organizational concepts and debates that interpret the work of cooperatives, which the ICA relies on. Since the ICA is the source for the working principles of cooperatives around the world, the Palestinian Cooperation Work Agency (CWA), has aligned itself with the seven principles noted above. These thus form the underlying foundations for the work grounds for Palestinian cooperatives. Given these established values, the research now will turn to discuss the economic theories used to understand the work of cooperatives.

2.3 Cooperatives from the Perspective of Economic Theories

A number of approaches are used for assessing the economic efficiencies and performance for cooperatives, including agricultural cooperatives (ACs). The first theoretical perspective is grounded in neo-classical economic theory, which relies on comparisons of the performance of cooperatives to Investor-Oriented-Firms (thereafter, IOFs). (Zamagni & Zamagni, 2010) This theoretical premise of comparisons is the difference in the structure of cooperatives in comparison to IOFs. Based on that, the theoretical discussion focuses on the difference in the efficiency of each structure based on its economic performance. Operationally, the comparison takes three main strategies; regression analysis using standard econometric methods, in addition to hypothesis testing which compare both types in their styles and principles, while the third strategy is to compare their effect on employment. (Bonin et al., 1993) On the other hand, these comparisons could be executed by comparing cooperatives' and IOF's effects on poverty, GDP, GINI, at the macroeconomic level. This is the usual orientation used in developmental view of comparisons. (Merrett & Walzer , 2016)

However, these comparisons require careful attention to the differences in IOFs' and cooperatives' missions and objectives. When IOFs are stakeholders-value oriented, cooperatives are member- oriented firms. Therefore, comparison may not provide such careful assessment regarding the benefits gained by cooperatives' members, starting from average profit dividends, to other non-financial benefits, such as education, training and other benefits. (Shamsuddin et al., 2018; Soboh, 2009)

Moreover, the comparisons between IOFs and cooperatives are usually conducted by measuring several efficiencies, such as allocative, technical, size, and scale (price) efficiencies. However, considering the different structural and administrative attributes for cooperatives make it less reasonable to be compared with IOFs using the same criteria. For example, IOFs leverage the opportunities and openness of horizon provided by financial markets' existence, whereas cooperatives are not governed by financial markets yet therefore cannot take this advantage. Accordingly, direct comparison leans the advantage of allocative efficiency, for example, towards IOFs against cooperatives. Furthermore, the required data for computing size efficiencies, for example, is regarding input resources and its costs, while it is not available most times for cooperatives. Subsequently, the national mean of wages is used for this process instead of actual wages, and total assets are utilized instead of capital, for example. Whereas these data are usually available for IOFs. Hence, comparisons of size efficiencies for both does not make sense. (Sexton & Iskow, 1993)

An alternative perspective is followed to compute these efficiencies to test cooperatives' own efficiencies but without comparing to IOF; such as cooperatives' own allocative efficiency. (Sexton et al., 1989) This approach only focus on the performance of cooperatives itself as an entity, which uses microeconomic indicators that concentrate in cooperative's contribution for

maximizing surpluses, utility, and financial/economic returns or overall profits, according to cooperative's type. (Merrett & Walzer , 2016)

The above discussion leads us to deduce that which theory to use when assessing the performance of cooperatives depends mainly on the objective behind the establishment of the cooperative; which could be economic, social, political or environmental objective, or a mixture. With regards to the economic performance of cooperatives, and while keeping in mind the fact that cooperatives act under capitalism, we can use neo-classical theory that assesses notions of economic efficiency as an indicator for cooperatives' performance, which basically focuses on the capacity of the cooperative to maximize its economic intended returns. (Royer S., 2014; Merrett & Walzer, 2016)

Within this context, Phillips (1953), who is considered as the cooperative's master theorist, focused his theoretical perspectives on cooperatives that are composed of companies, not individuals, whose basic purpose is to maximize their share of profit, retaining the rate of this profit on short and long runs, and gain the optimum efficiency for each member of these producer companies. Phillips' interest is to find the economic structure that all firms has proportional contribution in the decision-making, not one vote vs. one firm, with consideration that there is a common planet for all of them, besides to each own factories. The purpose for this cooperative is to reduce long run average costs; this is how economic efficiency or optimum performance is defined here. So Phillips theoretical perspective was in locating the common equilibrium point of production and profits for all companies in addition to each one's unique equilibrium point. This shaped his theoretical perspective of cooperatives as the opposite to market competitiveness. (Phillips, 1953)

On the other hand, for individual members' cooperatives, assessment of the economic performance was also theorized by Ward. While his basic model is guided by two assumptions,

the first notes that the circumstances faced by cooperatives and capitalist firms are the same; which is defined by market and technology that shape neo-classical production process for both entities. The second assumption focuses on the definition of performance which is understood differently based on the functional roles; the capitalist firm aims to gain maximum overall profits, while the cooperatives aims to gain higher additional returns for each member. (Zamagni & Zamagni, 2010) Ward also think that each member's returns composed of two parts; the first constant part per certain time due to the membership, in addition to a varied part that considers different aspects defined by each cooperative. The total profit per member called the maximand of Ward's PC, the formula of surplus for each member as below:

$$\text{Surplus/member} = \frac{(Price * Quantity) - Costs}{L}$$

The overall profit is in the numerator, while L divides it; as these profits divided among members evenly, as supposed for simplicity. Therefore, to maximize member's dividends, we must first maximize the overall profit gained by the cooperative. (Bonin et al., 1993)

By generalizing, cooperative's optimum economic performance is the optimal point in which the cooperatives do the best economic role, this optimal point changes according to the exact economic objective. There are four basic objectives for agriculture cooperatives (ACs) generally, the first one is maximize cooperative's net earnings, the efficiency is defined by the point in which marginal revenue = marginal cost (MR=MC). While the second objective is minimize the net price, this objectives efficiency defines by the point in which marginal cost equals the average total costs (MC=ATC). The third one is maximize the member's returns; the efficiency in this situation is when the average revenue equals marginal cost (AR=MC). Finally, some agricultural cooperatives has the objective of maximize the quantity produced, the cooperative's efficiency here is when average revenue equals average total costs (AR=ATC). (Royer S., 2014)

While Adam Smith found that Cobb-Douglas production functions give better meaningful measurements. On the other hand, we could test the factors that affect the productivity, like usual sectors' inputs. In addition to structural specifications such as workers' participation in decision-making, sharing of profits, and other factors that belong to the neo-institutional theory. (Bonin et al., 1993)

The neo-institutional theory interested in assessing the economic performance of cooperatives by taking the factors that differentiate cooperatives from any other form of economic entities, into consideration. This includes measuring the impact of the extent to which ACs adhere to cooperative principles and its consequences on their economic efficiencies. Among others, the invisible psychological motives that emerged from multiple aspects including the manner and the extent to which the principle of democrat control is applied, whether it is based on the "one member-one vote" or on proportional decision-making according on members' contributions, which fundamentally influences members' incentives to enhance economic performance. (Cook, 1995)

These incentives range from negative motives emerging from possible disproportionate contribution to control for example, to positive incentives emerged from a comfortable and motivating work environment or to productivity driven by social responsibility rather than solely individual economic gains. Furthermore, cooperative members not only contribute their labor but also manage the cooperative themselves, which increases their work motivation. However, it also entails lower costs for obtaining information and exercising ownership rights. This is why the size of managing committee or its competencies for example, turns from being a neo-classical factor to become a neo-institutional one in light of cooperatives' principles, as well as the external supports and grants that contradict the principle of self-financing. Another factor that differentiates cooperatives is the number of its members, distinct from the number

of employees in other economic institutions, that can be seen as a representation of the cooperative's capital, which represents a key factor that differentiate the economic performance of cooperatives. (Zamagni & Zamagni, 2010)

In the next section 2.4, some empirical researches will be discussed to enhance the analysis of the economic performance of the selected sample of Palestinian ACs that located in WB, and for optimum employment of available data used for this purpose.

2.4 Empirical Literature Review

2.4.1 Empirical Research Utilizing Multiple Functions

Empirical studies range between neo-classical and neo-institutional theories. The first approach for some researches focuses on the comparisons between cooperatives and IOFs that belongs to neo-classical economic theory. For example, Cheng et al. (2022) comparatively analyze the economic and environmental performance between smallholder farms and cooperatives that planted apples. It firstly used Life Cycle Assessment (LCA), which utilized to evaluate the environmental effects by 3 subsequent steps; goal and scope definition, inventory analysis, impact analysis and interpretation. It shown that the total environmental costs of cooperatives are less by %22.09 compared to smallholder farmers. While the second method used is Life Cycle Cost (LLC), which used to assess the economic performance, but by considering total environmental costs in addition to both total variable and fixed costs, and therefore, considering it in the process of profit calculating. About results; LLC for cooperatives are less by %19.27 and the profits are %21.23 higher than smallholder farms. (Cheng et al., 2022)

Other empirical studies chose to follow another approach, which concentrates on the ACs itself by focusing on cooperative-level information to study the factors that affect their performance

using different forms of indicators (dependent variables). Some of these use logit analysis, such as Wassie, Kusakari & Masahiro (2019) that measures ACs' performance using the factors that affect the decision of households or community to enter the Ethiopian agricultural cooperatives or not, as an indicator. It did so using usual neo-classical production function in which the value of dependent variables reflects certain decision (Y=1 if yes). The study reveals the significant nonlinear relationship between land size and ACs' performance; just households who have middle land size have motive to enter the ACs, while small and large land sizes' owners are less motivated. In addition, this study found that there is significant positive effect on joining if there is marketing and credit cooperatives in alliance with the agriculture one, as the revenue and income of the latter will increase by %16 and %32 respectively. (Wassie et al., 2019)

Similarly, Nguyen et al., (2023) follow the same logic with additional indicators of ACs' performance in Vietnam, by utilizing production function with 3 different groups in indicators, the first are indicating the economic performance which are; revenue, profit, total assets, total equity, ROA, ROE. While the second group indicating ACs' social performance using payment per laborer or contribution to union and insurance. Moreover, it suggests the presence of innovation in the production system (If yes = 1), and the presence of innovation in products (If yes = 1) as indicators for innovative performance. While it considers internet usage and female leadership as basic factors that affect the performance of these ACs; the main study's purpose to inspect. Results shows that ACs who use internet has higher revenue, higher total assets, fewer ROE and ROA with significant effect. While female leadership does not make significant economic performance difference. (Nguyen et al., 2023)

Others also use financial indicators to Assess ACs' performance, like a study done by Boyd et al., (2007). It also takes ROE as indicator for ACs' financial performance, which affected by several factors, such as assets that added to consider the effect of size and economies of scale, in addition to returns on equity, liquidity (current ratio as indicator), and solvency (assets to

equity ratio as indicator), these determinants significantly reduce ROE. It also used other determinants that have positive significant effect on ROE; profitability (net profit margin as indicator) and efficiency (assets turnover as indicator). While the last determinant; times interest earned (TIE) that used to measure AC's ability to pay its interests have a negative insignificant effect. (Boyd et al., 2007)

Resembling research done by Singh et al., (2019) make a panel regression analysis for a sample contains 39 U.S. ACs from 2009 to 2017 also used ROA as an indicator for AC's performance, which affected by 5 explanatory variables including uncertainty, size, and capital intense that have negative significant effects on ROA. In addition to the growth that significantly increase ROA, and leverage, which also have negative but insignificant effect. (Singh et al., 2019)

While Pokharel et al., (2020) primarily interested in inspecting the effect of size and diversification of ACs to its financial performance as measured by MROE (mean of ROE). It is based on the assumption that diversification of activities will help in stabilizing revenue; by utilizing diversification of skills, protect from competition, while others saw that it may reduce the efficiency of management. The size of AC here measured using assets and log assets to capture any nonlinear effect on MROE. While it uses Herfindahl Index (HI) as a measurement for diversification, which equals the sum of squares or percentages of income gained for each source of income. When HI= 1, then the cooperative gain its income from only one source, while HI < 0.5 refers to diversification of AC's income source. The function also includes variance of ROE (VROE), ROE itself, profit margin (PR), and debt on assets ratio (DA) as explanatory variables. Assets have positive significant effect on MORE with diminishing returns. While HI have negative but insignificant effect on ROE and other explanatory variables have significant positive effects on MORE. (Pokharel et al., 2020)

Other research carried out by Mckee et al., (2009) choose to take the profitability measured by the ratio of local gross margin to local assets as indicator for ACs' performance, which also affected by liquidity and solvency which both have significant negative effects on profitability. In addition to ACs' size that measured by dummy variable which equals to 1 if AC's sales > $10M, and 0 if sales ≤ $10M. Which disclose over insignificant positive effect on profitability. (Mckee et al., 2009)

Another strand of research use resembling performance indicators but by providing more weight for structural explanatory variables that belongs to neo-institutional theory. This primarily done for the purpose of taking cooperatives' special structure into consideration in the process of assessment. Pham (2022) for example, uses ROE, Return on Sales (ROS) and ability to create job opportunities as indicators for the performance of 308 ACs that located in Vietnamese Mekong Delta. The determinants of ACs performance are; Management competencies (%) that in turn computed by 6 criteria: general knowledge, group work, interpersonal relations, effective directions, management and administration, in addition to promotion of creativity, managerial competencies has the most powerful positive effect on the ROS, ROE and generation of jobs. Another determinant is the contributed capital, which also have positive significant effect on ROS and ROE, while the positive effect on generation of jobs is insignificant. The research also inspect the effect of membership size (number of members), which has significant positive effect on ROS, and generation of jobs, but negative insignificant effect on ROE. It also used 2 other interaction variables, one of them inspect the interactive effect of both management competencies and contributed capital, which has significant negative effect on ROS and ROE, as well as the interactive effect of management competencies and membership size that has significant negative effect on ROS but significant positive effect on generation of jobs. These interactions terms capture any additional effect for implementation these variables, which guarantee the best usage of resources. Moreover, it

determine the effect of member participation (%), which is the mean of percentages of other 6 criteria, which are members' participation in training sessions, regular meetings, participation with inputs, contributing in outputs, and operating solutions, and finally commitment in execution. Members' participation has significant positive effect on both ROS and ROE. Besides to these quantitative variables, there are other 3 dummy variables, the first one refers to surveyed province, the second refers to fields of operation of ACs, while the last one refers to their service type. (Pham, 2022)

Additional research executed by Sebhatu et al. (2021) study the impact of a number of factors on ACs' performance using indicators of sales and total profits. The function contains variables belong to neo-classical theory such as assets that have significant positive effect on ACs' total sales. It also contains structural characteristics such as gender variability, number of committees, size of membership, which also have significant positive effect, besides to cooperative's type, and its region. In addition to leader's competencies (education level and managerial experience), external relations and support; that did not show significant effects. Besides to the factor of being in union membership has significant negative effect, most of these latter factors belongs to neo-institutional theory. The evaluation process executed by usual production function, each of the previous criteria is set in an independent variable. (Sebhatu, et al., 2021)

Another study conducted by Mohammed & Hamza (2021) aimed to inspect the determinants that produce ACs' yearly operating surplus, by analyzing the explanatory variables of total assets, technical labors, and AC's storage capacity. In addition to the size of AC's dealing with production supplies (in EGP 1000), the cultivated area, and lastly, a dummy variable that equals 1 if AC implemented any agricultural project, and 0 if otherwise. This analysis shows that the significant variables are Assets, the size of ACs' dealing in production supplies, in addition to the last determinants that refers to existence of any agricultural project in AC. It is worth to

mention that this study theorized about the importance of income resources' enumeration, but did not empirically analyze its effect on the operating surplus. (Mohammed & Hamza, 2021)

To conclude the results, most research focuses on cooperative-level information to assess the ACs' economic performance by combining both neo-classical and neo-institutional theories, using various indicators of performance that mostly lie within economic performance indicating the profits. There is a consensus in previous research that input resources, capital, total assets and number of projects implemented within the ACs, in addition to the size of managing committees and their competencies, all have positive effect on these ACs' profitability. While ratios such as leverage, liquidity and debt to assets ratios negatively affect ACs' profitability in most cases. On the other hand, structural factors such as female participation in the ACs membership or managing committees, in addition to regional factors, show different effects ranging between positive to negative.

