A Different Kind of Sharing Economy: A Taxonomy of Platform Cooperatives

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Abstract

Platform cooperatives are emerging as new digital organizing forms of traditional cooperatives and as alternatives to big tech platforms behind gig economy. Despite their rapid growth, current research on platform cooperatives is still scarce. This paper aims to develop a systematic taxonomy of platform cooperatives using a theoretically grounded and empirically validated taxonomy development method, which is extended with data visualization and cluster analysis. The resulting eight archetypes show that platform cooperatives not only contribute to a more ethical sharing economy, but also provide new opportunities for gig and other workers across industries. Platform cooperatives are also exploring new opportunities in the knowledge economy, such as cooperative business models centered on data sharing and the creation of platform cooperative ecosystems through mutual support and collaboration. These findings contribute to building the necessary foundations for further research on platform cooperatives as well as entrepreneurial practice focused on ethical sharing/gig economy.

Keywords: Platform cooperatives, Digital platforms; Cooperatives, Taxonomy, Value creation.

1. Introduction

Platform cooperatives, also known as platform coops, are rapidly emerging as new organizing forms of digital enterprises. They are characterized by a cooperative ownership structure and a strong commitment to positive social impact. They are also considered to be a new, digitally enabled generation of the long-established cooperative enterprises (co-ops). As such, they continue the long line of co-ops, which are the oldest known type of human enterprise (ICA, 2023a). Indeed, the co-op history goes back for centuries, and these enterprises are still present and thriving today (BCCM, 2023; ICA, 2023b). For example, there are over three million cooperatives worldwide, and the three hundred largest cooperatives or mutuals generated over 2,000 billion USD in turnover (World Cooperative Monitor, 2022).

Guided by the International Cooperatives Alliance (ICA) principles (ICA, 2023a), platform cooperatives are collectively owned by their members. As co-owners, their members have full and democratic control of the enabling platform, including distribution of the created value on a more equitable basis (Scholz, 2016). Platform cooperatives could be for-profit or not-for profit organizations. Regardless of their type, all platform cooperatives share a strong commitment to contributing to sustainable development of their communities and creating social value, as per the ICA principles. It is those principles and the cooperative ownership structure that makes them legally and structurally different from typical social enterprises.

Platform cooperatives are considered as ethical alternatives to the big-tech global platform companies, such as Uber and Airbnb (Frenken, 2017; Graham & Anwar, 2018; Graham & Shaw, 2017; Scholz, 2016). In the platform cooperative alternatives, such as Fairbnb and The Drivers Cooperative, digital platforms are co-owned by its workers and the resulting value created is shared by them.

Arguing against misappropriated notion of 'sharing' in the mainstream 'sharing economy', Scholz and Schneider (2016) see platform cooperativism rising against shareholder/investor-owned platform capitalism. In particular, platform cooperatives are aiming to prevent exploitation of gig workers, predatory practices of unfair competition, algorithmic control, discrimination, and disregard for wellbeing of individuals and communities.

Platform cooperatives are growing both in numbers and types across many industry sectors, as evidenced by new additions to the current global Platform Coop Directory (Platform Cooperativism Consortium, 2023). Their growth is also starting to attract worldwide attention, with case studies of different platform cooperatives emerging – see, for example (Mòdol, 2019; Pazaitis, Kostakis, & Bauwens, 2017; Ridley-Duff, Wren, & McCulloch, 2018; Stocker & Takara, 2019). However, so far there

URI: https://hdl.handle.net/10125/106887
978-0-9981331-7-1

is a very limited understanding of this important type of digital organizations in the research literature. As Scholz and Schneider (2016) noted, platform cooperatives continue to hide in plain sight from our collective research attention, while rapidly and quietly growing across all industry sectors. While some nascent research is emerging, mostly in sociology, business and cooperatives literature – see (Bunders, Arets, Frenken, & De Moor, 2022; Fuster & Espelt, 2017; Pazaitis et al., 2017; Philipp, Hermes, Schreieck, & Böhm, 2021; Sandoval, 2019; Saner, Yiu, & Nguyen, 2019; Schneider, 2018; Zygmuntowski, 2018), there is a need to understand different types of platform cooperatives and investigate their value creation mechanisms (Mannan & Pek, 2021).

Against this background, in this paper we aim to investigate platform cooperatives, focusing on the key research question:

How do platform cooperatives create value for their members/co-owners, communities and a wider society?

We answer this question by building a systematic, theoretically-grounded and empirically-validated taxonomy of platform cooperatives focusing on different dimensions of value creation. To develop this taxonomy, we adopted a taxonomy development research method by Nickerson, Varshney, and Muntermann (2013), which we extended with data visualization and cluster analysis. We then applied our extended taxonomy development method to platform cooperatives listed in the global #PlatformCoop Directory (Internet of Ownership, 2023). Based on our resulting taxonomy, we identified and discussed eight archetypes of platform cooperatives, focusing on their respective value propositions.

The paper is structured as follows. The next section provides a literature review of platform cooperatives. Then we briefly introduce Nickerson et al. (2013)'s taxonomy development method and our extensions, followed by our taxonomy development process. Then we describe the conducted cluster analysis and show the resulting eight architypes of platform cooperatives. Finally, we conclude this work by offering some reflections on the taxonomy building process and its outcomes, study limitations and further implications of the proposed taxonomy.

