



Democratic Innovation in Mondragon: An Analysis of the Participatory Innovation Model of the World's Largest Cooperative Corporation

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Abstract Given the far-reaching impact of digitization on work organization and workers, calls for a more inclusive, participatory approach to technological innovation have become commonplace in recent years. This paper contributes to the debate on more participatory innovation regimes by looking beyond the boundaries of classical capitalist firms. It discusses how the cooperatives of the Mondragon Corporation (Mondragon), the world's largest cooperative group, balance democratic governance with economic efficiency in their approach to technological innovation. It reconstructs a dual structure that integrates both democratic governance as well as a functional differentiation, with workers exercising democratic control over strategic decisions, while operational decisions are made by professional

managers and technical experts. We will argue that this separation minimizes the costs of democratic deliberation while leveraging workers' expertise in innovation processes, highlighting the importance of participatory bodies that help channel shop-floor knowledge towards decision-makers. We will show how this governance model promotes both the cooperatives' economic competitiveness and a high level of job security for the cooperative members, leading to a focus on incremental innovation pathways, continuous skill development, and reconciling a strong focus on technological innovation with social sustainability. The study is based on qualitative interviews conducted with representatives from different production cooperatives and research institutions within Mondragon, contrasting smaller, knowledge-intensive organizations with larger, more hierarchical ones. Our findings suggest that the Mondragon model successfully reconciles democratic governance and entrepreneurial efficiency, but also sheds light on convergences in both technology use and labor organization that result from the competitive pressures of capitalist markets and thus the limitations of alternative innovation regimes. Nevertheless, we find that democratic participation in technological governance can enhance innovation efficiency, economic performance and social sustainability.

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Introduction¹

In recent years, enterprises' capacity for technological innovation has become a key indicator of their long-term performance as economic entities [1–4]. Digitalization, in particular, has been heralded as a source of significant economic benefits and performance improvements for companies [5, 6] – yet, at the same time, digitalization processes can lead to substantial changes in work organization and working conditions [7, 8]. Against this background, calls for more active participation of workers in the governance of technological change and other forms of economic transformation have grown. This demand is justified both on normative [9–11] and functional grounds. In the following, we want to build on the latter line of reasoning. Recent studies have argued that democratic corporate governance serves to improve economic efficiency by leveraging workers' knowledge as a key innovation resource and to reduce conflicts by facilitating more legitimate and efficient innovation [12, 13]. We want to support this line of reasoning by reconstructing the innovation systems of a set of enterprises whose business model – as we will show – is based on the combination of democratic governance processes and extensive use of workers' knowledge in their innovation processes: the cooperatives of the *Mondragon Corporación Cooperativa (Mondragon)*, the world's largest cooperative group by revenue.

Mondragon is the result of a cooperative business project that was launched in 1956 by five young students of a former apprentice school, which later became a polytechnic vocational school and one of the precursors of the subsequent Mondragon University. Its self-image is summarized in its corporate values: intercooperation, grassroots management, corporate social responsibility, innovation, democratic organization, education, and social transformation, among others. Since that year, Mondragon has grown significantly.

It currently consists of 83 independent and self-managed cooperatives and 12 research and development (R&D) centers, taking first place in the Basque business ranking and tenth place in Spain. Most of

these cooperatives operate internationally, and there are currently 80 subsidiaries that belong to these cooperatives, distributed across various countries. Today, around 70,000 people work in Mondragon's cooperatives, of whom around 10,000 are employed in the subsidiaries in the different countries. In total, it had a turnover of more than 10 billion euros in 2022, 76% of which came from international business.

These cooperatives are grouped into four areas, depending on the nature of their activities: finance, industry, commerce, and knowledge, with the latter area including the university and research centers.

Despite the strong performance of the innovation system of Mondragon's cooperatives, most of the research on Mondragon understandably focuses on social aspects such as the ownership model, its distributional effects, and Mondragon's significance for the Basque economy as a whole [14–18], the role of workers' participation, the design of institutional governance for its economic performance [19, 20], and the scope of workers' participation in general [21]. Research specifically dealing with the innovation system [22, 23] is rare and sporadic. In this paper, we aim to take a deep-dive into the innovation regime of individual Mondragon cooperatives at an institutional level.

Our overarching research question is how Mondragon cooperatives, as large and complex economic organizations, reconcile forms of democratic governance with economic efficiency. Thereby, we want to investigate how corporations, as economic actors striving for output efficiency, can be organized democratically. With their longstanding competitiveness in the global market, the Mondragon cooperatives provide a compelling example for understanding how democratic governance plays out under conditions of economic efficiency.

In Section “[Theory: Economic Efficiency between Deliberation Costs and Epistemic Virtues](#)”, we outline two research strands concerned with the economic performance of democratic corporations, which, on the one hand, emphasize that democratic governance might hamper economic efficiency due to its deliberation costs, but on the other hand, might increase output performance through the epistemic virtues of broad integration of workers' knowledge. Looking at Mondragon, we want to empirically examine how exactly this tension between economic challenges and the benefits of workplace

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democracy is managed within its innovation system. Section “[Methods](#)” describes our empirical data that is based on qualitative interviews with innovation actors at Mondragon. In Section “[Streams of Control and Flows of Knowledge. The Democratic Innovation Model of the Mondragon Cooperatives](#)”, we empirically reconstruct how Mondragon deals with the deliberation costs of democratic governance by combining democratic deliberation with participation in industrial hierarchies. Section “[Incremental Innovation, the Preservation of Skills, and the Epistemic Virtues of Democratic Innovation](#)” outlines how this innovation system leads to a specific incremental innovation model that succeeds in mobilizing the epistemic virtues of broad employee participation. In Section “[Conclusion](#)”, we present and discuss our findings.