Besides the factors adopted by the previous studies, a number of research papers focused on utilizing a variable that refers to the number of revenue resources or other variables indicating the diversification in general. One of these studies was conducted by Falco et al., (2008) to test the effect of biodiversity of crops to ACs' productivity. This test used 2-stages estimation approach with Cobb-Douglas production function. In the firsts stage, the study estimate the wheat spatial diversity index (Amount of diversity measured by the number of wheat varieties, relative to fixed geographical area), in alignment with cooperatives density (number of cooperatives in a certain region to percentage of lands used for agriculture in the same region) and assess the effect of this index on wheat productivity. Then the production function of Cobb-Douglas is estimated, with classic inputs and the variable of weather condition, wheat diversity index, rainfall levels, cooperatives density index, and pesticides. In addition, the yield of wheat as dependent variable. The model showed that there is positive significant relationship between cooperatives crop production and levels of variety diversity in wheat. In addition to significant

positive relationship with certain number of labors and quantity of pesticides used, while rainfall level has positive insignificant relationship with production. (Falco et al., 2008)

Speaking of which, diversity may significantly affect the capacity of ecosystem and productivity, and soil repairing, pest's control. However, diversity must not be very intensive. (Gatto & Signorino, 2011) There are more than one type of diversity; the general biodiversity that counted for all ecological organisms; even for insects and micro. (Russell et al., 2006) Alternatively, there is just plant diversity (intercropping) which has also special types. For example, there is what called inter- species intercropping, which refers to cultivating two or more different types of crops. In addition to intra-species intercropping, which refers to planting different cultivators of the same species. Results show that inter-species intercropping have greater positive effect on productivity than intra-species intercropping. (Darch, 2018)

There are contradicting results about the effect of diversity; another study found that there is negative effect of biodiversity because of competition to soil minerals, which means reduction in productivity for the basic crop, However, at the same time, biodiversity increases the productivity due to ecological system's support. (Russell et al., 2006)

2.4.2 Empirical Studies Assess ACs' Performance According to Scales

On the other hand, there is another perspective in the research on ACs which assesses their performance and classify them according to a particular scale. One of these studies is conducted by USDA (2007) and focus on the financial performance of AC by using the notion of extra value. Positive extra value refers to cooperative's ability to create value, while the negative refers to the lack of this ability. Extra value computed by the formula (Net Saving – (interest charge/ equity capital)), which can be expressed as rate of operating assets. According to this indictor, participating ACs were divided into 5 groups; ACs that have negative returns for 5

years, ACs that have positive ROE for all 5 years but also have negative extra value. While the third group includes ACs that has extra value generated at basic interest charge, which equalize its generated value with the interest rate that could be invested instead of building AC. The forth group is average extra value generated with a moderate (5%) risk premium on equity capital. The fifth is average extra value generated with higher (10%) risk premium charge for Equity capital. (USDA , 2007)

Dendup & Aditto (2020) on the other hand, aimed to assess 30 ACs according to cooperative performance index (CPI) and then inspected the relationship between ACs' performance measured by CPI, with its organizational characteristics. Results show significant positive relationship between ACs' performance and its size (number of members) and age (years in operation), education and expertise of its management, in addition to member's participation, and external support from government. (Dendup & Aditto, 2020)

Further analysis was carried by Abu AlQasem (2014), which conducted a general assessment for some aspects of ACs performance according to its members' opinions. It particularly evaluates the role of cooperatives to enhance its members' abilities in productive effectiveness, marketing, and provide them with credit facilities and quality increasing techniques by coordinating the relations between cooperatives and agricultural parties. About the results of this study, four hypothesis are rejected, so that the cooperatives did not find any support from the estate, gum Arabic producers' cooperatives also did not contribute in its members' evolving, in addition to the weakness of this cooperative in which most of producers did not join. Lastly, cooperatives did not facilitate credit services. (Abu AlQasem, 2014)

Another study carried out by Rianse et al., (2014) inspect the relationship between ACs' performance and the benefits gained by its farmers (members and non-members). To do so, it uses Structural Equation Model (SEM) to analyze a sample of 10 ACs in Kolaka, their

secondary data go through analysis of distribution frequency to find the determinants of ACs' performance, and these determinants are concern over the community, which has an effect over performance by 0.86. In addition to open and voluntary membership that effects it by 0.80. In addition to democratic control that has an effect by 0.79, Membership economic participation by 0.71, training and education by 0.25. Autonomy and Independence, which did not show any relationship in here. Lastly, the cooperation among cooperation also have slight effect by 0.08 on ACs' performance. Then all these 7 determinants have been summed and then divided to 7 to find the final score of ACs' performance, that lies between (Very good 84% - 100% - Good – Quite well – Not good enough – Not good 16%-31%). The overall performance concluded for Kolaka's ACs is good. On the other hand, respondents answer the question of the benefits they gained, which divided to 4 types of benefits (Fulfilment of their consuming needs, marketing their products, credit benefits, and social and welfare benefits). Then, it computed the relationship between performance and benefits gained by ACs' members by using second order CFA, which show relative and significant relationship. (Rianse et al., 2014)

To conclude, ACs generally gain higher scale if they are committed to cooperative principles, if the participation of its members is effective, and if these ACs provide their members with sufficient returns and facilities for growth.

On the other hand, this research will use multiple regression function to assess ACs' economic performance in the WB that is measured by their net surplus. While the explanatory variables resemble what being used in the previous empirical research, but by focusing on special features of Palestinian context, and by entering a unique interaction term that measures the additional effect of ACs' age if it take any grants in previous few years. The model and factors will be discussed in details, but before that, the next chapter will represent the Palestinian context.

Chapter Three: Palestinian Cooperatives–Struggle against the Odds under Colonialism

3.1 Operational and Legal Framework

Palestinian community culture has the cooperation special idiom "Al-Aouneh", which reflects the voluntary activities throughout villages, especially in some agricultural seasons, such as olive harvesting, in which families help each other in specific activities. (Mohammed, 2022)

Within the oPt context, building cooperatives is not just a liberating tool from capitalist hegemony, but it is also considered as a tool for liberation from Zionist settler colonialism. (Samara, 2018) Therefore, the exploitation in this case, that we aim to challenge, is compound, especially after the signing of the Oslo Accords, which undercut the agricultural and industrial production capabilities, and encourage both individual and public debts. (Tartir et al., 2012)

Agricultural cooperatives have a special role to play within oPt context; since the land is divided over three areas: A, B, and C. Area C is dominant thus covering about %61 of Palestinian lands occupied in 1967, in which most of agricultural activities take place. (Wafa, 2023) While the basic problem is the subordination of the Palestinian economy to Israel because of annexation policies that allows Israel to swamp Palestinian market with its goods, undercut the production possibilities, restrict trade, and absorb the labor power. Moreover, the PNA does not have a resistance-based developmental strategy, and most of its revenues rely on foreign aids. The PNA's strategy primarily relies on free market principles, which enforces individual interests that deepens consumerism, apart from collective interests. While a resistance economy can be defined as the economy that has the ability to afford shocks, retained its flexibility in unusual difficult situations, seeks to enhance resilience against economic turbulence. This type of economy is characterized by its ability to interact with the outer economic environment but also with safeguarding the economic security of the country,

ensuring that fluctuation and threats in the international economic environment have a marginal impact on key economic indicators in the long term. Furthermore, a resistance economy strives to utilize all available potential to maximize benefits within the production possibility frontier. (Arbabi et al., 2016; Samara, 2018)

Speaking of which, women empowering under PNA's strategy will not really help them, by the overburden loans and reinforcement of private property. Instead, it is worth to involve women in cooperative work, (Samara, 2018) and even give them leadership of cooperatives, which provide sustainability for agricultural cooperatives. (Nguyen et al., 2023) Moreover, PNA's most concentration on building institutions and financial market, which are reflected on aggregate nominal measurements, such as GDP, rather than reality or the solidarity of economic structure. (Tartir et al., 2012) Palestinians also face problems of confiscation of water resources and land, which enhanced growth of cooperatives that more efficiently adapt to circumstances and use the resources. (Falco et al., 2008)

Following a period of flourishing cooperatives work in Palestine, Palestinian Cooperation Work Agency (CWA) was launched in 2017 in accordance with the Palestinian cooperation Law no. 20. After that, CWA became the official governmental body that has the responsibility for supervising and monitoring the cooperatives sector. (CWA, 2024)

CWA follow the 7 principles of cooperatives that were approved by ICA, which include open and voluntary membership, democratic control, members' economic participation, autonomy and independence, cooperation among cooperatives, concern for the community, and providing education, training, and information to members. These principles are mandatory for all cooperatives have membership in CWA. (CWA, 2023)

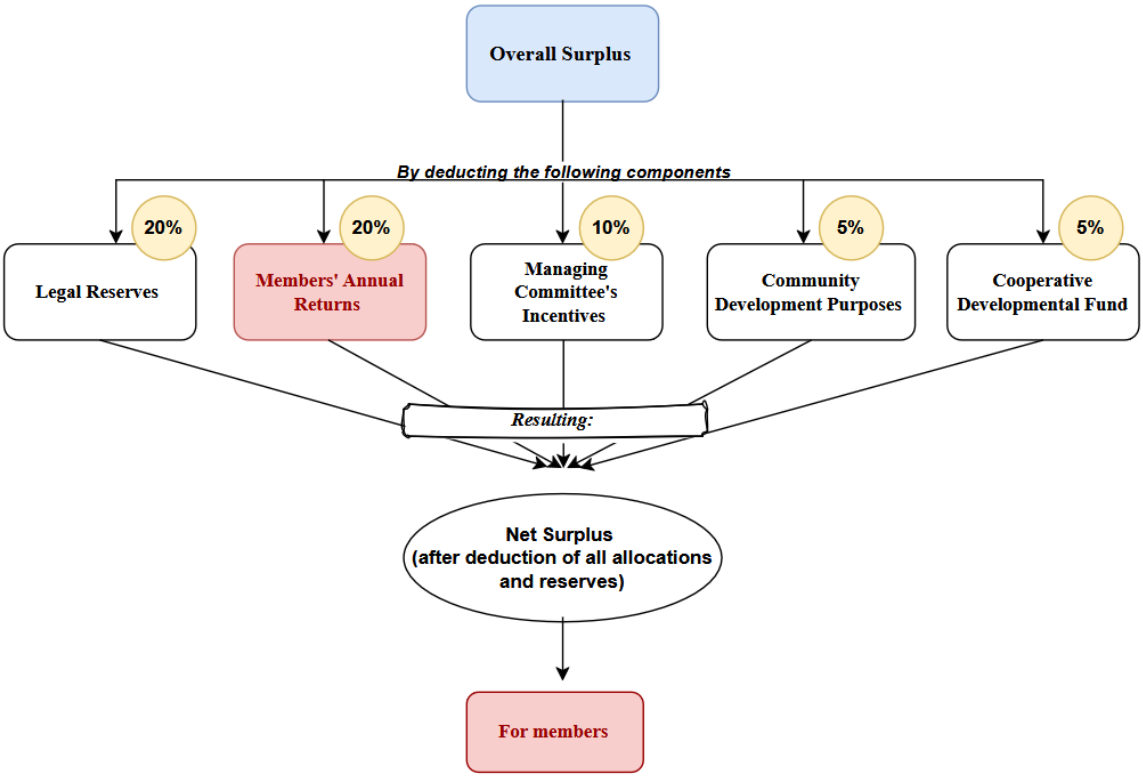
Palestinian Cooperation Work Law no. 20 also entailed the establishment of another 2 related governmental bodies; the cooperative developmental fund, which intended to provide cooperatives with financial facilities and loans. In addition to cooperative training institute,

which intended to take the responsibility of cooperative thoughts dissemination. (Cooperation Law no. 20, 2017) However, both bodies have not yet come into existence; as CWA is still working on the preparation of its strategies as well as operational and institutional frameworks. (CWA, 2024)

At the same time, Law no. 20 contains paragraphs about financial and managerial organizing of cooperatives that defines property rights, bylaws, and membership terms. It also specifies some terms regarding managing committees by article (34), who originally are members for at least 6 months, commit to the work and interest of the cooperative, paid all her/his membership obligations, without any legal violation or misdemeanor.

Moreover, Law no. 20 also governs the mechanism of dividing the actual surplus within cooperatives by article (47) after coverage of any deficit and deduction of expenses and assets depreciation, the distribution of surplus follow these terms: cooperatives are required to allocate at least 20% of its annual surplus for legal reserves that are used for future investments and improvements within the cooperative. Allocations of at most 20% of surplus are set as annual returns for members' shares. An additional 5% are allocated for community development projects, as a reflection of the social responsibility that cooperatives should uphold. Besides an additional 5% that is addressed for cooperative developmental fund to enhance its establishment, and in turn, enabling it to provide them with loans and financial facilities. Another 10% of the surplus (at most) would be dedicated for manager committees' incentives. While the remaining or what is termed as the net surplus (after deduction of all reserves and allocations) is distributed to members according to their role within the cooperative. The distribution mechanism of net surplus is represented by figure (3.1). (Cooperation Law no. 20, 2017)

Figure(3.1) : The distribution mechanism of overall surplus.



Source: Law no. 20 that was issued by PNA, the illustration was made using diagrams.net

This means that there are two parts of each member's returns; the first is a ratio of the (%20 allocations) of overall surplus that is dedicated to the annual returns of members' shares. While the other part is an additional ratio of net surplus (after all reserves and allocation have been transferred) according to members' participation in ACs' activities. These 2 parts of members' returns reflect the Ward PC's maximand that previously mentioned in the theoretical part, that the cooperatives' economic purpose is to maximize these both parts of members' returns. (Bonin et al., 1993) Here, it is worth mentioning that the only available data provided by CWA regarding surplus, is the net surplus that is left after the deduction of reserves and allocations, which will be used in our analysis model, that is why it is indicated as net surplus rather that profit.