2. Literature Review

Platform cooperatives started to emerge around 2014, in response to the mainstream sharing economy, in particular the monopolistic digital platforms companies behind it. Soon after Srnicek (2016) popularized the term 'platform capitalism' to describe platform economy and emphasize the nature of digitally-enabled capitalist platform companies. Ever since this term – platform capitalism – has been widely adopted by the platform cooperatives community (Scholz & Schneider, 2016), where they advocated platform cooperativism, led by the International Platform Cooperativism Consortium (PCC, 2023), in response to negative societal effects of platform capitalism. This movement promotes platform cooperatives as fairer and more ethical alternatives to the mainstream sharing (i.e. gig) economy platform companies, which has been widely criticized due to their negative societal effects (McCann & Yazici, 2018; Roelants, Hyungsik, & Terrasi, 2014; Scholz, 2018) as well as their misleading appropriation of the term 'sharing' (Schneider, 2014; Scholz, 2016).

According to Scholz (2016), platform cooperativism has three main characteristics. First, platform cooperatives are in essence cooperative enterprises enabled by digital platforms. However, rather than inventing their platform infrastructure and applications, they are committed to learning from, and when possible, replicating technology platforms developed and used by their platform capitalist counterparts. The main idea here is to combine the existing technical solutions with a cooperative business model, to enable value distribution to its members/co-owners on a more equitable basis. Second, although platform cooperatives also advocate distributed workforce, unlike their platform capitalist counterparts, they support solidarity and mutual learning among workers. Thus, unlike in the platform capitalist model, workers do not compete viciously against each other or race to the bottom. Instead, they are encouraged to collaborate in order to create value, in pursuit of shared opportunities. Third, platform cooperatives aim to reframe innovation and efficiency for the benefit of all, rather than just few.

However, in spite of stated and expected benefits, platform cooperatives are also faced with a number of challenges. For example, they continue to experience difficulties in raising external capital due to their cooperative structure, unlike their venture capital-backed and investor-owned counterparts (Borkin, 2019; Burnicka & Zygmuntowski, 2019; McCann & Yazici, 2018; Scholz, 2018). There are also concern over their competency, in particular technical competency compared to the big tech platform companies (McCann & Yazici, 2018; Sandoval, 2019; Scholz, 2018). Another reported issue is related to their limited resources, in particular for promotion and marketing, which in turn limit their ability to create strong network effect (Scholz, 2018). Also, as Sandoval (2019) warns, there are multiple ambivalences which could impede platform

cooperativism movement, including internal tensions between market and democracy, commercialization and commons, entrepreneurship and activism.

Although platform cooperatives are rapidly emerging (Fuster & Espelt, 2017; Scholz, 2016), the existing literature is scarce, mainly due to their novelty (Puranen, 2019). In the absence of any commonly accepted classification of platform cooperatives, Scholz (2016) proposed a typology for platform cooperatives based on different ownership structure. Platform cooperatives were thus classified into 4 main types: (i) Cooperatively Owned Online Labor Brokerages and Market Places; (ii) City-Owned Platform Cooperatives; (iii) Produser-owned Platforms ('produser' here means producer and user) and (iv) Union-Backed Labor Platforms. While Scholz's typology is still used today, new types of platform cooperatives no longer fit this simple classification. For example, the recent categories of data cooperatives and platform cooperatives eco-systems call for updated classifications.

Recognizing platform cooperatives' distinct combination of the co-op business model and application of technology, Borkin (2019) proposed a two-dimensional typology, considering dimensions of *Distribution of membership* and *Labour intensity*. Platform cooperatives were therefore classified into 4 main types, which are multi-stakeholder / community platform, producer-led platform, consortia / worker platform and data consortia platform. More recently, Mannan and Pek (2021) built upon Borkin's (2019) typology and replaced the *Labour intensity* dimension with the *Economic sectors* dimension, to better capture the Base of Pyramid context.

Acknowledging these earlier efforts of classifying platform cooperatives, we also noted some important shortcomings. Firstly, the reviewed examples of classifications and typologies lack theoretical foundations. Moreover, they were not designed following any systematic approach or any methodology. Instead the authors observed the ever-emerging examples of platform cooperatives and organized them into different categories, without further validation of these categories. Consequently, their independent classifications resulted in overlapping concepts and dimensions. Finally, so far there is no single, commonly agreed classification of platform cooperative.

Taken together, these reasons contributed to these rapidly emerging digital enterprises 'hiding in plain sight' (Scholz & Schneider, 2016) from the multidisciplinary research community. Against this background, in this paper we aim to contribute to building foundations for platform cooperatives research, by proposing a research-based, empirically informed taxonomy of platform cooperatives. While taxonomies could be built from many perspectives, guided by the research question we focus on how platform cooperatives create value for their members and other stakeholders, including wider society.

3. Research Method

A taxonomy helps to understand and analyze complex issues in research and business management by classifying objects (Nickerson et al., 2013). Our approach to building taxonomy of platform cooperatives is based on Nickerson et al. (2013) taxonomy development method. This well-known and widely-used method combines theoretical foundations and empirical evidence in an iterative, mutually-shaping way. There are already a number of exemplary studies that follow Nickerson's method to build various taxonomies – see for instance (Diniz, Siqueira, & van Heck, 2019; Eickhoff, Muntermann, & Weinrich, 2017; Mrass, Li, & Peters, 2017; Nakatsu, Grossman, & Iacovou, 2014; Remane, Nickerson, Hanelt, Tesch, & Kolbe, 2016). The method is argued to be particularly suitable for providing foundations for research on various emerging phenomena, as illustrated by the proposed taxonomies for (at-the-time new) carsharing (Remane et al., 2016) and FinTech (Eickhoff et al., 2017) phenomena.