Theory: Economic Efficiency between Deliberation Costs and Epistemic Virtues

The economic efficiency of democratic corporations is discussed mainly in two ways: First, democratic corporate governance is seen as a cost factor that hampers economic rationality; second, democratic participation is described as an epistemic virtue for innovation and economic sustainability since it enables the integration of various knowledge resources within corporations.

In particular, Hansmann’s economic research [24] highlights that cooperatives can only be economically sustainable if they manage to reduce the costs of democratic deliberation in some way. Democratic decision-making processes involve measurable costs. These arise primarily from the resources (e.g., time) committed to decision-making processes within the organizations. Pozzabon & Zylbersztajn [25], for instance, empirically examined the costs of democratic control in agricultural cooperatives, finding that member participation has a significant impact on governance costs. Specifically, they investigated how cooperatives can minimize both democratic and agency costs resulting from conflicts of interest and information asymmetries. They demonstrated that lower member participation reduces direct democratic costs but potentially increases the opportunity agency costs. Finally, another cost factor of democratic governance could be that empowering workers might lead

to economically less efficient decision making for the organization, as workers might prioritize immediate individual preferences over long-term organizational success. Against this background, Hansmann [24] points out that one of the main levers for minimizing the costs of democratic governance is the reduction of heterogeneous interests within cooperative organizations, especially by reducing the diversity of professional groups, the stratification of skill levels, and the density of the division of labor in general. With a more homogenous workforce, conflicts of interest regarding the organization of work and business are less likely to arise. This mirrors findings from the traditional sociology of work, according to which the development of an industrial and hierarchical division of labor within corporations intensified workplace conflicts, for instance, between high- and low-skilled workers or between management and their subordinates [26, 27]. Following this line of research, the participation of heterogeneous stakeholders with conflicting interests would overwhelm democratic governance and thereby reduce the overall economic performance of democratic corporations.

In contrast, another line of research particularly emphasizes that the integration of multiple perspective is precisely one of the economic benefits of workplace democracies. According to Gerlsbeck & Herzog [13], democratically governed firms could leverage knowledge resources that are blocked in private corporations, because collective deliberation leads to the integration of multiple perspectives into decision-making processes. This enables the integration of employees’ practical knowledge and a more comprehensive understanding of the challenges faced by organizations. This is considered a major advantage over systems where responsibility rests solely with individual decision makers. Similarly, more recent studies indicate that democratic workplace practices can unlock employee knowledge and commitment, potentially leading to productivity-enhancing innovations [28]. Borzaga & Sacchetti [29] argue that while multi-stakeholder deliberation may appear costly, these processes can actually increase internal efficiency by preventing exclusion and better aligning organizational objectives. In line with this, empirical research shows that high-performance work practices consistently have a significant positive effect on product and process innovation, particularly when industrial relations adopt a participatory style [30].

Table 1 Interview Sample

Interview sample Mondragon MCC N = 8

Department	Interviewee	Thematic focus
<i>Innovation ecosystem</i>		
Mondragon HQ	N= 1 General manager	R&D coordination, Mondragon MCC
R&D Centre Ikerlan	N= 1 General innovation-manager	Innovation processes in cooperatives
Faculty of Business Studies, Mondragon University	N= 1 Dean	Training for cooperative managers
MIK Management Research Center, Mondragon University	N= 1 Research-director	Participatory management methods in cooperatives
<i>COOP1</i>		
Production/Social Council	N= 1	Corporate innovation system
General Management	N= 1	
R&D	N= 1	
<i>COOP2</i>		
Innovation-Management	N= 1	Corporate innovation system

Source: own elaboration

However, the relationship is complex. While Harrison & Freeman [31] note that organizational democracy can boost innovation and employee satisfaction, it can also consume significant organizational resources and potentially slow down decision making. Sah & Sarif [32] support this by highlighting that while organizational democracy can increase innovation and commitment, there are practical challenges in its implementation. Jones & Kalmi [33] point out that the alleged trade-off between democracy and efficiency is not conclusive and emphasize the need for further research.

Our research aims to contribute to these contradicting strands of research on workplace democracy by outlining institutional arrangements that support a balance between democratic decision making, the use of epistemic virtues for innovation, and economic efficiency. To this end, we analyze in particular how the innovation system is structured in cooperative enterprises.

Hence, we pay special attention to how the costs of deliberation at Mondragon are managed through a functional and institutional division of labor and how this division of labor reconciles managerial expertise in day-to-day business with democratic governance of strategic decision making. Furthermore, we will reconstruct how the more active role of workers in innovation processes within the Mondragon cooperatives reshapes the nature of innovation, focusing on

continuous skills development, incremental innovation, and the use of workers' knowledge.

Methods

We conducted a total of eight qualitative interviews with representatives of various overarching research and development institutions at Mondragon, as well as with production workers and innovation actors from two individual cooperatives. These two cooperatives were an automotive supplier, hereinafter called COOP1, which manufactures chassis, powertrains, and various other structural components using aluminum and iron casting processes, and a software developer providing software for automation and other digital solutions for industrial use, hereinafter called COOP2. While COOP1 employs about 4.000 people worldwide, COOP2 has around 80 employees (see Table 1).