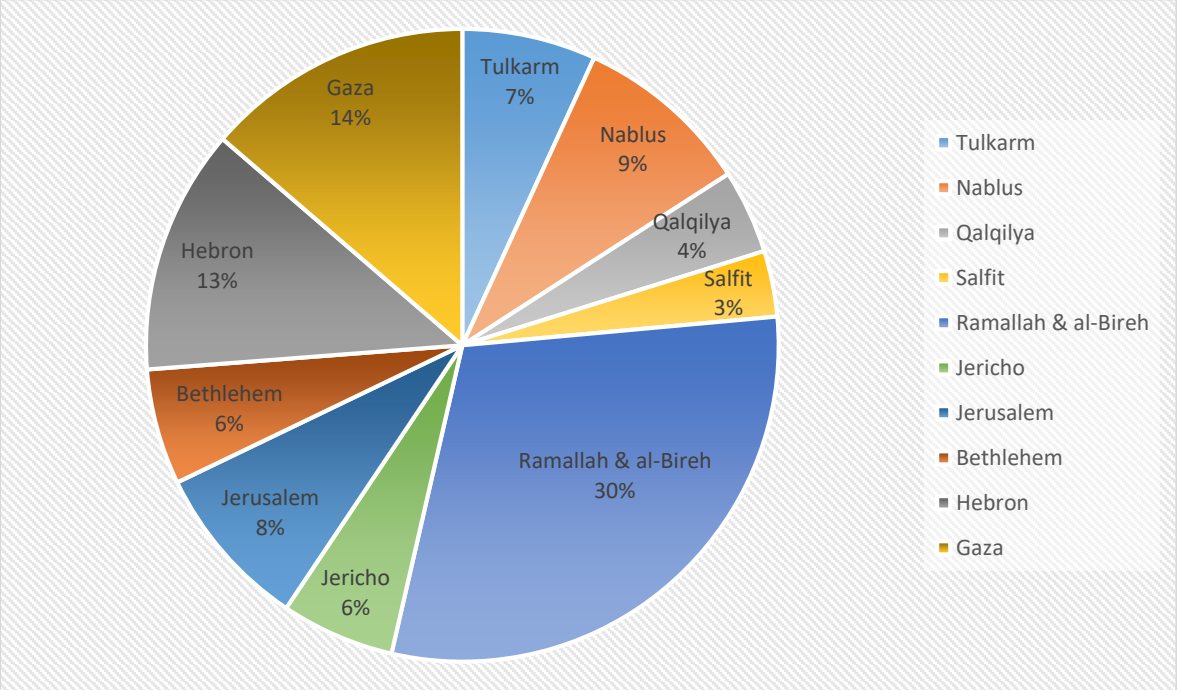
On the other hand, Law no. 20 reflects some of Palestinian government support for cooperative work; it contains a clause that exempts cooperatives from paying taxes, customs duties, and registration fees on movable and immovable property, but with a condition of reserving the value of these costs for at least 5 years. In addition to a presidential decision made in 2021 that obliged Palestinian Ministry of Finance to give the priority in purchasing contracts for cooperatives and customize grants for them. (Cooperation Law no. 20, 2017)

Within this context, cooperatives should depend on its member for financing itself; this is an inherent principle of cooperative work. So, paragraph 8 of article (5) and paragraph 10 of article (7) of Law no. 20 organize grants to cooperatives, by setting some terms for taking grants, which basically indicate that cooperatives cannot get any without a permission of CWA's chair of the board. (CWA, 2024)

3.2 Overview of Palestinian Cooperatives

Most financial indicators mentioned in this section were extracted from latest reports issued by CWA (2024), so it is worth mentioning that the statistical inferences in this section include only cooperatives that have CWA's members. Evidently, cooperatives across all sectors spread out across the West Bank and Gaza Strip, their percentages for each governorate are as shown in figure (3.2).

Figure (3.2) : The distribution of all cooperatives according to governorates, 2023



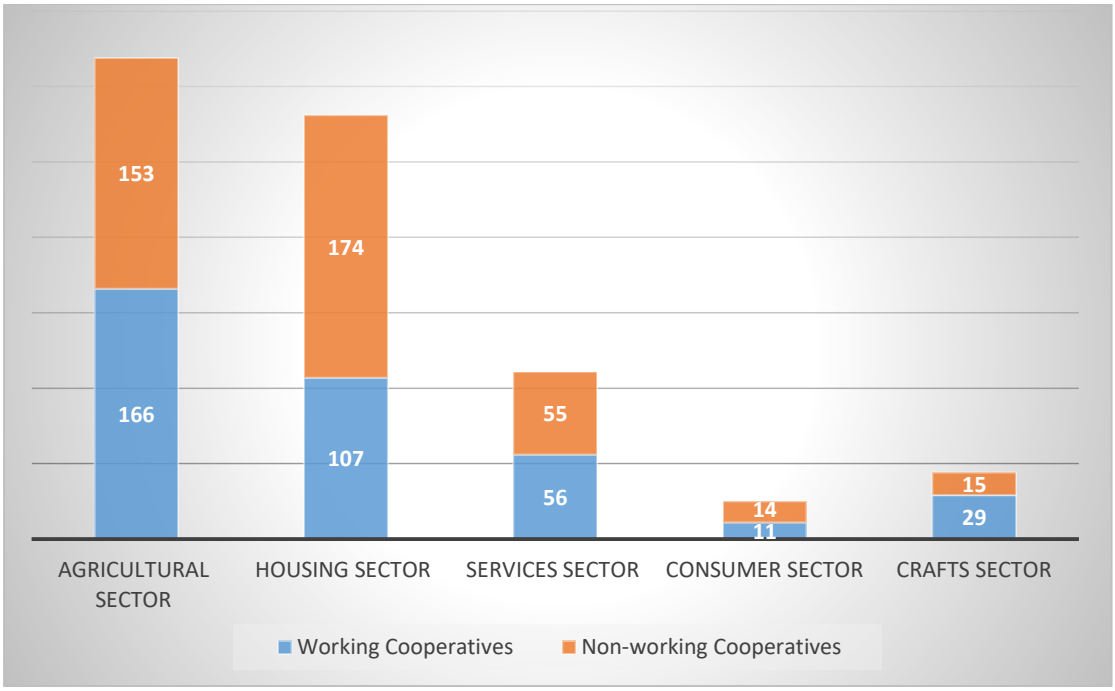
Source: Annual Report for Cooperation Work Agency (CWA), 2023

It is notable that Ramallah and al-Bireh governorate hosts the largest number of cooperatives despite of its smaller area compared to Hebron governorate that, though its larger area, has fewer percentage of cooperatives.

The main sectors in which cooperatives work include agriculture, housing, crafts, services, and consumer cooperatives. The total number of cooperatives that had membership in CWA in 2023 is 780 cooperative, which includes all working and non-working cooperatives. Working cooperatives, comprise 369 cooperatives, are those that commit to submit their balance sheet and hold a meeting for its members at least once in the last 3 years. While the non-working cooperatives did not commit to this, totaling 411 cooperatives. These 780 cooperatives are divided to; 281 housing cooperatives, 111 services cooperative, 25 consumption cooperatives, and 44 crafts cooperatives. While there are 319 agricultural cooperatives (ACs) which represents 45% of total cooperative. On the other hand, there are 14 newly registered cooperatives in 2023, which have entrepreneurial specialization in teaching, training, and

media. (CWA, 2024) Meanwhile, the following figure (3.3) illustrates the number of working and non-working cooperatives across previous mentioned sectors.

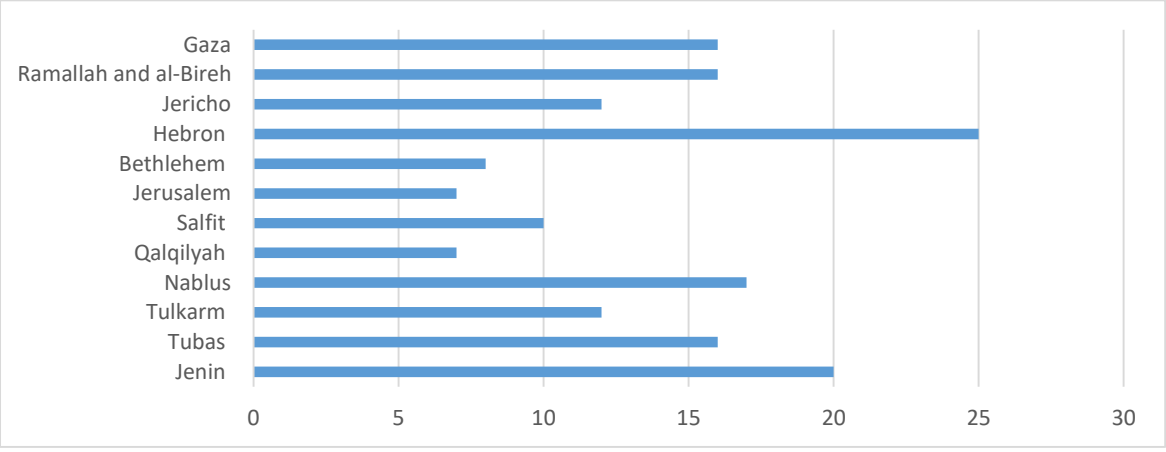
Figure(3.3) : Number of working and non-working cooperatives in each sector, 2023



Source: Annual Report for Cooperation Work Agency (CWA), 2023

As illustrated, the population of ACs in CWA is represented by the 319 ACs, which includes 166 working ACs and 153 non-working ACs. The interest of this research is with working ACs.

Figure (3.4) : Working ACs' numbers in each governorate, 2023



Source: Annual Report for Cooperation Work Agency (CWA), 2023

The distribution of ACs significantly differs compared to all-sectors cooperatives; as some governorates have higher percentage of ACs over cooperatives from other sectors. Hebron for Example, have the higher number of working ACs in 2023. While Ramallah and Al-Bireh, as well as Jerusalem have higher percentage of housing cooperatives, not ACs. On the other hand, Palestinian cooperatives contributes to employment, the following table (3.1) represents the number of member for all-sectors cooperatives that employ around 62,278 members in total, which is a considerable contribution. (CWA, 2024)

Table (3.1): Membership size in various cooperatives sectors

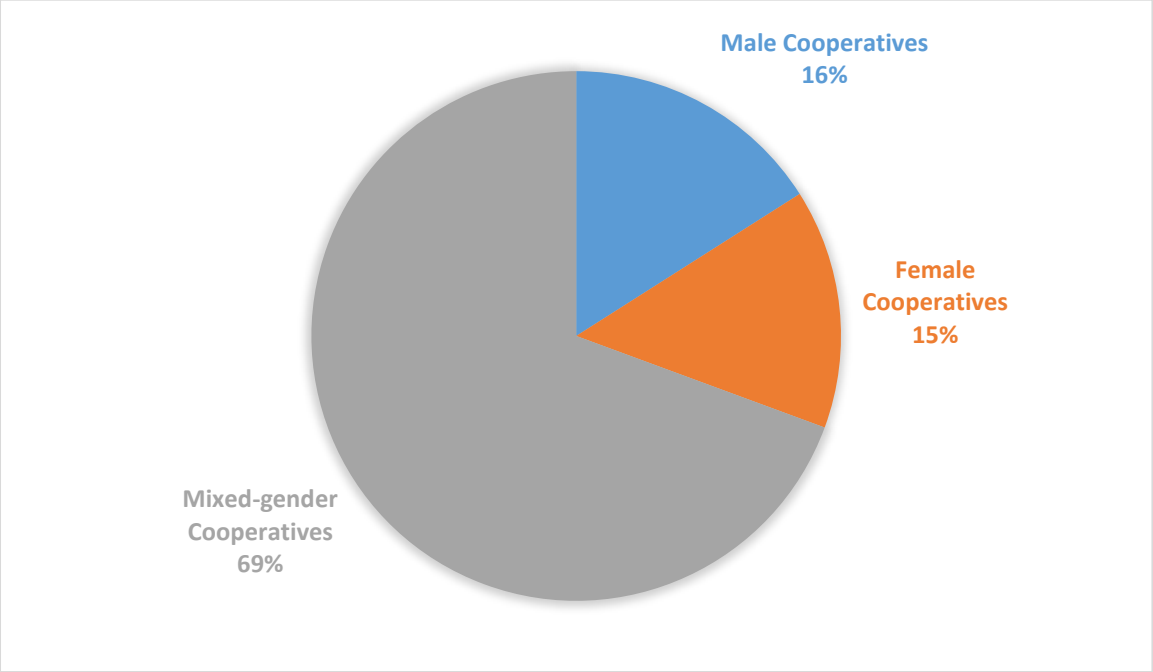
Sector	Within working cooperatives	Within non-working cooperatives	Total
Agricultural Sector	14,632	14,344	28,976
Housing Sector	5,646	5,222	10,868
Consumer Sector	999	969	1,968
Crafts Sector	707	502	1,209
Services Sector	16,515	2,742	19,257
Total	38,499	23,779	62,278

Source: Annual Report for Cooperation Work Agency (CWA), 2023

It is notable that agricultural cooperative sector gained the largest membership size, which indicates its high contribution to employment, while the services sector comes second in its employment contribution, but with higher membership size in working cooperatives against non-working ones, unlike the agricultural sector. This provides a hint that ACs need to rectify its administrative and financial affairs and tighten its commitment to cooperation law no. 20, in order to converting its status to working ACs. On the other hand, cooperatives are divided

into 3 types according to gender participation in its membership, and therefore, managing committees, as presented in figure (3.5). (CWA, 2024)

Figure (3.5) :Gender-based classifications of cooperatives across all sectors



Source: Annual Report for Cooperation Work Agency (CWA), 2023

Regarding gender classifications, as previously mentioned, cooperatives are divided into 3 types; male, mixed, and female cooperatives. In 2023, there was just 79 female cooperatives, the majority of them concentrated in services and crafts sectors respectively, and then the agricultural sector takes the third place with only 14 ACs for both working and non-working ACs. On the other hand, Hebron and then Ramallah and Al-Bireh gained the higher percentage of female cooperatives. (CWA, 2024)

CWA issued a report in 2024 for managerial and financial affairs' assessment for fiscal year 2023. This report is limited to cooperatives in the WB; due to the ongoing genocide in Gaza Strip, which complicates gathering balance sheets for cooperatives there, if they still exist. This recently issued report for all cooperatives in the WB shows that the total net surplus in 2023 is

around JOD 6M that achieved by 95 cooperatives across all sectors, while other 63 cooperatives achieved deficit by around JOD 290,000. Total Assets for all cooperatives are JOD 216.5M, which reflects strong financial basement for cooperation movements in Palestine. While the equity capital for all cooperatives is JOD 127M, which considered as essential factor for cooperation work's success that enables financial sustainability for cooperatives on both long and short terms. (CWA, 2024)

Meanwhile, the financial indicators indicate that around 12% of total assets that are estimated at JOD 25M pertaining exclusively to agricultural cooperatives (ACs), with equity capital of JOD 6M. While the total net surplus achieved by them is JOD 650,000, which represents 10% of total surplus attained by all working cooperatives. While the deficit occurred within ACs is estimated by JOD 146,000.

Other classifications were made for the purpose of this research, governorates were divided to 3 main regions in the WB; the northern region which includes governorate; Jenin, Tubas, Nablus and Qalqilyah. While the central region includes Salfit, Ramallah, Jericho, and Jerusalem. Lastly, the southern region includes Bethlehem and Hebron. Moreover, there are 4 minor specializations of ACs; ACs specialized in crop production by itself. Others align crop production with livestock or with selling agricultural equipment's and supplies, this categorize as multiple ACs. The third part specialize just in livestock, which includes beekeeping ACs. While the forth part specialize in food manufacturing which includes oil manufacturing ACs. The descriptive statistic for the sample will be followed in chapter four.

3.3 Other Palestinian ACs

There are ACs that were established in the WB which do not fall under the supervision of CWA thus these are not CWA members, yet try to generate income and employment. Most of these are not officially registered; therefore, their actual enumeration is not available. These ACs

follow the same style, by trying to maximize their income resources, in order to sustain their revenues, and internally provisioning their needed inputs, which reduces their costs and enhances ACs' solidarity. Livestock and warms husbandry for example, offers fertilizers with less costs, in turn, crop production will reduce the costs of livestock's feeding. On the other hand, previously mentioned intercropping techniques are already used in these ACs by '3 sisters planting' technique; in which 3 different crops are planted close to each other at the same line, and each play a different role. One of them is the basic yield we interested in, the other is basil which keeps insects and pests away, while the third can be beans that fixes nitrogen in the soil. This will reduce the costs of pesticides and fertilizers. (Khweireh, interview, Dec 15, 2024) Moreover, it will reduce ACs' dependency on Israeli inputs and some important pesticides that forbidden in Palestinian market, such as Sulfur. (Sharabati, interview, Dec 28, 2024)

On the other hand, ACs' also reduce their consumption of pesticides for another purpose, it follows environmental orientation to fulfill consumers' emerging needs for organic food products, which again, mostly offered by Israeli sectors, and deepens the problem of subordination, which need for a solution. Therefore, ACs try to meet consumers' needs and offer alternatives for Israeli products, which in turn strengthens the boycott movement. As a result, it is really important to study the effect of different types of diversity that previously mentioned in the theoretical part, to effectively employ it in Palestinian ACs. This research tried to do so, but unfortunately, there is no informative data to fulfill this objective.