Nickerson et al. (2013) method starts from the so-called *meta-characteristic*, which is the most comprehensive characteristic that serves as the starting base for choosing other dimensions and characteristics for the taxonomy. This is followed by the selection of subjective and objective ending conditions, which are used to terminate the iterative taxonomy building process. Therefore, both subjective and objective ending conditions are checked at the end of each iteration, and if they are not met, the taxonomy is revised again. As Nickerson et al. (2013) explained, this structured approach helps to deal with the uncertainty and complexity of taxonomy development, while also helps to deliver a mutually exclusive and collectively exhaustive taxonomy.

Nickerson et al. (2013) recommended two approaches to building and refining a taxonomy: *conceptual-to-empirical* and *empirical-to-conceptual*. The conceptual-to-empirical approach requires researchers to conceptualize characteristics or dimensions for the objects of interest, and then revise the taxonomy by fitting and examining objects across those characteristics and dimensions. The empirical-to-conceptual approach, on the other hand, requires researchers to identify common characteristics and then group them into dimensions based on subsets of objects data. The two approaches can be alternated

after each iteration. The resulting taxonomy needs be concise, robust, comprehensive, extendible and explanatory (Nickerson, et al. (2013).

Our taxonomy building and analysis method extends Nickerson et al. (2013) method with data visualization within the empirical to conceptual iterations of the taxonomy building process. Another methodological extension is in validation of the resulting taxonomy through cluster analysis, resulting in several platform cooperative archetypes, as described later in the paper. **Figure 1** depicts our extended taxonomy building and analysis method, described as follows.

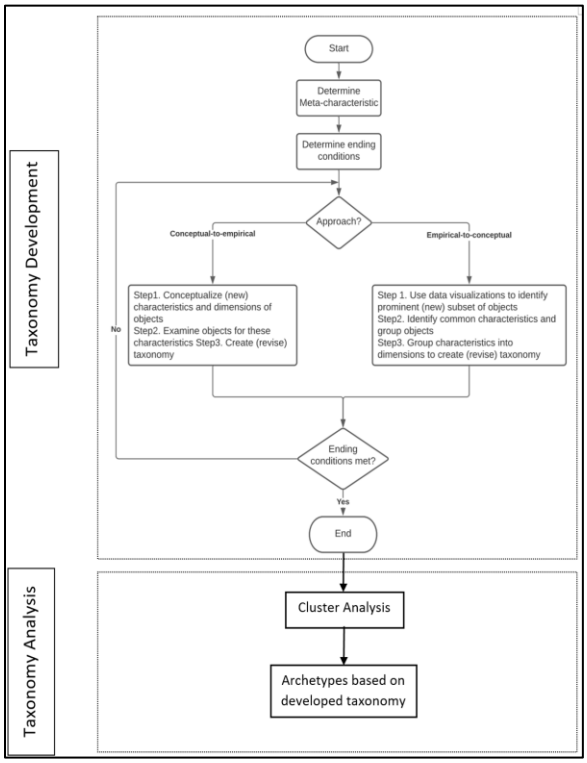


Figure 1. Extended taxonomy development method (based on Nickerson et al.'s (2013))

Our choice of *meta-characteristic* was guided by the main objective for building the platform cooperatives taxonomy and its intended users. Thus, aligned with the stated research question, our main objective was to examine differentiating characteristics of platform cooperatives in relation to how they create value for different stakeholder groups. The intended users of our taxonomy included multidisciplinary and co-op researchers, platform cooperative community members, government, policy makers, social entrepreneurs, as well as others interested in gaining a better understanding of platform cooperatives and their characteristics. Consequently, we selected the meta-characteristic to be 'value creation mechanisms' of platform coop business models. Next we formulated the subjective and objective ending conditions following Nickerson et al.'s (2013) suggestions, as follows: 1) All objects (or a representative sample) are examined; 2) There is no merge, split or addition of dimensions or characteristics in the last iteration; 3) Every characteristics and dimensions or combinations of characteristics are unique; 4) Every characteristics of every dimensions has at least one object classified.

The actual taxonomy building process started with a conceptual-to-empirical iteration followed by four rounds of empirical-to-conceptual iterations. As previously stated, we extended Nickerson et al. (2013) original method, by using data visualizations within empirical-to-conceptual approach. Thus, by conducting an explorative visual data analysis of the collected platform cooperative data (via data visualization software), we were able to find the most prominent subsets of data that we proceeded to analyze first. This in turn made our taxonomy building method more efficient and effective compared to a typical approach of examining all data sets at once, which would be more time consuming, or randomly selecting subsets of data, which could lead to significant characteristics or dimensions being missed. The five iterations resulted in the final taxonomy, which met both subjective and objective ending conditions.

To further test the resulting taxonomy and identify typical clusters (archetypes), we then performed cluster analysis using software R and Cluster package with Gower distance (Gower, 1971). This resulted in identification of eight clusters of potential platform cooperatives archetypes.