The interviews conducted were designed as expert interviews, which serve to uncover organizational knowledge institutionalized in formalized practices ([34]:140). Therefore, we did not aim for representativeness in our sample, but rather sought interviewees who could reveal relevant institutional knowledge thanks to their expert position. Our interviews focused on the institutional setting and the governance of innovation at Mondragon, the agency of

worker-owners, and the way strategy development takes place with regard to innovation (see interview guide in the Appendix). Through discussions with responsible persons in the innovation ecosystem, we were able to reconstruct the general patterns of research and development organization at Mondragon. Discussions were held with the general manager, the dean of the business faculty responsible for management innovation, and the director of the management research center to clarify whether Mondragon applies democratic methods in management practices and what values guide the management of the overall business group, particularly with regard to innovation. The interviews at COOP1 and COOP2 then served to clarify how innovation is organized within cooperatives and how all employees can participate in it, with an additional focus on the training of worker-owners and innovation managers to facilitate participatory innovation processes.

Since our research was guided by the question how far democratic workplace governance is economically sensible, most of our interview partners were highly qualified experts holding management and innovation positions, as we considered them particularly relevant for assessing the organizational efficiency of the cooperatives. Only one interviewee had a background in shop floor production. This somehow limits our findings because workers' perspectives could only be included in our sample to a limited extent. However, one of our findings from the in-depth interview with a production worker is that the perspectives among different employee groups at Mondragon seem to converge to some degree, since they all act as owners of their company and consequently share common interests.

Furthermore, although we examine the relationship between workplace democracy, innovation, and economic efficiency, our qualitative interview data do not provide evidence of the exact economic performance of the Mondragon cooperatives. Instead, we assess their economic competitiveness based on available business metrics for Mondragon (see Sections [“Introduction”](#) and [“Democratic Governance and Industrial Hierarchy”](#)). Given this economic competitiveness and Mondragon's long-standing economic success, we ask how innovation systems and democratic governance are structured under these high-performance conditions.

To verify the results of our interviews, a theoretical sampling approach ([35]:181 f.) was combined with a strategy of maximizing contrasts within the sample ([35]:47 f.). Contrast maximization is used in theoretical sampling strategies to vary theoretically assumed conditions that are considered crucial for the results related to the research question. According to Hansmann [24], the reliability of worker democracy in collectively owned firms depends on the homogeneity of the internal workforce, because this results in an alignment of interests and reduced deliberation costs. Following this assumption, the economic and corporate growth of cooperatives is likely to weaken democratic governance processes as it leads to an internal stratification of the workforce. The size and the internal homogeneity of the workforce are thus crucial factors to examine the reliability of democratic governance structures of innovation activities. Hence, a small cooperative with predominantly highly skilled employees (COOP2) was compared to a big cooperative with a stratified workforce (COOP1). This allowed us to compare various characteristics of the cooperatives, such as skill level of the workforce, number of employees, institutional differentiation, intensity of the division of labor, capital intensity, and industries in general (service sector vs. manufacturing). This served to verify the robustness of the findings on democratic governance practices.

The interviews were conducted using a theory-based interview guide and content-analyzed with MAXQDA coding software [36]. Deductive codes derived from theoretical heuristics were used to establish a general pattern of comparison between the cases ([35]:61–69). These main categories were then abductively differentiated to identify similarities and differences between the cases through a synoptic comparison of selected interview passages ([35]:73). By combining deductive and abductive coding, a theoretically informed typology was established.

In the following sections, we will answer two questions: First, how Mondragon, as a worker-owned corporation, organizes technological innovation and deals with the democratic costs of deliberation (Section [“Methods”](#)). Second, how this leads to a specific type of innovation based on the gradual development of skills (Section [“Streams of Control and Flows of Knowledge. The Democratic Innovation Model of the Mondragon Cooperatives”](#)).

Streams of Control and Flows of Knowledge. The Democratic Innovation Model of the Mondragon Cooperatives

In the following, we will reconstruct the innovation regime of the Mondragon cooperatives as a system shaped by a dual structure: on the one hand, by democratic control exercised indirectly by worker-owners over the industrial hierarchy of their cooperatives and, on the other hand, by a flow of workers' knowledge through the industrial hierarchy that links shop floor realities with broader innovation strategies. In doing so, we will illustrate how the Mondragon cooperatives reconcile democratic governance with entrepreneurial efficiency.

Democratic Governance and Industrial Hierarchy

The *democratic stream of control* is realized through an array of institutions within the governance structure. The main body is the annual *general assembly* (GA), in which every cooperative member can vote for or against certain policies of their own cooperative. The issues discussed here mainly concern strategic decisions regarding the cooperative's development. They do not directly relate to details of day-to-day operations. Strategic developments of the companies are agreed upon, such as major investments and the expansion into new business areas. With regard to the technological innovation model, the annual GA is important because every four years it approves innovation plans that define the company's long-term technological development paths. In recent years, for example, the GA at COOP1 decided to shift production to the supply of components for e-mobility, to introduce the new production processes required for this, and to build a new factory. At COOP2, strategic decisions such as the establishment of a new overseas branch or the transition to open-source development were made there. The GA thus serves primarily to approve long-term investment and innovation strategies by a majority vote of the employees.

The GA also elects the *Governing Council* (GC), which serves as a kind of representative parliament of all worker-owners within the governance structure. Normally, each council member is elected for a maximum term of four years. Members are elected annually on a staggered basis to avoid a complete turnover

of the GC. In this sense, when a member's term ends and their position is filled, the new members join a council that still includes experienced members, ensuring that expertise and knowledge from previous decision-making processes remain available. The council's primary function related to the organization of innovation is to forward the democratically approved innovation plans to the management board, which is the highest authority within the hierarchical organization of work. It is also responsible for appointing the cooperative's top management. The GC thus serves as a link between the cooperative's democratic governance and the industrial hierarchy. It commissions the management to implement business and innovation plans that have been collectively legitimized and advises on their operationalization.