Within the above-clarified context of **Palestine**, there are several purposes of building Palestinian ACs, which is -but not restricted to- sustaining AC's overall returns and per/member's returns. There is also political objectives in its function; in order to enforce solidarity, resistance and to achieve some of self-sufficiency, which provide an opportunity to become separated from the colonial economy.

Accordingly, the theory that will be utilized by this research relies on multiple purposes; economic and political, in addition to the fact of Palestinian ACs exist and operate within the capitalist system. (Lacy, 2001) This leads this research to rely on **the neo-classical theory**, which deals with assessment of economic factors, with trials to add other factors belong to **neo-institutional** theory, to take the cooperatives' structure, special specifications and its consequences into consideration. (Zamagni & Zamagni, 2010)

This will be implemented by focusing on cooperative-level perspective, to assess the effects of some determinants on ACs' performance, using the available performance indicator (net surplus, after deduction of reserves and allocations); the remaining part of overall surplus that is divided among members.

Chapter Four: Research Methodology

Based on the research questions and objectives outlined, this chapter will explain the methodology that is used in this research. However, beforehand, it is important to understand the nature and the formation of the available data and variables to be utilized for this purpose.

4.1 Sample Design

4.1.1 Data Source

Secondary data from The Cooperative Work Agency (CWA) in Palestine was used for the purposes of this research. The data is collected yearly, the full data set is available specifically for years (2021-2023), which is extracted from balance sheets for all kinds of cooperatives in the WB that evidently have membership in CWA. However, only the data related to agricultural cooperatives (ACs) was utilized in pursuit of this research.

4.1.2 Sample Size and the Selection Process

The sample was extracted from the population of ACs that have membership in CWA, of which a total of 319 were ACs in 2023. Yet this total number of ACs does not necessarily remain the same for each of research's interval years; as there are resolutions and new registrations of some ACs each year.

The received data set from CWA originally includes data for just 279 cooperatives across all sectors, which have common character as working cooperatives that CWA certified their balance sheets; the ACs among them are 136 as table (4.1) shows. (CWA, 2024)

Table (4.1): The population of ACs in 2023

ACs in 2023	Enumeration
Working ACs	136
Non-working ACs	183
Total number of ACs in 2023	**319**

Source: Annual report for 2023, issued by CWA

Among the 136 ACs, the ones selected for the research are those with a production-oriented nature with previously mentioned agricultural specializations; crop production, multiple specializations, livestock, and food manufacturing. While the agricultural marketing ACs with their service-oriented nature were excluded. Moreover, just ACs that have data rows for the 3 years were chosen. So the sample extracted includes 81 Palestinian ACs in the WB, each have observations for 3 years (2021-2023); with supposed total 243 observations for each included variable. The sample contains 25% of all ACs that have membership in CWA, and 60% of ACs that we received data around. The extracted data was then analyzed using Stata16 software.

4.2 Theoretical and Empirical Grounding

According to empirical studies, in addition to available variables received from CWA that considered as cooperative-level information, this research will employ two theories to analyze the economic performance of selected ACs in the WB. The first one is the neo-classical theory that interested in inspecting usual variables affecting economic efficiencies and performance, measured by higher overall profits, higher revenues per members, or higher economic benefits generally. While the second is the neo-institutional theory allows for some intervention of factors that reflect ACs' unique characters or principles and then inspect the effect of these

features on ACs' economic performance. Such as the effect of financial independency of ACs and taking external supports or grants, as well as the effect of the size of managing committee that differs in cooperatives generally, as the members of its committee originally composed of its active members.

Empirically, there are numerous previous studies analyze the performance according to these both theories, by employing them separately or jointly using multiple regression functions. Some of these specifically employ neo-classical production function, just if there is available data regarding input resources, such as Wassie et al., (2019) in which the cultivated land size play a positive significant role in enhancing ACs' performance. While Reach & Lee (2019) introduce additional variables such as weather conditions, rainfall levels, and the quantity of used pesticides.

Other researches also interested in the effect of production mode, Nguyen et al., (2023) for example, utilized the usual agricultural input resources in addition to introduce a dummy variable that reflects the effect of livestock or aquaculture's alignment with crop production. Some research also used a variable that indicates different type of diversification, such as wheat diversity index, which reflects intra-species diversity that used by Reach & Lee (2019).

Mohammed & Hamza (2021) also use production funtion that reveals the insignificant effect of input resources in addition to other structural features will be explained shorty. However, Mohammed & Hamza (2021) talk about the impotance of income resources' diversification that helps in stabilizing returns and minimizes the fluctuations. But the research did not introduce any variable to its model for inspecting its effect.

Other part of research used multiple regression functions without introducing input resources' variable, but use such variables indicating the mode of production, Pokharel et al., (2020) for example used Herfindahl Index (HI) that previously mentioned in the theoretical referencing,

which indicates multiplying of income resources in alignment with the size of ACs measured by its assets.

Speaking of which, the size of ACs is vital variable used in most researches that utilized multiple regression functions to explain ACs' performance, which is expressed in their models through different forms, such as the value of its assets that is used in Pokharel et al., (2020), Mohammed & Hamza (2021), Singh et al., (2019), and Boyd et al., (2007). Another indicator is the size of cooperatives' membership that is used by Dendup & Aditto (2020), Pham (2022), and Reach & Lee (2019). While Sebhatu, et al., (2021) use both forms. The last ACs size's indicator; the size of its sales that is utilized by Mckee et al., (2009) as a dummy variable.

Most of these researches also use financial ratios such as leverage, capital intense that were used by Singh et al., (2019). Besides to liquidity and solvency were used by Mckee et al., (2009) and Boyd et al., (2007). The latter also utilized profit margin, efficiency (assets turnover), time interested earned (TIE), and variability of ROE over time. While Pokhare et al., (2020) employed debt on assets ratio in addition to profit margin.

Other economic factors were used as explanatory variables for ACs performance, such as the number of implemented projects in the AC which was adopted by Mohammed & Hamza (2021), as well as capital, which is utilized by Pham (2022). In addition to external support or grants that were selected to explain ACs' performance in Sebhatu et al., (2021) and Dendup & Aditto (2020).

On the other hand, by delving deeper into structural indicators, more than one indicator was also introduced in previous research, such as the competencies of management committees, which includes committees number, education and experience that were utilized by both Dendup & Aditto (2020) and Pham (2022), while Sebhatu et al., (2021) suffice with their number.

Within the context of agriculture, it is also important to add variables that indicates different locations, which reflects different climate, soil and topography, that deeply influence the agricultural yield and thus, the revenues. A dummy variable that indicates different regions was used by Sebhatu et al., (2021) and Pham (2022) that also introduced another dummy variable indicating ACs' field of operation/ specializations. The Age of ACs also considered as structural feature that represented by ACs' years of operation. This indicator was utilized by Sebhatu et al., (2021) based on the assumption that old ACs may have better performance due to higher inventory turnover and higher fixed assets.

Meanwhile, most of these empirical studies utilized different indicators for performance (dependent variable), which belong to profitability indicators. Researches utilizing the production function often employ dependent variables such as the quantity of yield, which was used by Reach and Lee (2019). Whereas Nguyen et al. (2023) used 3 different groups of indicators, the first group indicates the social performance measured by payment per laborer and contribution to union and insurance. The second group indicates the innovation performance by dummy variables (Y=1 if there is innovation in production system or in products themselves). While the last group contains more than one economic indicator, such as revenues, profits, ROA and ROE. These latter indicators mostly used by researches. Pokharel et al., (2020) for example, also used both mean of ROE (MROE) and variance of ROE (VROE) that reflects the fluctuation of ROE over time, which composes another side of performance. Pham (2022) also chose using 3 indicators; ROA, Returns on Sales (ROS) and ACs' employment. While Singh et al., (2019) sufficed with ROA and Boyd et al., (2007) sufficed with ROE.

Other research papers used profits or total sales as indicators such as Sebhatu et al., (2021), whereas Mohammed & Hamza (2021) utilized ACs' yearly operating surplus.

4.3 Research Model Designing

About choosing the dependent variable, there are 4 candidate indicators that can be used as per previous research. These include total revenues, net operating income, total sales and net surplus (after all reserves and allocations have been deducted). The first indicator of total revenues is only available for 2023; the last year of this research's interval. While total sales and net operating income have very high percentage of data loss, by 50% and 74% respectively, while net surplus have lower percentage of loss (38%). According to that, this research utilizes the last variable (net surplus) as an indicator of ACs' performance. The issue of missing data, evidently, will be tackled in chapter five.

Regarding choosing the model and independent explanatory variables, there is no information about input resources for participating ACs, as the available variables are the ones related to balance sheet elements gathered by CWA. Therefore, the use of production function analysis is eliminated. Hence, this research will use multiple regression function that contains economic/financial and structural explanatory variables according to available variables and data.

4.4 Research Model

Following, the regression model for this thesis, which combines neo-classical and neo-institutional theories, which adapted from more than one previous researches that will be shortly followed, with slight changes according to available data.

The basic model is as follow:

$$Y_{it}(Net\ surplus_{it}) = \beta_0 + \beta_1 LogAssets_{it} + \beta_2\ AcAge_{it} + \beta_3 NoMng_{it} + \beta_4 Cash\_Ass_{it} + \delta_1 Mid\_Rgn_i + \delta_2\ STH\_Rgn_i + B_5 Mid_i * LogAss_{it} + \delta_3 Grants_{it} + \beta_6 Grants_{it} * AcAge_{it} + e_i$$

4.4.1 Variables and Measurements

The dependents variable Yi; refers to agricultural cooperatives i's net surplus that achieved after reserves and allocations have been deducted according to the article no. 47 of Palestinian Cooperation Law (2017) previously mentioned in the chapter 3.

While the independent variables are:

$* LogAssets_{it}$: The natural logarithmic form of AC's total assets, which includes current assets such as cash and incoming checks, in addition to fixed assets such as lands and buildings.

*$AcAge_{it}$: AC's age articulated as years of operation since registration date.

$* NoMng_{it}$: The size of managing committee; measured by the number of committee's members, who are originally active members were elected by other members to take administrative responsibilities, as clarified in the context.

* $Cash\_Ass_{it}$: Ratio of cash money over total assets, which represents cash flow.

* Mid_Rgn_i: Dummy variable that = 1 if AC located in the central region of the WB.

$* STH\_Rgn_i$: Dummy variable that = 1 if AC located in southern region of the WB.

$* Mid_i * LogAss_{it}$: Interaction term represents the difference of $LogAssets_{it}$'s effect on $Net\ surplus_{it}$ if the AC located in central region of the WB.

*$Grants_{it}$: Dummy variable that = 1 if AC took any grants in years (t-2 or earlier), and zero if not.

$* Grants_{it} * AcAge_{it}$: Interaction term represents the difference of $AcAge_{it}$'s effect on $Net\ surplus_{it}$ if AC took any grant in years (t-2 and earlier).

Note: i identifies certain ACs, and t denotes the time component (2021, 2022, 2023).

Table (4.2) shows the consulted empirical studies for each utilized explanatory variable in the model for this research.

Table (4.2): Explanatory variables and their References

Variable	Reference
$LogAssets_{it}$	Pokharel et al., (2020), Mohammed & Hamza (2021), Singh et al., (2019), Boyd et al., (2007)
$AcAge_{it}$	Dendup & Aditto (2020)
$NoMng_{it}$	Sebhatu et al., (2021)
$Cash\_Ass_{it}$	Chesnick (2000)
$Grants_{it}$	Sebhatu et al., (2021), Dendup & Aditto (2020)
Mid_Rgn_i, STH_Rgn_i	Sebhatu et al., (2021), Pham (2022)

All these variables could be considered as neo-classical factors. However, $NoMng_{it}$ and $Grants_{it}$ also belong to the neo-institutional theory; due to cooperatives' special structure and principles that refrain accepting grants and have special nature of managing committees, which are originally composed of its members. (Cook, 1995)

On the other hand, the research has utilized a number of interaction terms. The interaction between dummy variable of central area of the WB with assets, constructed on the basis of

somewhat different economic structure of each; northern, central, and southern governorates. While the same interaction term for southern region was deleted due to its high insignificance effect and multi-collinearity it causes in the model. Moreover, the interaction of $Grants_{it} * AcAge_{it}$ comes basically from the literature debate about the conservative terms of taking grants by cooperatives, some of them theorize that if it will be accepted, it must be just at the early years of ACs' age or other terms. (University of Wisconsin–Madison, 2012) While the economic logic behind this interaction term that both ($Grants_{it}$ and $AcAge_{it}$) require effective utilization of the ACs' relationships and experience that have built over the years, to ensure achieving a higher $Net\ surplus_{it}$. (Sebhatu, et al., 2021) From these aspects onward, this research decide to inspect this within Palestinian ACs. While the next section presents some failed experiments conducted by the research to add variables that were employed in previous empirical researches.

4.4.2 Experiments for Adding Explanatory Variables

As previously mentioned, both theories and previous applied researches noted a number of variables that could be estimated to explain the situation of ACs' performance, but this research did not utilize. These variables will be mentioned according to the reason of their exclusion.

The **first reason** is that some variables are available just for the last year (2023) of this research interval (2021-2023), such as the number of grants that certain AC took in the last 3 years, this used by both Sebhatu et al., (2021) and Dendup & Aditto (2020). The same reason also applies to excluding the variable ‘number of projects executed’ that extracted from Mohammed & Hamza (2021), in addition to the variable 'year of last meeting for members authority' that extracted from Pham (2022), this variable considered as a principal principle of cooperation, which reflect some members participation and engagement.

The **second reason** is that another set of variables have numerous missing values, which reduces the number of observations and render the results of the regression unreliable. Attempts to deal with this problem through imputations very much raise the uncertainty due to high percentage of missing values. Example of such a variable include the 'total value of grants' taken by AC in the year (t-1) that is utilized by both Sebhatu et al., (2021) and Dendup & Aditto (2020). As well as 'debt to assets ratio' that is extracted from Pokharel et al., (2020) and 'capital reserves to assets' ratio, an indicator of solvency that is applied by Mckee et al., (2009) and Boyd et al., (2007).

The **third reason** of excluding important theoretical variables is that they have very insignificant statistical effect on $Net\ surplus_{it}$. For example, the effect of 'women participation on both levels of membership 'authority' and management committees of AC' on its $Net\ surplus_{it}$ were tested as below:

1) By knowing that ACs are divided to male, female, and mixed-gender ACs according to their authorities; 2 dummy variables were introduced for the trial; one for mixed-gender and other for female ACs. Another trial made by introducing just one dummy variable for women participation in AC, which = 0 if ACs' members are only males, and 1 if otherwise. A last trial was also done by introducing a ratio of women participation in ACs' authority. All these trials produced insignificant effects. This indicator was trialed by consulting Sebhatu, et al., (2021) and Reach & Lee (2019).
2) Introducing other dummy variable indicating women participation in the managing committees that utilized by Nguyen et al., (2023) also produced an insignificant effect.