Regarding data collection, we used the web-based international directory of platform cooperatives, previously hosted on the Internet of Ownership (Internet of Ownership, 2023) and now listed on Platform Cooperativism Consortium. Using the 'platform cooperative' category as a filter, we examined the resulting organizations one by one and only selected platform cooperatives, since the directory also included supportive organizations or companies within platform cooperative ecosystem. The resulting 93 platform cooperatives, which met the ICA cooperative definition and compliance were included in the final dataset. Given that platform cooperatives registered their own data, we found a number of inconsistencies as well as syntactic and semantic data quality issues. These issues had to be resolved by accessing their respective web sites in order to find missing or additional data. The taxonomy building process involved an ongoing and highly intertwined process of data collection and analysis. Thus, our knowing emerged from doing and through

collective sense-making (Levina, 2005; Myers, 2013). A data coding process was established by the researchers to ensure consistency of interpretation among them, as well as across all five taxonomy building iterations.

4. Taxonomy Development and Analysis

Starting from the chosen meta-characteristic 'value creation mechanisms' of platform cooperative business models, we conducted the first conceptual to empirical iteration based on the literature review. We used the published case studies of platform cooperatives, previous classifications and the emerging research on platform cooperatives. We examined each platform cooperative's structure in order to understand *who* is creating value for *whom* (i.e. who is receiving the value created), *how* platform cooperatives create value or facilitate value creation, and create what kind of value. We also investigated the reasons *why* they emerged in order to get additional insights into their value proposition. The *when* question was related to their stage of maturity, i.e. in concept, development phase or open & working. Finally, we wanted to know *where* the value was created, in terms of geographical locations and industries. Asking these questions led to the draft version of our taxonomy, depicted by **Figure 2**. Symbol 'Dn' denotes Dimension n and 'C_{n1}... C_{nm}' are D_n's characteristics 1 to m. This initial taxonomy was based on very limited literature on platform cooperatives, which did not meet the 'comprehensive' ending condition.

T1 = { D1 Internal Members |*D1 = {C11 Workers, C12 Producers};*

D2 External Stakeholders |*D2 = {C21 Customers, C22 Community};*

D3 Sharing |*D3 = {C31 Business Process Sharing, C32 Skill Sharing; C33 Transportation Sharing; C34 Data Sharing};*

D4 Type of Platform |*D4 = {C41 Online Market Place; C42 Labour Brokerage; C43 Data Collaboratories};*

D5 Reason |*D5 = {C51 In Response to Platform Capitalism; C52 Underserved Industries; C53 Innovative Member-based Business Models};*

D6 Stage |*D6 = {C61 In Concept; C62 In Development; C63 Open; C64 Dormant; C65 Closed; C66 Unknown};*

D7 Location |*D7 = {C71 Single Country; C72 Multiple Countries; C73 Virtual; C74 Unknown};*

D8 Industry |*D8 = {C81 Agriculture; C82 Arts; C83 IT, C84 Transportation}}*

Figure 2 Platform coop draft taxonomy

In the second iteration we followed the empirical-to-conceptual approach. First, we collected and examined empirical data from the platform cooperative directory, looking for additional characteristics emerged from empirical data. For example, we focused on the activity performed by each platform cooperative. A closer examination of activity marketplace resulted in additional characteristic 'Consumers' being added to **D1 Internal Members**. Another discovered activity, sharing of business process, resulted in extension of T1's dimension **D3 Sharing**. After recording these changes discovered in the 2nd iteration in the running spreadsheet, we proceeded to use data visualization software (Tableau), which enables an interactive visual exploration of our taxonomy-in-progress. In this way, we discovered that visual grouping of platform cooperatives based on their types, as shown by **Figure 3**, made our taxonomy building process more effective. For example, by grouping platform cooperatives that perform the same or similar activities together, we were able to discover some common and prominent characteristics.

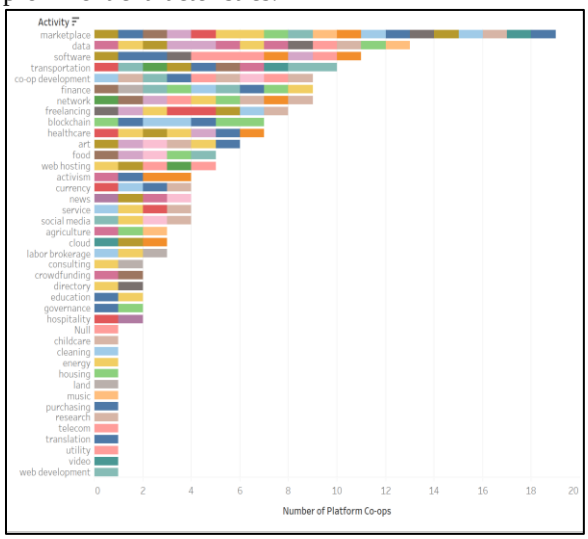


Figure 3 Visualization of different groups of platform coops by their activities

Focusing on those prominent groups and taking half of platform cooperatives from each activity group, we recorded a subset of 52 platform cooperatives for further examination in this empirical-to-conceptual iteration. The two researchers divided the data into two groups and coded them independently. Then they came together to consolidate the results, during which inter-coder agreement were conducted to ensure consistency and reliability of the findings. The main objective was to infer further characteristics under each dimension for this subset. For example, the characteristic C_{13} Consumers, C_{14} Sellers and C_{15} Growers were added to **D1 Internal Members**. In the process of assigning platform cooperatives to their most prominent characteristic, we discovered that some platform cooperatives have multiple