However, the translation of innovation plans into specific technological development projects does not take place within this democratic governance structure. It is rather embedded in the hierarchical organization of work. Decision-making authority regarding the use of new technologies in the cooperatives is unequally distributed, similar to private companies. Decisions on the introduction of new technologies are made in the companies' own R&D departments, where specific technological processes and artifacts are selected by research engineers. Project teams initiated by management engineers are responsible for specific implementation processes on the shop floor. For example, COOP1 needed to introduce new melting technologies for low-pressure aluminum-components. These new processes were not discussed with shop floor workers but were determined by high-level engineers. Shop floor workers generally have no say in the selection and design of new technologies for the workplace. Moreover, even in the Mondragon cooperatives, technology is used to increase labor productivity and thereby control shop floor workers. At COOP1, for example, time studies are carried out to regulate the pace of work for employees operating new machines. Ultimately, the economic rationalities mediated by technology are not overcome within the cooperatives, despite their democratic ownership structure.

Hence, control over the introduction of new technologies and detailed design decisions is not democratically distributed among all owners of the companies. The scope of collective decision making is limited to general and mainly strategic decisions

about innovation pathways and does not cover everyday issues related to technology. Nevertheless, workers can contribute to the design of new technologies within their daily work through an ongoing *participatory flow of knowledge*. We refer to this institutional framework as “participatory” because, although workers are actively involved and encouraged to contribute their ideas, managers and technical experts control the process and have discretion over the use of employees’ input. Accordingly, employees have no formal decision-making rights in this context.

This industrial hierarchy is mitigated through various participatory bodies at different levels, in which workers’ experiential knowledge is used to inform innovation processes. These participatory bodies are particularly sophisticated at COOP1. There, weekly quality circles are established for various production areas such as manufacturing or maintenance to enable exchange between workers, supervisors, and engineers on everyday problems such as health or performance issues. At a higher level, project teams serve as participatory bodies to align design decisions with the needs of workers on the shop floor. They are established by engineers for new development processes and include workers from the departments affected by the technological changes in order to develop suitable solutions. There, workers contribute informal expert knowledge to ensure the successful implementation of new technologies, thereby also influencing the development in their interest. At COOP1, for example, new industrial washing machines were introduced and project teams were formed with the participation of employees. A shop floor worker reports on the issues discussed there with the engineers:

“For example, we have to set up a washing machine for a BMW project. We need to know where to put the operations center, [...] where to set it up, what automation we could implement, where to put the elements for its management, what you need to keep [it] ergonomic [and] to help people. [...] You take part in any new [production] line that may come into the plant, you take part in different teams. It’s not like something new [is] arriving in the plant and nobody [is] having a saying on it” (Shop floor worker, Interview COOP1, Pos. 63).

Project teams, as participatory bodies, thus deal with a wide spectrum of topics, ranging from

production layouts and the degree of automation of certain technologies to ergonomic issues. In these meetings, workers can draw on their informal experiential knowledge to influence work organization and technology design in their sense.

Another institutional body responsible for organizing *participatory flows of knowledge from the shop floor* is the *social council (SC)*. According to Kasmir [15], the SC was introduced in 1957 in the first Mondragon cooperative, called ULGOR and later FAGOR. This employee representative body, which is an institution in most Mondragon cooperatives,² is elected on a representative basis from the entire workforce and thus represents shop floor workers in an outstanding manner. This body provides “top-down” information about the cooperative’s financial and productive performance, changes in the organization and business models, as well as issues related to the composition and decisions of managerial staff, but also acts as a “bottom-up” channel for sharing workers’ concerns about safety and working conditions as a counterbalance of the management’s focus [15, 37–39]. In this sense, Kasmir [15] distinguishes this body from unions, arguing that “it functions not only to exert pressure upwards from the shop floor to management but to communicate managerial decisions and convey information downward as well”.

While participatory bodies such as project teams tend to focus on engineering issues related to the implementation of new technologies, the SC serves as a public forum for social concerns of workers and thus also for problems related to the introduction of technology. Issues of workers are collected during monthly meetings. On this basis, the SC has the formal right to task individuals within the work organization who may be responsible for specific problems – such as production engineers or supervisors – with developing solutions. To this end, the SC maintains continuous communication with the R&D and engineering departments that develop and implement new technologies. At COOP1, an SC member even regularly attends the monthly meetings of all R&D engineers and keeps them informed about workers’ concerns in innovation projects. One instance of such

² Smaller cooperatives such as COOP2 do not necessarily establish SCs; their GC takes over the basic functions of such councils.

an intervention, mentioned several times in the interviews, concerned the introduction of new aluminum-recycling technologies at COOP1, which were part of an overall business strategy to reduce resource costs and improve the ecological sustainability of production. However, these new technologies generated vapors that made working conditions very uncomfortable for shop floor workers. This problem was raised in the SC meetings, leading the Council to call for the project to be stopped. In response, production engineers developed new processes for cleaning the recycled aluminum prior to melting. Hence, the SC, as a representative body of workers' social interests, is embedded as an actor in the innovation system of work organization.

However, these participatory bodies have no *formal* right to decide on the course of technological innovation. This can be considered a fundamental difference between democracy and participation as distinct modes of collective decision making. While democratic institutions distribute formal decision-making power equally, participation leaves it to a central authority, which can use stakeholders' knowledge to inform its decisions ([13]:7). Participatory management practices have thus, of course, long been established in companies and do not challenge private ownership [40–42].