Other variables added with insignificant effects include; 3 dummy variables that reflect ACs' specializations, that is used in Sebhatu, et al., (2021) which also aimed to test multiplying of income resources that are represented in the dummy variable of multiple specialization ACs that is utilized by Pokharel et al., (2020).

On the other hand, the size of equity capital, the equity capital to assets ratio, as well as the value of grants received by ACs in the years (t-2 and earlier) were all experimented, but also generate insignificant effects. It is worth to mention that the last variable is replaced by the dummy variable ($Grants_{it}$) that the research will utilize, which = 1 if the AC receive any grant in years (t-2 and earlier), 0 if otherwise.

4.4.3 Hypothesis

H_1: $\beta_1 \neq 0$, There is a non-linear positive effect of AC's assets on its net surplus.

H_2: $\beta_2 \neq 0$, There is a positive effect of AC's age on its net surplus.

H_3: $\beta_3 \neq 0$, There is a positive effect of the size of ACs' managing committee on its net surplus.

H_4: $\beta_4 \neq 0$, There is a positive effect of cash/assets ratio in AC on its net surplus.

H_5: $\delta_1 \neq 0$, There is a negative effect on AC's net surplus if it located in the central region of WB.

H_6: $\delta_2 \neq 0$, There is a negative effect on AC's net surplus if it located in the southern region of WB.

H_7: $\beta_5 \neq 0$, There is additional negative effect of assets on AC's net surplus if it located in the central region of WB.

H_8: $\delta_3 \neq 0$, There is a positive effect on AC's net surplus if it had any grant in years (t-2 and earlier).

H_9: $\beta_6 \neq 0$, There is additional positive effect of AC's age on its net surplus if it had any grants in years (t-2 and earlier).

4.5 Introductory Quantitative Analysis

This research will set off by utilizing panel data regression under random effect (re) model. The random affect model is preferred to be used against fixed effect model; this is due to Hausman test's result of testing the following hypotheses:

$\boldsymbol{H_0}$***:*** *Difference in coefficients is not systematic, which supposes that there is no correlation exists between random effects and explanatory variables* ➔ random effect model is the suitable model.

Versus $\boldsymbol{H_1}$***:*** *Difference in coefficients is systematic, which supposes that there is a correlation between random effects and explanatory variables* ➔ fixed effect model is the suitable model.

While the result is: Prob > chi2 = 0.1932, which means that there is no correlation between random effects and explanatory variables, which leads this research to utilize random effect model.

Nevertheless, before proceeding, it is also important to make sure about using random effect model against common (pooled OLS), by executing Breusch and Pagan Lagrangian multiplier (LM) test (Susetyo & Fitrianto, 2024) that tests the following hypotheses:

Test: $\boldsymbol{H_0}$***:*** *There are no random effects exist in the data; data does not contain any individual-specific effects (across units or over time)* ➔ (Pooled OLS is the suitable model)

Versus $\boldsymbol{H_1}$:*There are random effects exist in the data; data contains individual-specific effects (across units or over time)* ➔ (Random Effects model is the suitable model)

While the result is as below:

chibar2 (01) = 14.68

Prob > chibar2 = 0.0001

The result once again favors the random effect model over pooled OLS; as it accounts for differences across units or over time, which allow for additional (between and within) variances in producing coefficients, whereas Pooled OLS does not. After this result, choosing Pooled OLs means not considering individual-specific differences, which will produce biased coefficients. (Wooldridge, 2016)

The utilization of the random effect model means that estimation of regression parameters with OLS method cannot be applied anymore; as the error terms in this case are always correlated. Random effect model has the competencies to deal with this feature, (Susetyo & Fitrianto, 2024) which contradicts OLS assumptions, in addition to previously mentioned reason that OLS does not consider the different units over time. (Wooldridge, 2016) Stata16 output for both Hausman and LM tests are presented in details in Appendix A.

On the other hand, it is worth mentioning that data is strongly balanced; as all ACs in the sample have rows/data for each year of research's interval (2021-2023), this is due to originally way of choosing the sample of ACs that was previously clarified.

Chapter Five: Results

5.1 Descriptive Statistics of the Sample

Both Skewness/Kurtosis and Shapiro-Wilk tests were conducted to examine the nature of continuous variables that utilized in this research. $Net\ surplus_{it}$, $AcAge_{it}$, $NoMng_{it}$, and $Cash\_Ass_{it}$ failed in both Skewness/Kurtosis and Shapiro-Wilk tests (0.000) for each, which reflect the non-normal distribution for all of them. While $LogAssets_{it}$ passed the Skewness/ Kurtosis test (0.01034), but failed in Shapiro-Wilk W test (0.2893). Its histogram contains some confusion compared to normal one.

Table (5.1) shows the descriptive statistics for the utilized variables, including total observations, sample means, standard deviations, and variances for all continuous variables included in the regression analysis.

Table (5.1): ACs descriptive data results, 2021-2023

Variable	Obs.	Mean	Std. dv	Variance	Skewness	Kurtosis
$Net\ surplus_{it}$	151	9058.84	24187.97	5.85e+08	4.265481	26.0775
$LogAssets_{it}$	243	11.30382	1.360355	1.850566	.1965924	2.704435
$AcAge_{it}$	243	21.1893	13.90988	193.4847	1.325182	4.178856
$NoMng_{it}$	243	5.91358	1.792068	3.211509	1.403446	7.981145
$Cash\_Ass_{it}$	243	21.65538	25.88765	670.1702	1.54812	4.644925

Source: Researcher's calculations based on CWA data using Stata16

To elaborate, intended ACs included in this research's sample generates a $Net\ surplus_{it}$ average figure of JOD 9,059; while the mean of total assets they have is estimated at around

JOD 81,131 ($e^{11.30382}$)[3]. ACs also have an average age of 21 years, with around 6 members in their managing committees. While their average cash/assets ratio is around 22%.

Regarding the linearity, it have been tested by drawing (scattering) the relationship of independent variables with the dependent variable $Net\ surplus_{it}$, which revealed the non-linear nature of the relationship. This non-normal, non-linear nature of variables do not pose a problem in using panel data analysis.

Table (5.2) presents the frequencies and percentages for each category of the binary variables. Among included ACs, 34.6% are located in the central region of the WB (Salfit, Ramallah, Jericho, and Jerusalem), 23.5% are located in the southern region (Hebron and Bethlehem), while the remaining 41.8% (reference group) are located in the northern region of the WB

Table (5.2): Frequencies and percentage of binary variables.

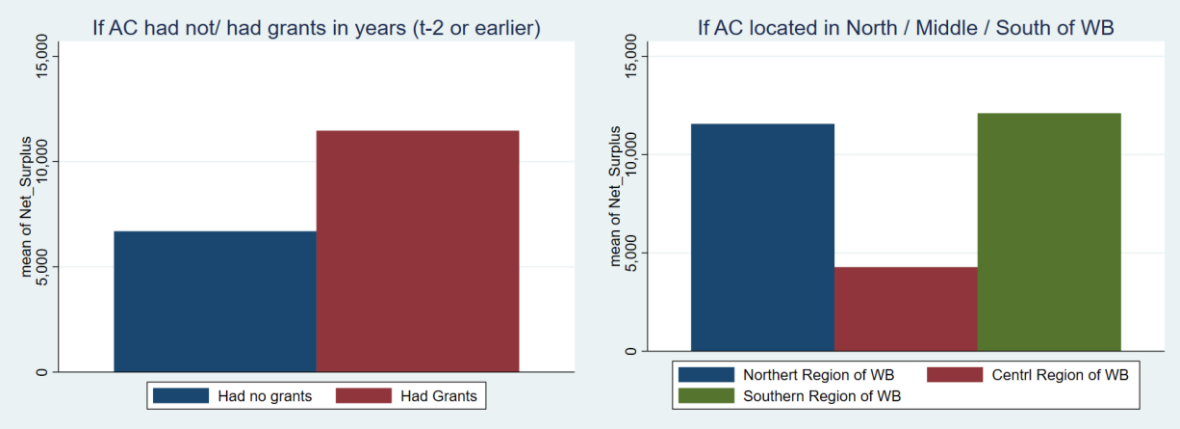
	0		**1**		**Total observations**
Variable	**Frequency**	**Percentage**	**Frequency**	**Percentage**	
Mid_Rgn_i	159	65.43	84	34.57	243
STH_Rgn_i	186	76.54	57	23.46	243
$Grants_{it}$	104	42.80	139	57.20	243

Source: Researcher's calculations based on CWA data using Stata16

The mean of $Net\ surplus_{it}$ is JOD 11,559 for southern ACs, JOD 4,275 for the central ones, and JOD 12,105 for the northern ACs. While the mean of $Net\ surplus_{it}$ is JOD 6,685 for ACs that did not receive any grant in years (t-2 and earlier), and JOD 11,465 for those who took grants in the same interval.

[3] Converting the natural logarithmic figure for $LogAssets'_{it}s$ mean to an absolute value.

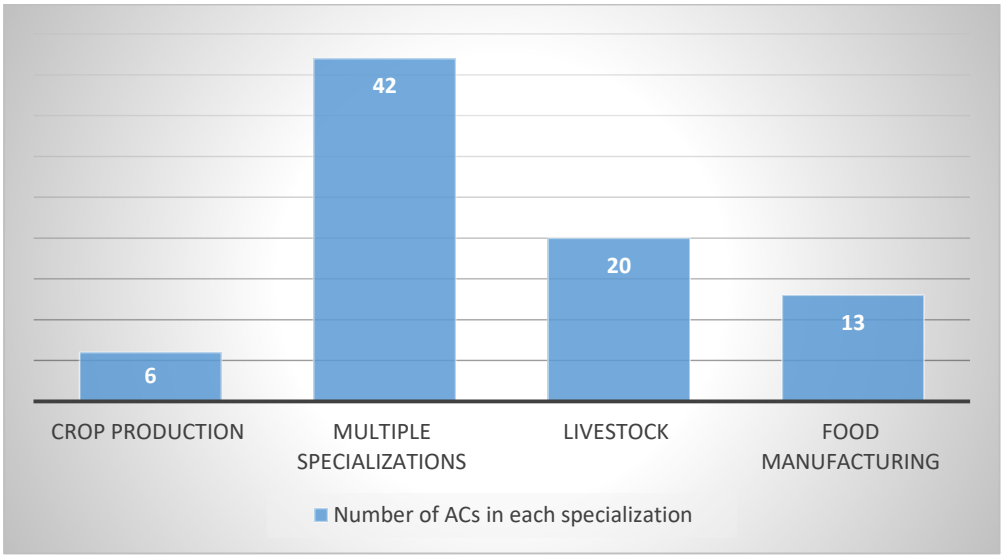
Figure (5.1): a- The difference in means of AC's $Net\ surplus_{it}$ if they receive/not receive any grant in years (t-2 and earlier). b- Difference in means of ACs' $Net\ surplus_{it}$ based on their geographical location.



Source: Researcher's calculations based on CWA data using Stata16

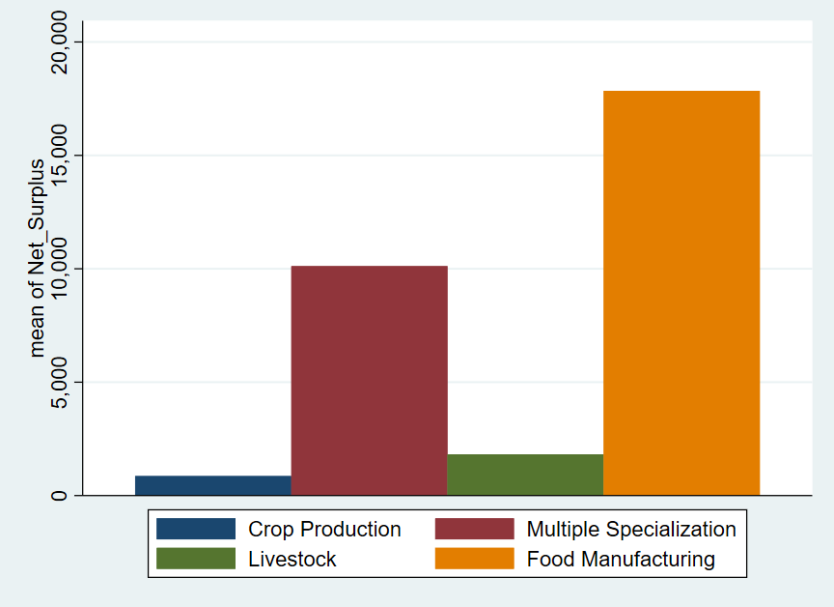
As mentioned before in the context section of this research, ACs registered with the CWA have 4 different specializations, overlapping at times. Some of them just specialize in crop production that represents 7.41% of the sample. Other ACs add more choices to crop production by selling agricultural and irrigation equipment and supplies, in addition to just one cooperative that add livestock to crop production. These latter cooperatives are classified with multiple specializations, which represents 51.85% of the sample. There are also ACs that specialize in livestock only and represent 24.69% of the sample. While the last category that work in the area of food manufacturing represents 16.05% of all ACs in the sample. Figure (5.2) shows the number of ACs in each specialization, while figure (5.3) shows the mean of net surplus for each category of them.

Figure (5.2) : The number of ACs in each specialization.



Source: Researcher's calculations based on CWA data.

Figure (5.3) : The mean of net surplus for each specialization of ACs



Source: Researcher's calculations based on CWA data using Stata16

Regarding the number of observations, all included variables in the model have 243 observations, except the dependent variable $Net\ surplus_{it}$, which has only 151 observations, and thus misses 92 observations which represents 38% of all its observations. Dealing with this issue before analysis is essential; to produce reliable unbiased estimators.

However, the results of the first estimation model before processing the missing values are presented in details in table (A.1) in Appendix A, in alignment with necessary tests, while the brief results are followed in the table (5.3).

Table (5.3): Brief Results of Main Estimation Model Before missing data processing

Variable	Coefficient	Variable	Coefficient
$LogAssets_{it}$	13863.25***	STH_Rgn_i	-5940.723
$AcAge_{it}$	176.0633	$Mid_i * LogAss_{it}$	-13266.73***
$NoMng_{it}$	2640.342***	$Grants_{it}$	5899.306
$Cash\_Ass_{it}$	186.7281**	$Grants_{it} * AcAge_{it}$	-446.8154**
Mid_Rgn_i	-10547.69***	_Cons	-163686.6***
Within R^2	**0.1939**	**Overall R^2**	**0.4177**
Between R^2	**0.3978**	**No. of Obs./group**	**151 / 76**

Table (5.3): ***Statistical Significance at level 0.01 **statistical significance at level 0.05

For the first sight; $LogAssets_{it}$, $NoMng_{it}$ and $Cash\_Ass_{it}$ have positive significant effects on $Net\ surplus_{it}$. While the dummy variable Mid_Rgn_i as well as both interaction terms ($Mid_i * LogAss_{it}$) and ($Grants_{it} * AcAge_{it}$) negatively affect $Net\ surplus_{it}$ with significant influences. The coefficients and other statistical inference will be discussed in detail after processing the missing values.