characteristics within one dimension, which we temporarily coded as C_{18} Multi-Type, C_{25} Multi Stakeholders and C_{39} Multi Sharing. As for **D8 Industry**, we discovered a number of new industry types such as C_{85} Financial, C_{86} Healthcare and C_{813} Online Retail. Bearing iterative approach of developing taxonomy in mind, we also took notes about each characteristic, in particular when expecting further classification possibilities or needing more information. For example, under C_{17} Others in the **D1 Internal Members**, we recorded what may become a separate characteristic for the following iterations, such as patients, service users and other co-ops.

Although the resulting version of taxonomy was more comprehensive than the previous ones, it still did not meet all the ending conditions. Moreover, the notes kept during this iteration called for more granular exploration of different characteristics.

In the third iteration we focused on the remaining platform cooperatives, with half of them assigned to each author. Using the empirical-to-conceptual approach, we discovered more granular characteristics (e.g. C_{19} Other Co-ops from C_{17} Others), added new ones (e.g. C_{40} Story sharing) or revisited the boundaries of the existing ones (e.g. C_{32} as Skill/Knowledge Sharing). This process resulted in further refinements of multiple dimensions in the previous version of taxonomy. However further iteration was still needed since some dimensions ended up having too many characteristics, i.e. a concise taxonomy was not met.

In the fourth iteration, we revisited all recorded platform cooperatives using the taxonomy developed thus far. This resulted in further changes to those platform cooperatives identified in the 2nd iteration. For instance, some platform cooperatives were initially assigned to C_{51} In Response to Platform Capitalism, while they are actually followers with earlier business models. Therefore, we now moved them to C_{56} Replication of Existing Type. Meanwhile, we re-examined our progressive notes to see if some characteristics needed refinements. This led to one more industry type being identified and added as C_{820} Property to **D8 Industry**. As a result, **D8 Industry** still contained too many characteristics, thus failing to meet the concise ending condition again.

In the final fifth iteration, we focused on refining **D8 Industry** as well as all other dimensions with imprecise characteristics, such as C_{17} Others and C_{44} Special Purpose. This iteration resulted in further refinements of existing dimensions, as their characteristics were consolidated, modified, or extended based on yet another round of investigation of empirical data. The resulting final taxonomy is depicted in **Figure 4**, which met the subjective and objective ending conditions. Moreover, it was judged by the researchers to be sufficient and useful, as it provided an overview of platform cooperatives and their value creation mechanisms.

	Dimension	Characteristics									
Who & Whom	*Internal Members*	Workers		Producers	Sellers	Workers and Producers	Other Co-ops	Others		Multi Internal Members	
	External Stakeholders	Customers		Society/Community		Public		Business		Multi Stakeholders	
What & How	*Sharing*	Business Process Sharing	Skill/Knowledge Sharing	Transportation Sharing	Data Sharing	Risk Sharing	Housing Sharing	Innovative Solutions Sharing	Tech Sharing	Story Sharing	Multi Sharing
	Platform	Online Market Place		Labour Brokerage		Data Collaboratories		Web Hosting		Special Purpose	
Why	*Reason*	In Response to Platform Capitalism		Underserved Industries		Innovative Member-based Business Models			Supporting Other Co-ops	To Make Use of Innovative Technology	Replecation of Existing Type
When	*Stage*	Emerging			Open				Shutdown	Unknown	
Where	*Location*	Specific Country							Unknown		
	Industry	Agriculture	Art & Entertainment	IT	Transportation	Financial	Healthcare	Online Retail	Media	Other	Multi Industries

Figure 4 The final taxonomy of Platform cooperatives

In order to gain further research insights from the resulting taxonomy, we then used cluster analysis to identify typical clusters (archetypes) of platform cooperatives. Since we were using mostly categorical type of data, we transformed and uploaded data into software R and used Cluster package with Gower distance (Gower, 1971). We further applied divisive (top-down) clustering algorithm for hierarchical clustering, assuming all platform cooperatives are within one big cluster and then dividing and separating most dissimilar or unusual ones into other groups. To decide the optimal number of archetypes or clusters, we applied Elbow method and generated the 'elbow' graph, shown by **Figure 5** below.