In its innovation system, Mondragon effectively separates managerial authority within the industrial hierarchy from worker-owners' control within the framework of democratic governance. Worker-owners can decide on long-term strategies and innovation pathways, but the details of technological design are determined by the professional hierarchy, i.e., by professional managers and (technical) experts. Both spheres are interconnected in order to complement and limit each other. This configuration is associated with sustainable economic performance, organizational resilience, and innovation capacity at scale. This is reflected in Mondragon's long-term employment stability, making Mondragon the largest employer in the Basque Country and one of the largest in all of Spain ([43]:177), as well as in its continued investment in technology and sustained revenues exceeding 11 billion euros in recent years [44]. Furthermore, consistent with broader findings on worker cooperatives, this hybrid structure promotes internal adjustment mechanisms, such as wage and working-time flexibility, rather than contributing

to job destruction during periods of economic stress [45–47]. Empirical studies on innovation processes within Mondragon also show that democratic participation and professional hierarchy are complementary rather than antagonistic: Participatory mechanisms facilitate the mobilization of workers' knowledge and commitment, while hierarchical coordination enables the efficient management of complex technological projects [48].

Against this background, our interviews indicate that the absence of codified rights for workers' representative bodies is not perceived as a deficit. Rather, respondents emphasized that the cooperatives' democratic culture endows social councils and participatory bodies with sufficient moral authority for management and technical experts to take their initiatives seriously. This informal authority is supported by robust democratic governance mechanisms that provide credible channels for voicing concerns and resolving conflicts, thereby promoting both corporate efficiency and workers' influence within a professionalized innovation system. Previous research suggests that this balance – rather than the absence of hierarchy – underpins the functioning and resilience of the Mondragon model, even when it faces tensions related to scale and internationalization [14, 49].

Managers Act, Owners Control, Workers Inform: Owners' Control Over Management Policy

This balance is reinforced by two main factors: First, management is forced to take workers' contributions in participatory processes seriously due to its democratic accountability. Second, potential interests of workers that go beyond general corporate efficiency are marginalized through the design of democratic institutions as ownership democracies.

First, the importance of participatory bodies is significantly enhanced, as their influence is supported by the democratic governance structure. This is particularly evident in the process of developing the overall innovation plan, which is approved by the democratic governance structure. In line with the hierarchical organization of work, the management board has the right to prepare a proposal for a four-year innovation strategy in cooperation with the R&D department. This innovation plan is then submitted to the GC, which decides whether it should be presented to the GA for approval. In this process, the

GC acts as a trustee of the interests of all cooperative members. It assesses whether the innovation plan is a sound strategy that considers not only the ambitions of higher management but also the interests of all other employees. A manager at COOP2 describes this role of the GC's president as a trustee of employee interests using the example of management's proposal to set up a new office in Latin America in order to access new markets:

"So, you have to be careful that the general manager, who wants to do it, doesn't present it too nice and too green. Because you as a president of the governing council, you have to be aware that you can get into trouble with your company [...]. So, [...] it's a thin line. [The president might say] 'I support [the] general manager, but guys be careful because it's with risk. It's like you go to the bank, you have an investment fund. [...] But there are some risks associated with that.' So, there's a little of the balance you have to fight [for]." (Innovation manager, Interview COOP2, Pos. 50–53).

Even if general management might promote a certain investment or innovation strategy, the GC has a duty to assess the associated risks for all worker members of the cooperative and to inform the GA about potential challenges. Furthermore, it also has the right to instruct general management to revise innovation plans if these are unlikely to receive majority approval from the worker-owners. Ultimately, this leads to an institutional setting in which management and R&D departments face strong incentives to anticipate employee needs when developing innovation plans. Perhaps the most robust mechanism obligating top management to consider the interests of the worker-owners is their (indirect) election by the cooperative's workforce, leading to a strong interest in a sustainable relationship and, according to several of our interview partners, to a more egalitarian workplace culture. This also strengthens the participatory bodies within the work organization as influential institutions. When preparing the four-year innovation plans, management and the R&D department must ultimately submit drafts that are approved and broadly supported by the democratic governance structures.

This means that they recognize the need to cooperate with the above-mentioned participatory bodies and worker representations at an early stage. The SC

plays a crucial role in informing management about employee needs. It serves as the central point of contact for management and the R&D department when drawing up innovation and business plans in order to ensure that workers' knowledge and interests are integrated at an early stage. The reason for this is that they do not want to present innovation plans that are rejected by the GC or disapproved by the GA. The head of the R&D unit at COOP1 describes the drafting of an innovation plan as follows:

"We don't wait [...] [for the general assembly] to present [the innovation plan]. [...] it is very difficult to have disagreement in the final meeting [the general assembly, the authors] because [...] every month we have this [meeting with the] social council [and] governance council [...]. So [...] the workers are in close contact and [exchange] information [...] with the [...] boss. And if we have any disagreement, [...] they can [...] discuss there the problems and the things that we [...] think that are not correct." (Innovation manager, Interview COOP1's R&D Unit, Pos. 118).

In this way, the cooperation between R&D departments or units and participatory bodies within the industrial hierarchy shapes the overall innovation plan, which is approved by all worker members in the democratic governance structure.

Regarding the question of how Mondragon deals with potential costs of deliberation, it is crucial that although workers' interests within the corporate hierarchy are acknowledged by management and engineers, no formal decision-making rights are handed over to shop floor workers. Workers in participatory bodies and the elected members of an SC have no formal authority to decide on the course of technological development. These authorities remain centralized within the R&D and management-departments. These are the actors who have formal *operational rights* to research, design, and select new technologies based on expert knowledge. The authorities of participatory bodies and the SC, on the other hand, can largely be described as *information rights*. They are able to convey knowledge about workers' needs to corporate decision makers. However, their flow of knowledge is backed by the stream of control by democratic institutions, as management is dependent on final approval by the GC and the GA.