5.2 Mechanisms and Patterns of Missing Values

Before proceeding in resolving missing data issues, it is essential to understand the mechanisms governing the missing values in $Net\ surplus_{it}$. There are 3 types of missing data; **1) Missing Completely at Random (MCAR)**, which supposes absence of any relationship between missing values in $Net\ surplus_{it}$ is entirely unrelated to any independent variable or any

characteristic of the dependent variable itself, either individually or jointly. If the data are MCAR, it is acceptable to proceed with regression analysis while ignoring the missing observation**. 2) Missing at Random (MAC)**, this assumes a more mitigated assumptions compared to MCAR; as it may accept the existence of relationships between the missing values in $Net\ surplus_{it}$ and other variables, but does not allow any feature of $Net\ surplus_{it}$ to govern the missing values, such as the size of $Net\ surplus_{it}$. **3) Missing Not at Random (MNAR)**, which violates the latter condition, and happens when the missing values are correlated with specific feature of $Net\ surplus_{it}$ itself. (Allison, 2016)

5.2.1 Classifying the Research's Missing Values

In accordance with the above explanation of missing values' mechanisms, we need to classify the missing values in this research in order to best deal with their issues. Firstly, Palestinian Cooperative Work Agency (CWA) noted (interview, Nov 27, 2024) that there is no special feature in the in $Net\ surplus_{it}$ itself that governs missing values in this variable; as the internal law of CWA prevents reservation of these accounting numbers. So it does not depend on the size of $Net\ surplus_{it}$ for example. By doing this, we rule out the possibility of being MNAR, it may be MAC if not MCAR.

After that, inspection is done to determine if the missing values are MAC by logit regression between missing values in $Net\ surplus_{it}$ and all independent variables mentioned in the main estimation model. In addition to other variables that may be related to the missing values themselves by general sense or trials, even if they will not be included in the main regression; such as the year of last budget received by CWA ($LastBudYear_{it}$), $SqlogAss_{it}$, and equity capital (Equ_Cap_{it}). These latter variables and some of independent variables show significant relation with missing values in the logit regression, in addition to overall P-value (0.0177) for

LR Chi2 that reflects overall significance, this rules out the probability of MCAR. It is worth to mention that all variables included in the logit regression are called auxiliary variables. The results of this Logit regression are presented in table (B.1) in Appendix B. at the same time, T-test and Chi2 test were also executed for double-checking, which emphasize the same result and again rule out MCAR option. By standing on the case of MAC, we cannot simply ignore the missing data, as the generated coefficients will be biased and unreliable.

Table (5.4): Describing missing values in variables of interest

Variable	Missed values	Observed values	Total values
$Net\ surplus_{it}$	92	151	243
$Equity\ Capital_{it}$	1	242	243

The rest, non-mentioned auxiliary variables have full set of 243 observations.

By checking the missing values of the dependent variable and auxiliary variables, including $Equity\ Capital_{it}$ which also has 1 missing value. However, we have not included this variable in the research's main estimation model; yet we have to impute this missing value with the same imputation equation (code); as the code will not be executed if any of auxiliary variables have any missing values. Furthermore, the pattern of the missing values was tested, which reveals the non-monotone or random nature of missing pattern that presented in table (5.5)

Table (5.5): The Pattern of Missing Data

	Pattern	
Percent	$Equity\ Capital_{it}$	$Net\ surplus_{it}$
62%	**1**	**1**
37%	**1**	**0**
< 1%	**0**	**0**

1 indicates observed values and 0 indicates missing values.

The first pattern (1:1) means that 62% of observations (rows) have complete data without any missing in both variables, and the second one (1:0) means that 37% of rows have complete data in $Equity\ Capital_{it}$ but with missing values in $Net\ surplus_{it}$. While less that 1% of rows have missing values in both variables (0:0), so the missing pattern is non-monotone.

5.2.2 Solving the Problem of Missing Data

After knowing the mechanism of missing values in dependent variable and high percentage of missing values (38%), multiple imputations (henceforth MI) is the best ways to process missing values in this case. (Allison, 2016)

MI depends on producing missing data using multiple iterations (m) of complete data; by employing appropriate imputation model that add suitable random variance to new data. It does so by using Bayesian approach. (Akmam et al., 2019) This mechanism of producing data makes MI the best choice for MAR case and with relatively high percentage of missing values (20-60%); as it provides results that are closer to actual data, with fewer biases, less RMSE, and higher coverage percentage compared to complete cases analysis, mean substitution, and LOCF. (Zhu, 2014) There are more than one strategy to impute inside MI, a simple way to choose is to consider the nature of variables that have missing values, such as (regress) that is suitable for linear relations, (mvn) for normal variables; as it generates iterations by producing normal errors. In addition to predictive mean matching (PMM) that used for imputing continuous variable we doubt about its normal distribution, and suitable for data containing some outliers and complicated relations. (UCLA: Statistical Consulting Group, n.d.) It does so by insuring to add appropriate random error consistent with variables' distribution, which help to produce good unbiased coefficients; this is the parametric stage of PMM, which depends on the observed values and their distribution to impute values. (Akmam et al., 2019)

PMM also employs non-parametric stage in processing missing values, which allow it to depend on certain number of neighbors (donors) in enhancing the distance's prediction between observed and missing values. (Akmam et al., 2019). This composition (semi- parametric techniques) help in producing values by taking advantages of both observed values of dependent and independent variables from one side, and their distributions from the other side. (Williams, 2022)

Success of MI does not depend only on observed data itself, but it heavily depends on correctly modeling the imputation equation by considering the specifications of the main estimated model and the nature of utilized variables. As the distribution of imputed data depends on exist data's distribution. (University of Wisconsin–Madison, 2012)

The consideration of the main model's and its variables' specifications can be more guaranteed by using more complicated minor option of MI, which is Multiple Imputation by Chained Equation (henceforth MICE) that just add the word (chained) to the code of imputation. MICE provide more weight to the data structure and relations between variables in imputing missing values and does not depend only on the observed values. This makes it more appropriate in dealing with special structure of panel data compared to previous simpler ways that solely use regress, mvn, or PMM, by producing less RMSE. MICE process includes 3 stages; imputation missing data and generate m iterations of complete data, analyzing each complete data set, then pooling (summarizing) the parameters resulted from each analysis using Rubin's rules and divide them over the number of executed iterations. Following a simple equation of pooled value of the coefficients generated by PMM. (Susetyo & Fitrianto, 2024)

$$\overline{\hat{\beta}_k} = \frac{1}{m}\sum_{n=1}^{m} \hat{\beta}_k^n \qquad [1]$$

5.3 The Imputation Model

By acknowledgment of the nature of missing data with high percentage, and the non-normal distribution for variables and non-linear relationship with the dependent variable, in addition to the special structure of panel data, MICE will be used with the option PMM. This will ensure gaining the previous advantages of both MICE and PMM in our case.

In this process, all auxiliary variables should be included in the imputation model (code). These auxiliary variables include the basic estimation model's variables even the interaction terms, in addition to other variables that have a relationship with the missing values as discovered earlier, which may not really important in the main estimation model, but will improve the quality of producing values. (Akmam et al., 2019) Moreover, imputation model should consider random effects, which can be executed by also including year in the code of imputation equation. (Williams, 2022)

By trials, including these variables individually and jointly have been tested, their existence enhances the imputation process and reduces the resulted standard errors, relative increase in variance (RVI), and the fraction of missing values (FMI). RVI and FMI serve as diagnostic tools to evaluate the accuracy of the imputation process' results, which will be explained later in more details.

Recalling that the missing values are in the dependent variable, it is essential to ensure that the regression of all auxiliary variables on $Net\ surplus_{it}$ produces R^2= 0.5 or greater, otherwise, MI will not be useful in this case. (Williams, 2022) This has been achieved by obtaining an overall R^2 of 0.5437. The results of this regression are followed in the table (5.6).

Table (5.6): Imputation Model

Variable	Coefficient	Std. (Error)	p-value
$SqLgAss_{it}$	5933.102	1021.004	0.000
$LogAssets_{it}$	-118135.7	22809.57	0.000
Equ_Cap_{it}	-.0374224	.0113631	0.001
$AcAge_{it}$	177.3848	158.9891	0.265
$NoMng_{it}$	1771.413	924.259	0.055
$Cash\_Ass_{it}$	84.4301	78.67306	0.283
Mid_Rgn_{i}	-9737.184	3662.971	0.008
STH_Rgn_{i}	-5705.164	4443.549	0.199
$Mid_i * LogAss_{it}$	-18520	3031.235	0.000
$Sth_i * LogAss_{it}$	-1777.025	3442.442	0.606
$Grants_{it}$	13756.27	5604.135	0.014
$Grants_{it} * AcAge_{it}$	-702.4911	204.1549	0.001
$LstBdgYear_{it}$	658.9619	1623.854	0.685
_Cons	-764584.6	3269029	0.815
Within R^2	**0.3541**	**Wald chi2(13)**	**130.94**
Between R^2	**0.5360**	**Prob > chi2**	**0.0000**
Overall R^2	**0.5437**	**No. of Obs./ groups**	**151 / 76**

Source: researcher's calculations by Stata16 based on CWA information

After making sure that the imputation model is appropriate, the imputation code is run using Stata16 by adding 50 iterations, and by utilizing 5 donors. Justifications for using these numbers will be explained after presenting the results.

5.4 Final Analytical Results after MI

Following the running of the correction process, the final results are presented below.

Table (5.7): Regression results and statistical inferences

Variable	Coefficient	Std. (Error)	p-value
$LogAssets_{it}$	11645.18***	1992.648	0.000
$AcAge_{it}$	220.7027	169.1503	0.192
$NoMng_{it}$	2659.976***	940.9396	0.005
$Cash\_Ass_{it}$	142.0241**	72.05173	0.049
Mid_Rgn_i	-9445.413**	3996.705	0.018
STH_Rgn_i	-5832.975	4338.265	0.179
$Mid_i * LogAss_{it}$	-12644.75***	2808.954	0.000
$Grants_{it}$	5983.187	4826.201	0.215
$Grants_{it} * AcAge_{it}$	-462.1914**	190.6625	0.015
_Cons	-139220.3***	22309.39	0.000
Average RVI	**0.1839**	**F(9,16300.9)**	**7.63**
Largest FMI	**0.2523**	**Prob> F**	**0.000**
sigma_u	**11526.243**	**Rho**	**.41979909**
Sigma_e	**13550.528**	**No. of Obs. / groups**	**243 / 81**

Table (5.7) ***Statistical Significance at level 0.01. **statistical significance at level 0.05

Independent variables are linked to the dependent variable $Net\ surplus_{it}$ with coefficients shown in table (5.7). The overall Prob>F shows an overall significance of model estimation in interpreting the differences in achieving $Net\ surplus_{it}$ according to each level of independent variables.

The findings indicate that $LogAssets_{it}$, $NoMng_{it}$, $Cash\_Ass_{it}$ give positive significant effects on $Net\ surplus_{it}$ with different levels of significance. $LogAssets_{it}$'s coefficient (11645.18) indicates that a raise of total assets of 1% will increase the $Net\ surplus_{it}$ by around JOD 116.5. This is compatible with results in (Mohammed & Hamza, 2021) and (Singh et al., 2019).

According to theory, this reflects the advantages of economies of scales on ACs' economic and financial performance.

While $NoMng_{it}$'s coefficient (2659.976) indicates that any additional member in managing authority will cause a rise in $Net\ surplus_{it}$ by around JOD 2,660 which indicates the efficiency of the recruited managers hired by these ACs. This result corresponds with the results of Dendup & Aditto, (2020) that revealed the significant positive role of number of efficient board members who are originally active members, whose commitment to achieve the ACs' higher economic performance is beyond doubt, as it will eventually benefit them. This considered as inherent difference between cooperatives and IOFs.

Additionally, the coefficient of variable $Cash\_Ass_{it}$ (142.0241) indicates that a 1% increase in the ratio of cash over total assets will in turn increase the $Net\ surplus_{it}$ by JOD 142. This positive effect reflects the importance of moderate ratio of cash to total assets in enhancing operating revenues and thus, the net surplus. This result is consistent with what Chesnick (2000) reported.

On the other hand, a number of variables were found to exert a negative impact on the dependent variable, $Net\ surplus_{it}$. These include the dummy variable Mid_Rgn_i and the interaction term $Mid_i * LogAss_{it}$ and $Grants_{it} * AcAge_{it}$ negatively affect $Net\ surplus_{it}$ with different levels of significance.

The coefficient (-9445.413) of Mid_Rgn_i indicates that AC's being in central region of the WB will reduce its $Net\ surplus_{it}$ with around JOD 9,445 per annum. This could be attributed to the limited left lands in central region of the WB that customized for agricultural purposes compared to lands in northern or southern region of the WB. Moreover, it can be referred to the occupation's restrictions in the Jordan Valley area, including attempts to seize exist water sources and preventing the issuance of permits for new well drilling, which means depending

only on winter's rainfalls. Additionally, the settlers' continuous attacks against residents. (Rjoub, 2014)

While the coefficient (-12644.75) of $Mid_i * LogAss_{it}$ indicates that AC's location in the central region of WB have additional indirect effect on $Net\ surplus_{it}$ by reducing the effect of $LogAssets_{it}$ on $Net\ surplus_{it}$ by JOD 126. So the total effect of $LogAssets_{it}$ for the central region's ACs is (116.5 - 126 = JOD -9.5), which basically indicates that there is inefficient and bad employment of assets in these centrally located ACs in the WB due to previous mentioned reasons.

Lastly, the coefficient (-462.1914) of the interaction term $Grants_{it} * AcAge_{it}$ indicates the additional effect of AC's age ($AcAge_{it}$) on yearly $Net\ surplus_{it}$, which had not any significant itself, but provides negative significant effect if the AC got any grants in the years (t-2 or earlier) if the AC had any grants in this interval, its $Net\ surplus_{it}$ declines by JOD 462 as $AcAge_{it}$ increases by one year. This result indicates the bad utilization of experience and inefficient business relations in using these grants. This could include the use of these grants for covering accumulated debts and bridging deficits, or distributing them directly for allocations without making any actual investments that guarantee long- term returns.

On the other hand, the age of AC as a standalone variable ($AcAge_{it}$), and having grants in years (t-2 and earlier) which represented by the dummy variable ($Grants_{it}$) did not provide significant effects on $Net\ surplus_{it}$. This contradict the result of Dendup and Aditto (2020) that revealed the significant positive effect of external support in the form of grants on ACs' profits or net surplus. This result indicates that these ACs need to better utilize their experience and business relations accumulated over the years and grants they received to enhance their $Net\ surplus_{it}$.

Furthermore, AC's being in the southern region of the WB (STH_Rgn_i) has not any significant difference in its effect on $Net\ surplus_{it}$ compared to the reference group (northern ACs); ACs in both regions are subjected to similar agricultural factors.

5.5 Imputation Diagnostics

Checking if the imputations statistical inference are within the same range throughout the iterations is essential, which provides us with hint that there is low variance between actual values and the new-generated ones. (Williams, 2022) The inferences were checked and it became clear that they are within their original ranges, which indicates that the iterations made are stable thus the results stand as relevant.