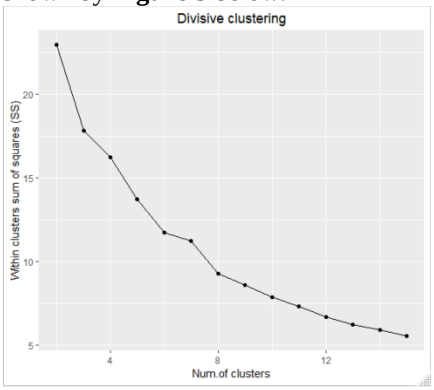
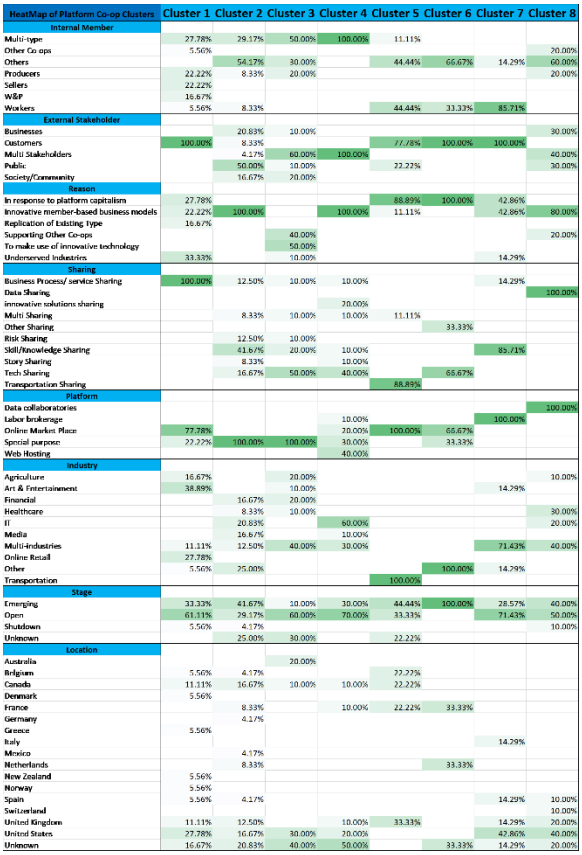


Figure 5 Elbow chart (divisive clustering method)

As we were looking for distinctive "bend" where further clustering gave only minor decrease in the within clusters sum of squares, 8 appeared as elbow in **Figure 5,** indicating the optimal number of 8 clusters. Consequently, each platform was assigned to a cluster. The resulting heat map is shown in **Figure 6**.



HeatMap of Platform Co-op Clusters	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	Cluster 8
Internal Member								
Multi-type	27.78%	29.17%	50.00%	100.00%	11.11%			
Other Co-ops	5.56%							20.00%
Others		54.17%	30.00%		44.44%	66.67%	14.29%	60.00%
Producers	22.22%	8.33%	20.00%					20.00%
Sellers	22.22%							
W&P	16.67%							
Workers	5.56%	8.33%			44.44%	33.33%	85.71%	
External Stakeholder								
Businesses		20.83%	10.00%					30.00%
Customers	100.00%	8.33%			77.78%	100.00%	100.00%	
Multi Stakeholders		4.17%	60.00%	100.00%				40.00%
Public		50.00%	10.00%		22.22%			30.00%
Society/Commmunity		16.67%	20.00%					
Reason								
In response to platform capitalism	27.78%				88.89%	100.00%	42.86%	
Innovative member-based business models	22.22%	100.00%		100.00%	11.11%		42.86%	80.00%
Replication of Existing Type	16.67%							
Supporting Other Co-ops			40.00%					20.00%
To make use of innovative technology			50.00%					
Underserved Industries	33.33%		10.00%				14.29%	
Sharing								
Business Process/ service Sharing	100.00%	12.50%	10.00%	10.00%			14.29%	
Data Sharing								100.00%
innovative solutions sharing				20.00%				
Multi Sharing		8.33%	10.00%	10.00%	11.11%			
Other Sharing						33.33%		
Risk Sharing		12.50%	10.00%					
Skill/Knowledge Sharing		41.67%	20.00%	10.00%			85.71%	
Story Sharing		8.33%		10.00%				
Tech Sharing		16.67%	50.00%	40.00%		66.67%		
Transportation Sharing					88.89%			
Platform								
Data collaboratories								100.00%
Labor brokerage				10.00%			100.00%	
Online Market Place	77.78%			20.00%	100.00%	66.67%		
Special purpose	22.22%	100.00%	100.00%	30.00%		33.33%		
Web Hosting				40.00%				
Industry								
Agriculture	16.67%		20.00%					10.00%
Art & Entertainment	38.89%		10.00%				14.29%	
Financial		16.67%	20.00%					
Healthcare		8.33%	10.00%					30.00%
IT		20.83%		60.00%				20.00%
Media		16.67%		10.00%				
Multi-Industries	11.11%	12.50%	40.00%	30.00%			71.43%	40.00%
Online Retail	27.78%							
Other	5.56%	25.00%				100.00%	14.29%	
Transportation					100.00%			
Stage								
Emerging	33.33%	41.67%	10.00%	30.00%	44.44%	100.00%	28.57%	40.00%
Open	61.11%	29.17%	60.00%	70.00%	33.33%		71.43%	50.00%
Shutdown	5.56%	4.17%						10.00%
Unknown		25.00%	30.00%		22.22%			
Location								
Australia			20.00%					
Belgium	5.56%	4.17%			22.22%			
Canada	11.11%	16.67%	10.00%	10.00%	22.22%			
Denmark	5.56%							
France		8.33%		10.00%	22.22%	33.33%		
Germany		4.17%						
Greece	5.56%							
Italy							14.29%	
Mexico		4.17%						
Netherlands		8.33%				33.33%		
New Zealand	5.56%							
Norway	5.56%							
Spain	5.56%	4.17%					14.29%	10.00%
Switzerland								10.00%
United Kingdom	11.11%	12.50%		10.00%	33.33%		14.29%	20.00%
United States	27.78%	16.67%	30.00%	20.00%			42.86%	40.00%
Unknown	16.67%	20.83%	40.00%	50.00%		33.33%	14.29%	20.00%

Figure 6 Heat Map of Platform Coop Clusters

The resulting clusters can vary if using different clustering methods, choosing a different optimal number of clusters and when new stream of platform cooperatives emerge, nevertheless it helps us to have an overview of current typical platform cooperative groups and their shared prominent characteristics with our taxonomy.