By leaving the design of technology to professional competencies while delegating the authority to approve it to democratic institutions, complemented by a body of participatory knowledge-conveying institutions, the Mondragon cooperatives keep deliberation costs under control while maintaining democratic control. The underlying principle of the cooperatives is to grant corporate and managerial autonomy while encouraging them to take workers' perspectives into account. Engineers make technical decisions about innovations, owners exercise democratic control, and workers provide input through participation. In this way, the dual governance structure of the cooperatives – management in the area of work organization and the GC in the area of democratic ownership structure – mutually complement and constrain each other in steering innovation.

Second, although this institutional setting ensures the integration of workers' interests in the design of innovation plans, it also reduces deliberation costs at Mondragon, since democratic governance to some extent neglects workers' actual interests in the design of technology and favors the common interests of all employees – from management to shop floor workers – in their role as owners. Democratic institutions such as the GA or the GC are assemblies of workers acting as *owners*. As such, they shape the rationale under which discussions about innovation take place there. Our findings suggest that decision making prioritizes the cooperatives' competitiveness over more immediate workers' interests, such as autonomy on the shop floor. Accordingly, the mindset displayed by most cooperative members across all hierarchical levels was largely entrepreneurial in nature.³ For example, the option of establishing a new overseas office in Latin America at COOP2 was mainly discussed from the perspective of how far it would be possible to ensure the efficiency of the distant operations and the workforce hired locally:

“Well, one of the elements we [...] [discussed was], who is going to control? [...] How do we guarantee that what we have [in Latin America] is reliable? Because you can have a manager over there who says, ‘We are making a lot of money.’ Okay, cool, but [...] who says this is true? And how do you know the first year that you really are making money? So, there we had the recommendation to hire an external accounting office who does every three months mini audits, just to reduce risk, for example.” (Innovation manager, Interview COOP2, Pos. 63).

One of the main concerns of the GA in this case was to reduce market risks and free-riding by off-site workforces. Their solution here was a stronger business control of overseas operations. Hence, the democratic institutions mainly serve to secure future corporate profits, which can be converted into income for all members of the cooperative, regardless of their status within the industrial hierarchy. In this way, managers and workers develop common interests regarding technology and innovation. And at the same time, workers advocate for stronger control of the activities of other workers in order to secure their income. Entrepreneurial logic thus forces them to neglect genuine interests of workers.

As mentioned above, beyond this responsible management of investments to secure the cooperative's future, detailed questions about the paths of innovation and the design of technology are not part of this democratic ownership structure, but are rather delegated to bodies within the industrial hierarchy. In doing so, the Mondragon cooperative limits democratic deliberation on these issues, where stronger and potentially antagonistic conflicts might arise. This could possibly be the case when it comes to specific issues of technology design that lead to de-skilling, limit workers' autonomy, or increase work stress for the sake of greater efficiency. These problems are left to the industrial hierarchy – mitigated by the participatory bodies.

This means that aside from the reconstructed elaborate institutional setup, democratic governance within Mondragon benefits from the existence of a rather homogenous set of interests among its employees – specifically in their role as owners of a company – who are interested in maintaining a high level of

³ We cannot make any definite statement as to whether this focus is also due to the fact that more immediate workers' interests are already adequately addressed through the cooperatives' corporative relations. The only clear case of discontent we were able to identify (the vapors caused by the smelting of recycled aluminum) was resolved in the interest of the workers. Hence, a charitable interpretation might be that the enforcement of workers' interests plays less of a role because it has already been largely achieved.

competitiveness to safeguard their jobs and incomes. These homogenous interests are fostered both culturally and institutionally through an extended probationary period for new employees who are to become worker-owners, as well as materially thanks to the worker-owners' role as committed shareholders whose livelihoods depend in the long term on the success of their companies. Other issues that are subject to more antagonistic interests are left to industrial and professional hierarchies. In contrast to their shared interests as owners, these antagonistic interests can develop among employees in their daily work depending on their professional position. A typical example here is the conflict between management and shop floor workers, because management exercises a control function over workers who might oppose this in order to reduce their workload and preserve their autonomy at work [26, 27].

That being said, the dual structure of cooperatives, as both democratic enterprises and hierarchical work organizations, successfully reduces the risk of rising deliberation costs in democratic corporations in two ways: First, competencies are distributed – managers and technical experts decide on innovation, owners exercise control, and workers provide information. Second, the scope of democratic decision making is limited to workers in their role as owners, thereby reducing the heterogeneity of interests.

Incremental Innovation, the Preservation of Skills, and the Epistemic Virtues of Democratic Innovation

The democratic ownership structure also leads to a specific path of innovation that effectively promotes the continuous contribution of knowledge by workers within the industrial hierarchy and the long-term development of skills. In private companies, technological innovation and the reorganization of shop floor and office operations may lead to workforce substitutions or the devaluation of existing skills. Since workers, as owners, cannot lose their jobs except in the most extreme scenarios (e.g., if they commit very serious breaches of internal regulations or if the cooperative ceases operations due to bankruptcy and a transfer to other cooperatives via inter-cooperative mechanisms fails), innovation must be driven in other ways to avoid these potential consequences.

In general, the cooperatives we observed favor an incremental innovation model, as defined by various pioneers of this concept [50–53], where business strategies and corresponding workflows are not drastically altered. This incremental innovation leads to a human resources management approach that focuses more on adapting existing skills and the workforce to new products and processes and is forced to respect the qualifications of existing workers. Ultimately, this also leads to an innovation model where the importance of workers' knowledge is emphasized, as long-standing experience is a high-value asset for the continuous improvement of products and processes; in this sense, the experience of “veterans” is highly valued. We want to conceptualize this increased appreciation of workers' knowledge as a key innovation resource as an epistemic virtue of workplace democracy, where more inclusive approaches to decision making lead to better utilization of existing knowledge resources within corporations [13].