After each stage of adding rounds, the means, standard errors, minimum and maximum values of generated data in each iteration have to be checked, if the variance between the rounds' measurements is low or reasonable, the added rounds may be enough. For double-checking, Relative Efficiency (RE) index is used, as the below equation:

$$RE = \left(\frac{1}{1 + \frac{\lambda}{m}}\right)$$

λ denotes the fraction of missing information (FMI) and m denote the number of so far generated iterations. (SAS Institute Inc., 2018) FMI shows the increase of the standard errors of the estimated parameters due to the ignorable effect of missing values. (Chen & Savalei, 2021) If RE is around 1, the generated iterations are enough, but if it does not reach 0.95, iterations should be added but not randomly; as it also will make a small inflation in the standard errors; as it designated to build regression that endures higher uncertainty. (SAS Institute Inc., 2018)

Also there is another diagnostic indicator, Relative Increase in Variance (RVI), which is the proportional increase in the sampling variance of the variables' parameters caused by the missing data. (Akmam et al., 2019)

Regarding the number of iterations to be added, some literatures advice that the number of iterations should be added is equal to the percentage of loss. For example, the missing values percentage in this research is 38%, so 38 iterations should be added. (Akmam et al., 2019) While others saw that more iterations have to be added until the coefficients and other inferences become stable. (University of Wisconsin–Madison, 2012)

After conducting the imputation process using MICE, we have to ensure that models reach a stabilization point, 50 iterations did this, as adding 38 iteration provided coefficients, std, and p-values close to 50 iteration, which means that a stable point is reach on $m = 50$. However, raising them up to 50 also provides approximately similar inferences, but with higher overall and individual RVI and FMI. That is the reason to suffice with 50 iterations; where the overall Relative Efficiency (RE) for the model is 0.9949, the average RVI is 0.1839, and largest FMI is 0.2523.

Hereinafter, table (5.8) shows RVI, FMI, RE, and variances for all variables mentioned in the estimation analysis in addition to the constant term.

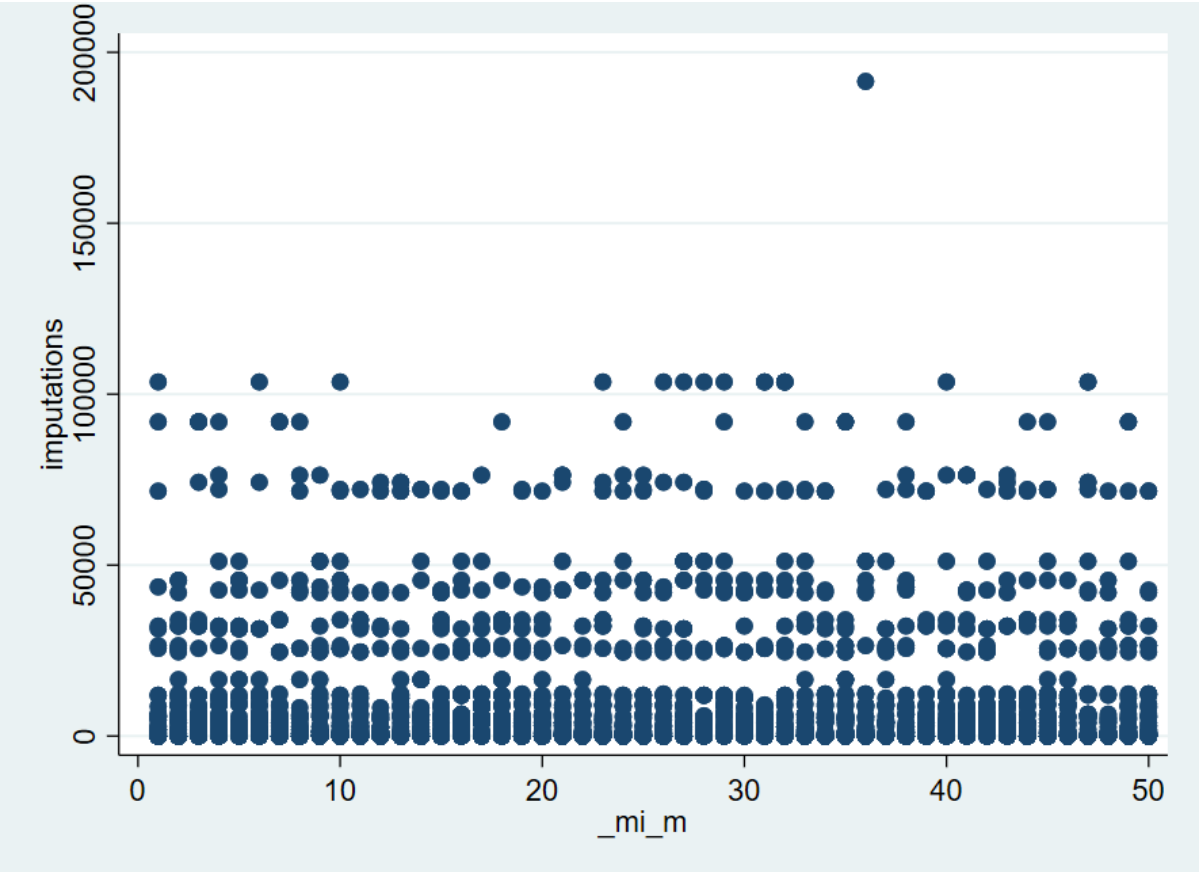
Table(5.8) : RVI, FMI, RE and variances for constant term for all estimated variables

Variable	RVI	FMI	RE
$LogAssets_{it}$	.19156	.161648	.996777
$AcAge_{it}$	.334017	.252295	.994979
$NoMng_{it}$	.151004	.131803	.997371
$Cash\_Ass_{it}$	.13415	.118785	.99763
Mid_Rgn_i	.171619	.147227	.997064
STH_Rgn_i	.130178	.115662	.997692
$Mid_i * LogAss_{it}$	.302509	.233935	.995343
$Grants_{it}$	.146201	.128131	.997444
$Grants_{it} * AcAge_{it}$	.233752	.190649	.996201
_Cons	.211007	.175263	.996507

Source: Researcher's calculations using Stata16 based on CWA data.

On the other hand, a detailed guide issued by University of Wisconsin–Madison (2012) suggests additional test to inspect the stability of new-generated values. On this basis, figure (5.4) displays the scatter plot of imputed data over iterations, which shows a good sense of stability and regularity in patterns of producing data from (0-50) iterations.

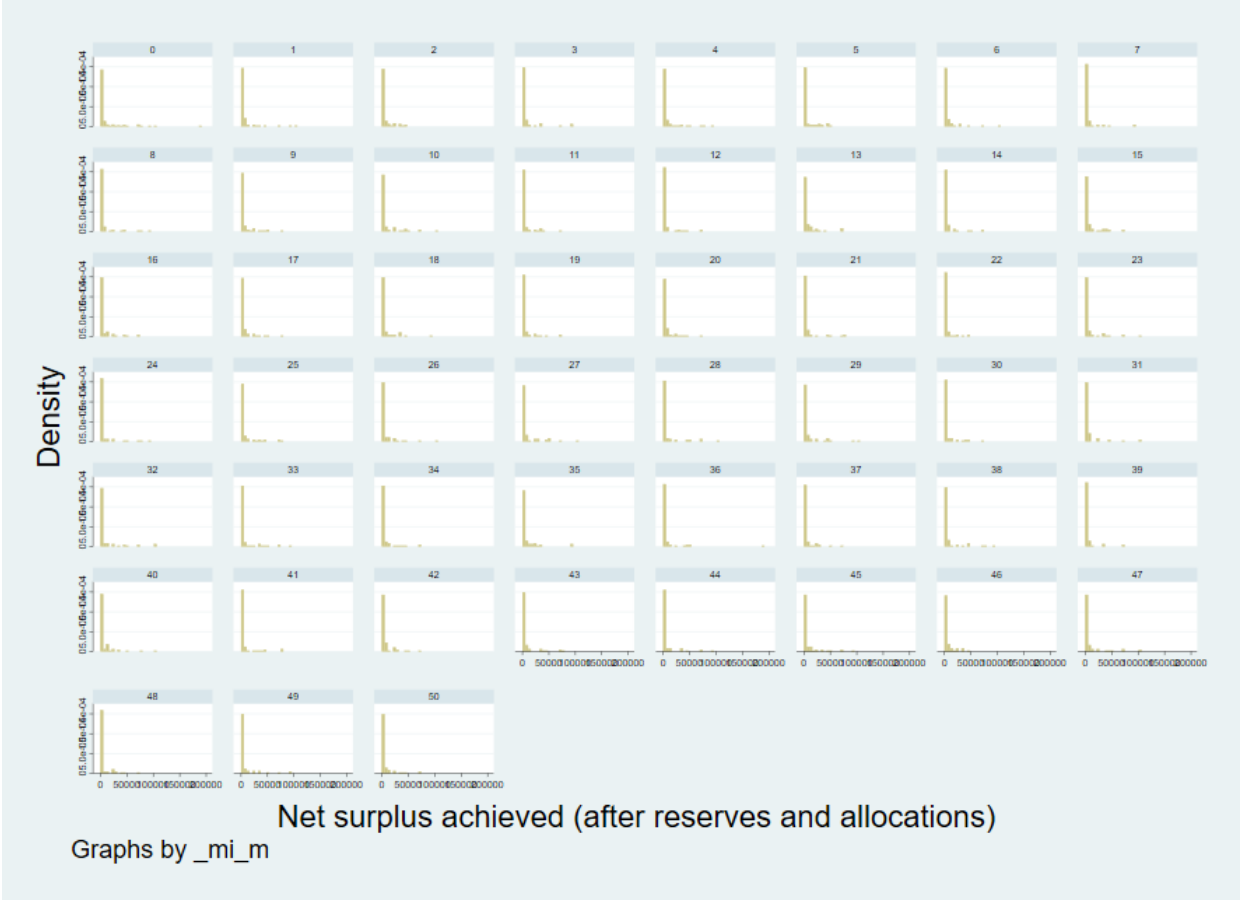
Figure (5.4): The scatter plot of imputed data over the 50 iterations



Source: Researcher's calculations based on CWA data using Stata16.

On the same time, the histogram for $Net\ surplus_{it}$ throughout the 50 iterations are around their values, they are presented in the following figure number (5.4).

Figure(5.5) : Histograms for values of $Net\ surplus_{it}$ in all iterations



Source: Researcher's calculations based on CWA data using Stata16.

Besides to all made diagnostics, Kolmogorov-Smirnov (K-S) test is also conducted, which shows that the difference between the distribution of original data compared to the distribution of complete data after iterations is not significant, the result also shown in Appendix B in addition to some details about trials of improving the imputation model.

5.6 Summary Findings

Based on the statistical analysis of the dataset, the following findings were observed:

There is a significant positive non-linear effect of ACs' total assets on its net surplus (β_1= 11545.18). This indicates that the larger ACs (measured by their total assets) contribute to higher net surplus by around 11.5%. In addition to the significant positive effect that was identified for ACs' size of managing committee (β_3= 2659.976), both factors (ACs' total assets and ACs' size of managing committee) are significant on 1% significance level. The analysis also revealed a positive effect of cash to assets ratio on ACs' net surplus (β_4 = 142.0241) on 5% significance level, which indicating that a larger size of managing committee positively influence ACs' net surplus. This means that hypotheses H_1, H_3 , and H_4 are accepted.

On the other hand, no significant effect of ACs' age (measured by the years in operation) on its net surplus was found (β_2 = 220.7027, p-value = 0.192) nor for grants that was received by ACs in the years (t-2 and earlier) that did not show any significant positive effect on ACs' net surplus as a standalone factor (δ_3= 5983.187, p-value = 0.215). This means that both hypotheses H_2 and H_8 are rejected. However, there was a negative significant interaction between grants received in the same interval and ACs' age, indicating the older ACs receiving grants in years (t-2 or earlier) experience a decline in their net surplus (β_6 = -462.1914) on 5% significance level which leads this research to accept H_9.

Regarding the regional effects, ACs located in the central region of the WB show a significant negative impact on their net surplus by (δ_1= -9445.413) on 5% significance level. Additional negative effect of ACs' total assets by -12% on its net surplus was observed for these ACs that located in the central region of the WB on 1% significance level (β_5= -12644.75), therefore, both H_5 and H_7 are accepted. However, no significant effect was observed for ACs located in the southern region of the WB, so, H_6 is rejected.

Chapter Six: Conclusion

The cooperatives based economic system is one of the most viable production organizational modes in the WB, particularly in light of compound exploitation of capitalism and colonialism's seizure of lands and water resources. As a result, colonization significantly undermines the capabilities of the agricultural sector, the vital sector that a resistance economy can be built upon. This gave rise to the need to explore the determinants that enhance agricultural cooperatives' (ACs') economic performance in the WB, thereby bolstering their deeper social and political roles.

In retrospect of previous theoretical and empirical research that analyzed the cooperatives, this research attempts to delve deeply into its structural modes and assessment of its economic performance. To achieve this goal, the research adopted a multiple regression analysis that utilized both neo-classical and neo-institutional theories in formulating its model and choosing the suitable explanatory variables from the data set that was received from CWA. However, the research had to deal with the missing values in the dependent variable, which have been imputed using the multiple imputation (MI) process that employs both MICE and PMM techniques to impute missing data throughout 50 iterations. After that, the data set was subsequently analyzed.

The results revealed that ACs' assets size plays a crucial role in driving its net surplus, with diminishing returns observed for ACs that are located in the central region of WB. These central ACs seem affected by significant challenges as revealed by its standalone variable's negative significant effect, warranting further investigation into regional disparities and considerations for ACs in this region.

On the other hand, grants taken by ACs in previous few years do not directly contribute to its net surplus. However, their interaction with ACs' age reveals potential inefficiencies in utilizing these resources effectively over time, or challenges regarding taking grants at all, as this will really harm the principle of self-financing term.

Therefore, the results of this research emphasize the importance of strategic assets management, regional policies, particularly in regions like the central region of the WB. Moreover, greater caution must be taken when granting funds to ACs, as this will harms ACs' independency and solidarity, which in turn influence its social and political role, the essential one especially in the Palestinian context.

On the other hand, future researches are recommended to make similar research with longer time intervals, and to inspect the effect of different types of diversity that previously mentioned, to provide more solid information about its effect within Palestinian context, and then to widely utilize it to enhance ACs' productivity. This implies CWA to provide more solid data about certain features of cooperatives, such as information regarding the divisions of ACs' specializations and the diversification of crop production, in addition to provide data regarding input resources, in order to study their effect on ACs' economic performance, therefore, enhancing their non-economic roles. In addition to record ACs that have membership in cooperative unions, to inspect its effect on cooperative's economic performance.

CWA also is recommended to provide training for ACs to help them leverage their years of experience in order to enhance their economic efficiency. In addition to guide the officially unregistered ACs about accounting matters, and ensuring the establishment of standardized records; this would enable researchers to study specific factors without compromising these ACs' independence.