From this cluster analysis, we identified eight archetypes of platform cooperatives, described as follows.

Cluster 1: Business Service/Process Sharing, Online Market Place. These are platform cooperatives that focus on sharing of business services, processes or provision of online market places. Examples of Cluster 1 platform cooperatives include: 1) Stocksy, which is co-owned by mutually-supporting photographers selling their digital art on a shared global platform; 2) Smart, which provides freelance workers and organizations, typically in precarious sessional work (e.g. artists, performers), with hosted invoicing and other online services.

Cluster 2: Innovative Member-Based Business Model, Special Purpose. Platform cooperatives contained in this cluster value the democratic governance and co-ownership feature of cooperative member-based business mode and use the platform for special purposes (other than online marketplace), such as data collaboratories with multi-stakeholders. Some examples include Snowdrift.Coop (which supports freely licensed works with sustainable funding and crowdmatching) and Positive News (which is considered first crowdfunded international media cooperative in the world).

Cluster 3: Tech Sharing, Making Use of Innovative Technology, Supporting Other Co-ops. In this cluster, we found platform cooperatives that were established to support other co-ops. Examples include 1) BHive, which allows other local enterprises and people to participate, create and co-own their local sharing economy; and 2) Incubator.Coop, which provides resources to help entrepreneurs to set up cooperatives that follow the seven ICA principles.

Cluster 4: Web Hosting. These are platform cooperatives within IT industry that employ the cooperative business models and focus on web hosting services. They emerged in response to the need to protect members' data ownership and privacy from the big tech companies such as Google and Facebook. One example is Webhosting.Coop, which is a non-profit web hosting cooperative.

Cluster 5 and Cluster 6: Online Market Place, In Response to Platform Capitalism. Platform cooperatives in Clusters 5 and 6 together offer platform cooperative alternatives to overcome the dark side of gig economy. Cluster 5 focus on ride hiring or food delivery, while Cluster 6 includes platform cooperatives from other industries such as short-term house rental. For example, platform coop FairCab (from cluster 5) and Fairbnb (from cluster 6) are claimed as ethical and sustainable alternatives to their platform capitalist counterparts Uber and Airbnb.

Cluster 7: Skill/Knowledge Sharing, Labour Brokerage. These are types of platform cooperatives that use the online platform as labour brokerage to connect customers in need with experienced freelance workers. For example, platform coop Loconomics Australia offers an app for local customers to book local services performed by service professionals. Up & Go is a professional cleaners' co-owned platform that distributes majority of its earnings to their members.

Cluster 8: Data Co-op. These are emerging types of platform cooperatives that primarily focus on pursuing new opportunities through data protection, data sharing or data analysis for the benefit of their members and/or society as a whole. They recognize the value of pooled data and their use to empower its cooperative members or benefit general public. For instance, GiSC, which is an agricultural platform cooperative, aims to bring big data analytics to participating US farmers by collecting and sharing

their farming data. Another example, MIDATA.coop, is a medical data co-op that enables citizens to control and share health related personal data in one secure place, advancing medical diagnosis or research for social good.

5. Discussion

The resulting multi-dimensional taxonomy of platform cooperatives and the eight archetypes have enabled us to answer the stated research question: *How do platform cooperatives create value for their members/co-owners, communities and a wider society?* as follows:

First, the two dimensions - **D1 Internal Members** and **D2 External Stakeholders** – in combination, give insights into who creates value and/or benefits from platform cooperatives. Our insights confirm previous findings by Scholz (2016)'s and Borkin (2019) classifications, that the owner membership types include workers, producers and sellers. However, our taxonomy offers more insights into these types of members and workers. For example, rather than turning more stable work into precarious 'gig' work, as it is done by the big tech extractive platforms, we found platform cooperatives which aim to do the opposite. They are instead formed to create more stability for artists and other workers whose nature of work is already seasonal or less stable. The prime example is the platform coop "Smart", which started by providing online services to artists, such as processing and sending invoices to their own clients, to now providing opportunities to apply for home loan and experience other benefits of more stable working conditions. Moreover, we also found that some platform cooperatives were co-owned by other individual co-ops. This category of internal members was not considered by the previous classifications. One example is Data Commons Cooperative, which is a data cooperative hosting a collaborative online directory of other cooperatives. This also points to the emergence of platform cooperative ecosystems or federation in response to common challenges or in joint pursuit of new opportunities. Platform cooperatives also create value for external customers, communities and society at large. For instance, MIDATA.coop is a healthcare data cooperative, which enables citizens to share their health data and contribute to medical research for the benefit of society. It is an example of platform technologies enabling platform cooperatives to widen, and scale up the impact beyond their local communities. They also provide new opportunities for a different kind of impact, which was not found in traditional cooperatives, such as for example, positive impacts created by sharing of resources such as medical data.