As mentioned above, the major transformations discussed in the two cooperatives concerned the transition to e-mobility and the different third-party-components required for this reorientation at COOP1, as well as the shift to open-source development at COOP2. Both innovations are linked to a long industrial development process, which encompasses, on the one hand, the manufacture of chassis within the automotive industry's value chains and, on the other hand, the development of business and production software for industrial clients.

Despite this non-disruptive technological change, both innovations pose challenges to the existing workforce in the cooperative. This was particularly true at COOP2, where the alignment of existing skills with the new development processes had to be managed. The new processes were promoted by external researchers from Mondragon University, collaborating with COOP2, and then introduced by the internal R&D department. However, according to the innovation manager, this introduction was accompanied by some challenges rooted in the cooperative's democratic ownership structure. Long-term employees, accustomed to established development processes, were not eager to adopt new technologies. Without the threat of dismissal, management lacks the ability to force them into retraining. Clinging to existing skills leads to a management strategy in which new technologies are adapted to the workforce, rather than

the workforce being adapted to new technologies. At COOP2, pioneer teams were formed in which software developers who are open to new open-source processes could experiment with the new technology and transfer the R&D models into daily operations. Ultimately, however, this does not lead to the devaluation of those employees who are unwilling to adopt new methods. Rather, client projects are selected and assigned in a way that aligns with existing skills:

“[...] [you have] early adopters and the laggards. [...] The question is, is it necessary from a company point of view to transform everybody? Maybe it's not necessary. Maybe the trick is to [...] make them live together. If you have enough projects, enough workload, why would you push somebody toward the technology if he really doesn't want to?” (Innovation manager, Interview COOP2, Pos. 159).

However, it would be premature to interpret this lack of “top-down” management style for enforcing retraining as a factor that hampers innovation. First, the democratic governance structure and the benefits of collective ownership lead to a shared consensus on pursuing jointly decided technological pathways. And this leads to greater openness to new technologies among workers. The transition to open source technologies at COOP2 was approved by the GA as a means to improve competitiveness and secure customer orders. As market success is linked to the income of the worker-owners, this provides an incentive to adopt new technologies in daily work. At COOP1, to give another example, the above-mentioned discussion among shop floor workers about new industrial washing machines and their degree of automation is said to have been quickly settled in favor of a higher level of automation, as this ensured efficient workflows. Since workers benefit from the company's success through profit-sharing and increased competitiveness is seen as a means of securing employment, workers view new technologies as less critical or even detrimental to their own interests.

Second, the ownership structure, leading to more incremental paths of innovation and skill development, promises to unleash the full potential of all workers in the long run. Employees who gain experience in specific work processes possess knowledge that can be used as an innovation resource. Here, the

combination of democratic governance and participatory management methods is once again of crucial importance. Through these institutions, it is possible to integrate workers' expertise into the design of new technologies. At COOP1, one of the major democratically made decisions was the construction of a new plant to keep up with changing market needs. The workforce for this new plant was partially reallocated from existing plants. This continuity in the workforce also enabled the transfer of accumulated knowledge that could be used to improve production methods. The workers' experience with older molding methods led to an incremental innovation process to increase the batch size of molten materials, as one shop floor worker described:

“We have taken part in that new plant, because in the end, we did have some previous knowledge on that technology. [...] For example, when you set up a new molding line, [...] we used to have an oven and inside that oven we had a soup, and we would put that soup into different molding machines. Nowadays, it is different, depending on the alloying, you can send it to different ovens [...]. So we have more flexibility, we have better control of our alloying and of what we want to mold. We did not use to have that option. And we have learned that together, right?” (Shop floor worker, Interview COOP1, Pos. 209–210).

The long-term stability of the workforce at COOP1 thus makes the workers' informal knowledge available as a resource for innovation. And its utilization is fostered by the participation of shop floor workers in collective decision making and equal sharing of profits.

This preservation of long-time expertise through collective ownership structures and the willingness of workers to innovate can be described as one of the epistemic and organizational virtues of workplace democracy. Against this background, we aim to demonstrate how the tension between the epistemic virtues of workplace democracy and its deliberation costs can be navigated. As we have shown, the democratic governance of the cooperatives does not cover detailed aspects of innovation, such as the design of certain technologies, and also aligns the heterogeneous interests of various employee groups in their roles as owners. In this way, it is not possible within the

democratic bodies to uncover the diverse perspectives and knowledge bases that might exist in the companies, as Gerlsbeck & Herzog [13] suggest. But the collective ownership structure with its long-term workforce enables the development of highly specialized knowledge resources among broad segments of the workforce. The motivation to share this expertise for innovation purposes within the industrial hierarchy seems to be relatively high due to the solid legitimacy of democratic decisions, long-time commitment to the company, and stronger material incentives associated with an equal distribution of income. All this leads to incremental innovation paths where skills and infrastructures are continuously adapted to new requirements.

Thus, the Mondragon model combines long-term employment, a highly qualified workforce, and incremental innovation paths with strong redistributive features as well as well-legitimized participatory processes that enable the effective use of workers' knowledge without extended democratic deliberation. This can be seen as a response to the issue raised by Hansmann [24], who suggested that the costs of deliberation in democratically governed enterprises might rise with increasing complexity of labor organization because functional differentiation between professional groups leads to a more complex structure of interests regarding corporate policy. Mondragon cooperatives limit democratic deliberation on innovations to strategic core issues, but enable the flow of long-time expertise within a stable workforce, made possible by collective ownership structures.