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Appendices

Appendix A: Primary necessary tests and very first estimation model

Hausman Test

```
. hausman fe re
```

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
logAss	**10811.72**	**13863.25**	**-3051.535**	**7272.458**
CoopsAgeco~t	**1497.182**	**176.0633**	**1321.119**	**2306.558**
SumNoManag~g	**7389.4**	**2640.342**	**4749.058**	**2143.965**
cash_ass	**-174.4658**	**186.7281**	**-361.1938**	**219.1973**
MidRgn_lgAss	**-8445.804**	**-13266.73**	**4820.922**	**25325**
ID_grants	**-2790.002**	**5899.306**	**-8689.308**	**7828.983**
ID_grants# c. CoopsAgeco~t 1	**-525.3392**	**-446.8154**	**-78.52375**	**212.9737**

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(**7**) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= **9.92**
Prob>chi2 = **0.1932**

LM test - Breusch and Pagan Lagrangian multiplier test

P_value = 0.0001, random choosen against pooled-common effect model

Breusch and Pagan Lagrangian multiplier test for random effects

Netsurplusachievedafterrese[ID,t] = Xb + u[ID] + e[ID,t]

Estimated results:

	Var	sd = sqrt(Var)
Netsurp~e	**5.85e+08**	**24187.97**
e	**2.53e+08**	**15891.11**
u	**4.82e+07**	**6942.181**

Test: Var(u) = 0
chibar2(01) = **14.68**
Prob > chibar2 = **0.0001**

Table (A1.1) : Main estimation model before missing data processing

Variable	Coefficient	Std. (Error)	p-value
$LogAssets_{it}$	13863.25***	2030.824	0.000
$AcAge_{it}$	176.0633	168.7177	0.297
$NoMng_{it}$	2640.342***	974.9438	0.007
$Cash\_Ass_{it}$	186.7281**	82.6705	0.024
Mid_Rgn_i	-10547.69***	3944.809	0.007
STH_Rgn_i	-5940.723	4826.528	0.218
$Mid_i * LogAss_{it}$	-13266.73***	2742.002	0.000
$Grants_{it}$	5899.306	5948.222	0.321
$Grants_{it} * AcAge_{it}$	-446.8154**	218.086	0.040
_Cons	-163686.6***	22849.87	0.000
Within R^2	**0.1939**	**Wald chi2(9)**	**82.32**
Between R^2	**0.3978**	**Prob > chi2**	**0.0000**
Overall R^2	**0.4177**	**No. of Obs./group**	**151 / 76**

**table (A1.1): ***Statistical Significance at level 0.01, **statistical significance at level 0.05,

It is worth to mention that we processed high collinearity in this model caused by the interaction term $Mid_i * LogAss_{it}$, which is reflected in high VIF for both Mid_Rgn_i (98.6) and for $Mid_i * LogAss_{it}$ (106.18), which influence the coefficients of dummy variables (Mid_Rgn_i and STH_Rgn_i). We solve this by subtracting mean of $LogAss_{it}$ from the interaction term $Mid_i * LogAss_{it}$. The resulted estimation is the same with its all elements, just with adjustments on coefficients of both Mid_Rgn_i and STH_Rgn_i. In addition to adjusted VIF matrix as shown in the following table (A1.2).

Table (A1.2): VIF values for the basic estimation model

Variable	VIF	Variable	VIF
$LogAssets_{it}$	3.16	STH_Rgn_i	1.23
$AcAge_{it}$	2.24	$Mid_i * LogAss_{it}$	2.33
$NoMng_{it}$	1.41	$Grants_{it}$	3.67
$Cash\_Ass_{it}$	1.76	$Grants_{it} * AcAge_{it}$	3.85
Mid_Rgn_i	1.34	**Mean VIF**	**2.33**

Most variables have VIF values around 1, and all of them are less than 5, which reflects a good modeling.

Appendix 2: Missing Data Processing

A2.1 Test for (Missing At Random) MAR

We have to introduce binary variable (missing_flag) = 1 if the value is observed and =0 if the value is missing. Then make a logistic regression in which the introduced binary variable is the dependent with all auxiliary variables.

Table (A2.1): Logit regression between missing_flag and all auxiliary variables

Variable	Coefficient	Std	P-value
$SqLgAss_{it}$	-.2169678	.1087881	0.046
$LogAssets_{it}$	4.459162	2.417008	0.065
Equ_Cap_{it}	3.55e-06	1.31e-06	0.007
$AcAge_{it}$	.0308876	.0170763	0.70
$NoMng_{it}$	.0473049	.0971971	0.626
$Cash\_Ass_{it}$	-.0046568	.0077243	0.547
Mid_Rgn_i	.0342403	.3722913	0.927
STH_Rgn_i	.7224745	.3933073	0.066
$Mid_i * LogAss_{it}$	-.3907408	.3371565	0.246
$Sth_i * LogAss_{it}$	.0573408	.3152939	0.856
$Grants_{it}$	1.734249	.6578861	0.008
$Grants_{it} * AcAge_{it}$	-.0351311	.0254729	0.168
$LstBdgYear_{it}$	-.9322713	.1815325	0.000
_Cons	1859.123	365.16	0.000
LR chi2(13)	**65.21**	**Prob> chi2**	**0.0000**
Pseudo R^2	**0.2035**		

A2.2 The Imputation Model

```
. ksmirnov Netsurplusachievedafterrese, by(original_or_imputed)

Two-sample Kolmogorov-Smirnov test for equality of distribution functions

 Smaller group       D       P-value
 ------------------------------------
 0:                 0.0043    0.995
 1:                -0.0365    0.678
 Combined K-S:      0.0365    0.990

Note: Ties exist in combined dataset;
      there are 75 unique values out of 4751 observations.
```

A2.3 Trials to improve the imputation equation (code)

Some guides advice to add the choice burnin to the imputation equation using PMM, which assumes that the very first iterations are not stable, so this choice ignores the firsts iterations; burnin (10) for example, neglects the first 10 iterations, the aim of the process is to reach more stable estimations. We tried to execute the imputation process by adding burnin(50) and burnin(100) with the same number of imputations, but both choices produce exactly the same coefficients, std(s), p-values, RE, RVI and FMI for all variables. Which seems we do not need to skip any iteration, so that we execute the imputation without burnin choice.

On the other hand, we chose to use 5 donors after trails against 3 and 10 donors. In the empirical studies, they mostly use these 3 options. Trials must made to choose the best number of donors according to the nature of data set. Which can be revealed also by diagnostic tests. (Akmam et al., 2019) Within this context, 5 donors choice provides us with tighter std(s), RVI, and FMI compared to 3 and 10 donors.

Appendix C: Stata16 code/Script

It is worth mentioning that generated values from MI process differ throughout iterations each time of executing the code; as according to what mentioned before; the process add suitable random error for the nature of auxiliary variables, this implies that there are unlimited options of slightly different values in each iteration. Subsequently, the generated coefficients differ slightly each time of executing the imputation code, but evidently with the same range of significance. So a root seed option with a chosen random number; for example rseed(223344) is entered to the imputation equation (code) to ensure that the results (coefficients, standard errors, and other inferences) will stay the same each time of executing the code. (University of Wisconsin–Madison, 2012)

```
**Generating needed variables**

gen logAss = log( TotalAssets)
gen SqlogAss = logAss^2

egen mean_LogAss = mean(logAss)
gen LgAss_Centered = logAss - mean_LogAss
gen MidRgn_lgAss = ID_RGN_MID * LgAss_Centered
gen SthRgn_lgAss = LgAss_Centered * ID_Rgn_SWTH
gen cash_ass = (cashmoney/ TotalAssets) *100
gen Grants_Age = ID_grants* CoopsAgeconstant


**Setting the panel data**
xtset ID year
xtdescribe


**Testing variables' nature and their relationship with the dependent variable**

histogram Netsurplusachievedafterrese , normal
qnorm Netsurplusachievedafterrese
summarize Netsurplusachievedafterrese , detail
sktest Netsurplusachievedafterrese
swilk Netsurplusachievedafterrese
*****

histogram logAss, normal
qnorm logAss
summarize logAss, detail
sktest logAss
swilk logAss
scatter Netsurplusachievedafterrese logAss
*****

histogram cash_ass , normal
qnorm cash_ass
summarize cash_ass , detail
sktest cash_ass
swilk cash_ass
scatter Netsurplusachievedafterrese cash_ass
*****
```

```
histogram CoopsAgeconstant, normal
qnorm CoopsAgeconstant
summarize CoopsAgeconstant , detail
sktest CoopsAgeconstant
swilk CoopsAgeconstant
scatter Netsurplusachievedafterrese CoopsAgeconstant
*****

histogram SumNoManaging , normal
qnorm SumNoManaging
summarize SumNoManaging , detail
sktest SumNoManaging
swilk SumNoManaging
scatter Netsurplusachievedafterrese SumNoManaging
*****

**The mean of net surplus for each category of dummy variables**
**Grants:**
graph bar Netsurplusachievedafterrese , over(ID_grants) asyvars
**Specializations**
graph bar Netsurplusachievedafterrese, over( orderedspec ) asyvars
**Regions**
graph bar Netsurplusachievedafterrese, over( ID_RGN_MID ) asyvars
graph bar Netsurplusachievedafterrese, over( ID_Rgn_SWTH ) asyvars
graph bar Netsurplusachievedafterrese, over( ID_Region ) asyvars


**To find mean's values**
tabulate ID_Region , summarize(Netsurplusachievedafterrese)
tabulate ID_grants , summarize(Netsurplusachievedafterrese)
tabulate orderedspec

**The basic regression model before Multiple Imputations (MI)**
xtreg Netsurplusachievedafterrese logAss CoopsAgeconstant SumNoManaging cash_ass
ID_RGN_MID ID_Rgn_SWTH MidRgn_lgAss ID_grants i.ID_grants#c.CoopsAgeconstant, fe
estimates store fe

xtreg Netsurplusachievedafterrese logAss CoopsAgeconstant SumNoManaging cash_ass
ID_RGN_MID ID_Rgn_SWTH MidRgn_lgAss ID_grants i.ID_grants#c.CoopsAgeconstant, re
estimates store re
```

```
**Hausman Test for choosing between re and fe models:**
hausman fe re

**LM test - Breusch and Pagan Lagrangian multiplier test for random effects - to
choose between re and pooled OLS-common effect model**
xtreg Netsurplusachievedafterrese logAss CoopsAgeconstant SumNoManaging cash_ass
ID_RGN_MID ID_Rgn_SWTH MidRgn_lgAss ID_grants i.ID_grants#c.CoopsAgeconstant, re
xttest0


%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%

**Testing for MCAR**
xtreg Netsurplusachievedafterrese SqlogAss logAss CoopsAgeconstant EqCap_Ass
SumNoManaging femaleinauthority cash_ass ID_RGN_MID ID_Rgn_SWTH MidRgn_lgAss
SthRgn_lgAss ID_grants i.ID_grants#c. CoopsAgeconstant, re

gen missing_flag = missing(Netsurplusachievedafterrese)

 (**T-tests: To inspect the dependency of missing values on other absolute
variables: if any of them show p_value< 0.05// 0.1:  Pr(|T| > |t|) = 0.05/0.1 OR
Pr(T > t) = 0.05 / 0.1,  MCAR is    violated)**
ttest SqlogAss, by(missing_flag)
ttest logAss, by(missing_flag)
ttest Equitycapital, by(missing_flag)
ttest SumNoManaging, by(missing_flag)
ttest CoopsAgeconstant, by(missing_flag)
ttest cash_ass, by(missing_flag)
ttest MidRgn_lgAss , by(missing_flag)
ttest SthRgn_lgAss , by(missing_flag)
ttest LastBUDGETsyear, by(missing_flag)
ttest Grants_Age, by(missing_flag)

**Chi2-Test to inspect the dependency of missing values on other dummy variables:**
tabulate ID_RGN_MID missing_flag, chi2
tabulate ID_Rgn_SWTH missing_flag, chi2
tabulate ID_grants missing_flag, chi2
```

```
 **Testing for MAR**
 logit missing_flag SqlogAss logAss Equitycapital CoopsAgeconstant SumNoManaging
cash_ass ID_RGN_MID ID_Rgn_SWTH MidRgn_lgAss SthRgn_lgAss LastBUDGETsyear ID_grants
 Grants_Age

 **Variables will used in imputation model must have R^2 higher than 0.5**
 xtreg Netsurplusachievedafterrese SqlogAss logAss Equitycapital CoopsAgeconstant
SumNoManaging cash_ass ID_RGN_MID ID_Rgn_SWTH MidRgn_lgAss SthRgn_lgAss ID_grants i
.ID_grants#c.CoopsAgeconstant LastBUDGETsyear, re

 **Or the linear regression provides approximately the same result**
reg Netsurplusachievedafterrese SqlogAss logAss Equitycapital CoopsAgeconstant
SumNoManaging cash_ass ID_RGN_MID ID_Rgn_SWTH MidRgn_lgAss SthRgn_lgAss ID_grants i
.ID_grants#c.CoopsAgeconstant LastBUDGETsyear


 **To find the pattern of missing values before Multiple Imputations (MI)**
 misstable summarize Netsurplusachievedafterrese Equitycapital
 misstable pattern Netsurplusachievedafterrese Equitycapital
 misstable tree Netsurplusachievedafterrese Equitycapital, frequency


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 ******** MULTIPLE IMPUTATION (MI) to compensate missing values ******

 **Setting up the Multiple Impuatation**
 mi set mlong
 mi desc

 **Registerring variables that have missing variables and want to impute them**
 mi register imputed Netsurplusachievedafterrese Equitycapital

 **Registering Auxiliary Variables (regular)**
 mi register regular SqlogAss logAss CoopsAgeconstant SumNoManaging cash_ass
ID_RGN_MID ID_Rgn_SWTH MidRgn_lgAss SthRgn_lgAss ID_grants Grants_Age
LastBUDGETsyear year

 **To unregister any variable -If needed **
 mi unregister varlist
```

```
***Imputation Equation/Code***
mi impute chained (pmm, knn(5)) Netsurplusachievedafterrese Equitycapital =
SqlogAss logAss CoopsAgeconstant SumNoManaging cash_ass LastBUDGETsyear ID_RGN_MID
ID_Rgn_SWTH MidRgn_lgAss SthRgn_lgAss year ID_grants ID_grants Grants_Age, add(50)
rseed(223344)

**Execute the regression after Multiple Imputations (MI) has been done with 50
iterations**
mi estimate: xtreg Netsurplusachievedafterrese logAss CoopsAgeconstant
SumNoManaging cash_ass ID_RGN_MID ID_Rgn_SWTH MidRgn_lgAss ID_grants i.ID_grants#c.
CoopsAgeconstant, re

**To make sure about the current number of imputation iterations // rounds**
mi describe

**To check the variance of descriptive statistics for net surplus throughout the
iterations:**
mi xeq 0 1 5 8 10 13 15 18 20 23 25 28 30 33 35 38 40 43 45 48 50: summarize
Netsurplusachievedafterrese

mi xeq: summarize Netsurplusachievedafterrese, detail

**To check the distribution of dpendent variable after Multiple Imputations**
summarize Netsurplusachievedafterrese, detail
histogram Netsurplusachievedafterrese, normal


**after mi estimation, to compute overall Relaive Efficiency (RE)***
local FMI = 0.2523
local m = 50
local relative_efficiency = 1 / (1 + (`FMI' / `m'))
display "Relative Efficiency: " `relative_efficiency'


**to check FMI and RVI for variables after mi estimate:**
mi estimate, vartable dftable


**To check the stability of values over iterations**
mi xeq : generate imputations = Netsurplusachievedafterrese
scatter imputations _mi_m if _mi_m > 0
```

```
 **Comparing original data (m=0) with complete data in each iteration (m=1 to
m=50)**
 histogram Netsurplusachievedafterrese, by(_mi_m)

 ***Comparing means and standard deviations  for net surplus over iterations***
 mi xeq: summarize Netsurplusachievedafterrese

 **Is the difference in net surplus' mean in m=0 significant compared to its means
in all iterations?**
 ** Kolmogorov-Smirnov (K-S) test***
 ksmirnov Netsurplusachievedafterrese, by(original_or_imputed)

 **Trials for adding burnin(50) and burnin(100)// its imputation equation/code
are:**
 mi impute chained (pmm, knn(5)) Netsurplusachievedafterrese Equitycapital =
SqlogAss logAss CoopsAgeconstant SumNoManaging cash_ass LastBUDGETsyear ID_RGN_MID
ID_Rgn_SWTH MidRgn_lgAss SthRgn_lgAss year ID_grants ID_grants Grants_Age, burnin(
50) add(50) rseed(223344)

 mi impute chained (pmm, knn(5)) Netsurplusachievedafterrese Equitycapital =
SqlogAss logAss CoopsAgeconstant SumNoManaging cash_ass LastBUDGETsyear ID_RGN_MID
ID_Rgn_SWTH MidRgn_lgAss  SthRgn_lgAss year ID_grants ID_grants Grants_Age, burnin(
100) add(50) rseed(223344)
```