When considering how platform cooperatives create value and how their value sharing is facilitated by their type of platform (i.e. **D3 Sharing** and **D4 Type of Platform**), we noticed that many platform cooperatives use the platform as online market place, labor brokerage or the so-called 'data collaboratories'. They focus on provision and sharing on skill/knowledge, data, business process and/or innovative technology. This in turn points to platform cooperatives being increasingly focused on knowledge economy and new opportunities it creates, such as those opened by digital platforms, data sharing and integration. Therefore, platform cooperatives are moving further away from platform capitalism where the focus appears to be on physical resources and jobs requiring lower levels of skills.

Examining the reasons why they emerged (**D5 Reason**), it is not surprising to confirm that most platform cooperatives initially emerged in response to platform capitalism. Those are mainly captured by Clusters 5 and 6. Thus, the main value proposition of them is to provide a fairer or more ethical alternative to the platform capitalism and the exploitative gig economy. Following the ICA principles, this entails, for example, fair work conditions, co-ownership, mutual support, learning opportunities, and respect for equity, diversity and human dignity. These in turn point to a wider notion of value, such as its intangible manifestations (e.g. human dignity). While responding to platform capitalism was and still important, this is no longer the only reason why they emerge. For example, Cluster 3 indicates that platform cooperatives are increasingly embracing new opportunities created by new technologies, including providing support to other platform cooperatives. Also, as shown by Cluster 8, platform cooperatives are now leading the long-established cooperatives organizations into digital age, by focusing on value created through sharing of digital resources, such as data and platforms.

To understand where the value created is distributed and/or circulated, it is useful to check **D7 Location** and **D8 Industry**. Thus, D7 Location at this stage gives information on where platform cooperatives are geographically located (registered), while D8 Industry shows industry types they operate in. Our findings indicate that platform cooperatives are embracing opportunities across different industry sectors, such as agriculture, IT, transportation, arts, financial services and healthcare. It is important to point out that these industry sectors are much wider than those currently targeted by capitalist platforms. Moreover, their interest in agriculture, financial

services and healthcare point to new opportunities for a new kind of yet-to-be explored digital innovations, guided by the cooperative principles and values.

Finally, when considering their value proposition, it is also important to understand the current stage of their operation. Although **D6 Stage** is a dynamic dimension, and as such constantly changing, we found that platform cooperatives currently range from the concept stage to fully operational ones. We observe that the shared directory of the platform cooperatives, currently hosted by the Platform Cooperativism Consortium, plays an important role in encouraging sharing and mutual support of cooperatives. We posit that platform cooperatives at different stages are likely to benefit from contacts, experiences and knowledge sharing with those at the similar stage of development or more advanced ones operating in the same region or industry sector. Further research is required to understand if and how this could be achieved by platform cooperatives at different stages of maturity.

6. Contributions, Limitations & Conclusions

Our research makes several theoretical contributions to the emerging multidisciplinary research on platform cooperatives and sharing/gig economy in general: First, we bring platform cooperatives to the attention of multidisciplinary researchers by providing their taxonomy. Second, we offer an extension of the taxonomy development method by Nickerson et al. (2013), with visualization and cluster analysis, which improves the efficiency and effectiveness of the original classification process. The proposed extended taxonomy development method could be adopted by other researchers building taxonomy of other phenomena in their own context. In terms of practical contributions, the resulting multi-dimensional taxonomy could be used by industry practitioners for strategic and entrepreneurship purposes. For example, practitioners within the same cluster could learn about the others. Others interested in starting a platform cooperative could learn about existing categories and their value propositions.

The proposed taxonomy is built with several assumptions and its use has several limitations. Firstly, as Nickerson et al. (2013) warned, the selection of meta-characteristic always affects the development of taxonomy. Our focus here is to understand value creation mechanisms of platform cooperatives across multiple dimensions. Other meta-characteristics, if chosen, would lead to other resulting taxonomies. Second, our data set is collected from an online platform cooperative directory, which is updated frequently as platform cooperatives are emerging or even closing. We anticipate that there could be other new types of platform cooperatives emerging that could affect some of the underlying characteristics of our taxonomy. However, our taxonomy development method makes it possible to easily extend the existing characteristics and dimensions to account for new changes. Thirdly, our research is mainly built on the dataset from the online platform cooperative directory. Although we also checked each individual platform cooperative's website to ensure better classification, sometimes assumptions had to be made about certain characteristics, such as membership structure. Our future work includes further refinement of the proposed taxonomy in collaboration with participating platform cooperatives from the community, as well as future empirical case studies with representatives of different platform cooperatives archetypes.

The main conclusion of this study is that platform cooperatives are no longer emerging only in response to their platform capitalist counterparts, as previously observed by (Scholz & Schneider, 2016). They are widening the scope of their business models and pursuing new value-creation opportunities through digital innovations in more industries, including healthcare, finance and agriculture. They also create value by providing more stable work in industry sectors that traditionally include seasonal and precarious work. Most of all, their unique value proposition comes from cooperation and genuine sharing. This includes sharing of digital resources, pursuit of joint opportunities through, for example 'data collaboratories', and supporting other platform cooperatives. These reasons, combined with their commitment to making positive societal impact, make them particularly interesting and important to researchers. Therefore we offer this research to the multidisciplinary community, as our call to join us in researching platform cooperatives, and a very different and empowering kind of sharing/gig economy, they are committed to creating.

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