The organization of the Mondragon cooperatives can therefore be described as a dual decision-making structure (see Fig. 1). On the one hand, they are democratically governed and collectively owned enterprises in which a decision-making system based on the principle of "one worker-owner, one vote" applies in the GA. On the other hand, they are hierarchical industrial labor organizations with unequally distributed competencies and power asymmetries regarding day-to-day activities and management. The qualification structure at COOP1, for example, is characterized by a high share of trainees and skilled workers on the shop floor, who are controlled by production area managers, engineers, and executives at various levels. The egalitarian association of owners within democratic governance is thus mirrored by a hierarchical stratification in which these owners act as

professional groups exercising authority within the work organization. Nevertheless, the Mondragon cooperatives are able to combine these two dimensions of their corporate structure to ensure both democratic deliberation and entrepreneurial efficiency. We describe the relationship between these two dimensions as a *democratic stream of control flow* running from the governance structure through the industrial hierarchy and a *participatory flow of workers' knowledge* through the industrial hierarchy from the shop floor to the GA.

Conclusion

In this paper, we have reconstructed the innovation regimes of the Mondragon cooperatives. We have demonstrated how their institutional and functional differentiation allows them to balance democratic governance and economic efficiency. Furthermore, we have discussed how the structural conditions and the institutional setup of the Mondragon cooperatives foster innovation processes that are based on workers' knowledge and support their continuous skill development. Based on our theoretical framework, we see the specific configuration of democratic institutions as well as the innovation model of the Mondragon cooperatives as rooted in two aspects. First, the differentiation between democratic governance and participatory industrial hierarchy reflects an attempt by the cooperatives to reduce deliberation costs, as postulated by Hansmann [24] and Surroca et al. [20]. This is achieved in particular by aligning the interests of a heterogeneous workforce in their role as owners in the general assembly, which decides on the future business strategy of the corporation. In this way, potential conflicts arising from heterogeneous positions in the division of labor are mitigated in an ownership democracy. Although this model supports economic efficiency, it nevertheless compromises the epistemic virtues of workplace democracies, since democratic governance does not address detailed issues, such as those concerning technological design. This reflects the fact, that not all workers in a cooperative—especially in large cooperatives—have knowledge about each technology that the cooperative uses or develops. They may know a great deal about the technologies used within their own area, but not as much about those used in other areas or departments, whose

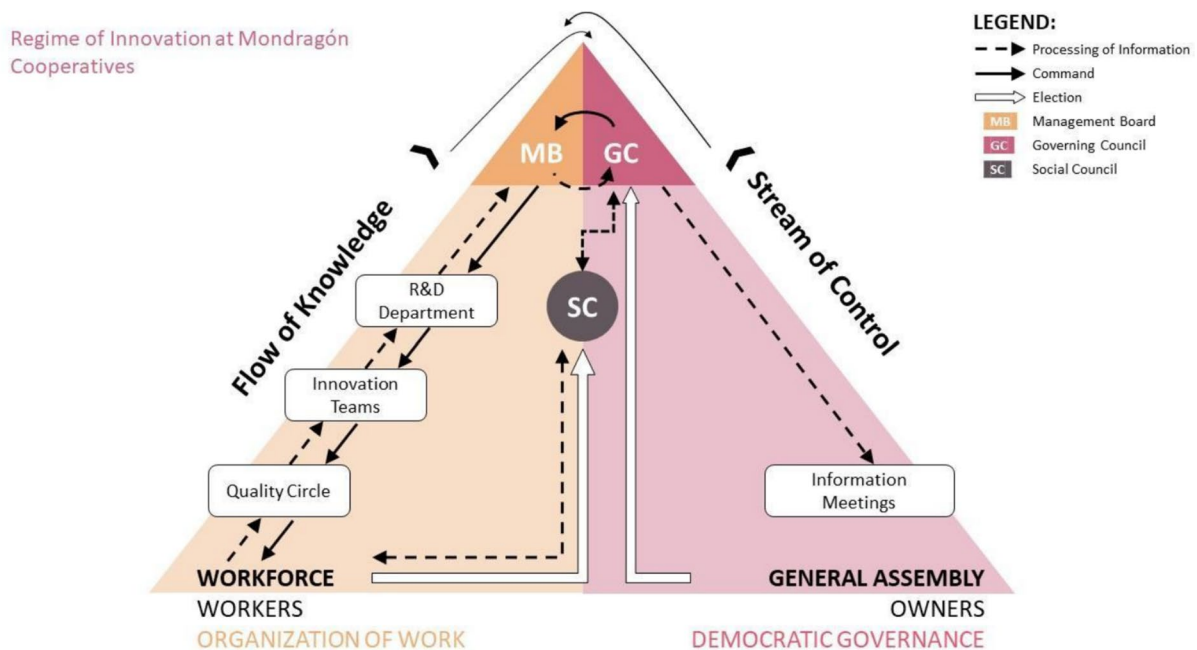


Fig. 1 Innovation Regime of a Mondragon Cooperative

activities may be entirely different from their own. As a result, they may face difficulties when making decisions about technologies or features with which they are unfamiliar. Second, however, collective ownership structures lead to a continuous contribution of knowledge by workers and to incremental innovation, as they enable long employee retention and the development of highly specialized knowledge. The democratic governance mechanisms and opportunities for participation endow innovation processes with a high level of legitimacy and seem to stimulate workers' contribution of knowledge. These findings echo the experiences of industries with high union density and advanced institutions of worker codetermination, as seen in the German system of industrial relations, where long-term employment, highly skilled shop floor workforces, and incremental innovation paths are combined in a similar way [54, 55].

This is not to say that the Mondragon model is without limitations: Despite the clear advantages of its innovation systems and ownership model, the cooperatives must ultimately remain competitive and economically viable in order to survive in a capitalist market. To this end, they have pursued different trends and strategies, such as internationalization [56–60] and innovation [23]. This means

that they face the same structural imperatives and constraints as other businesses, since they operate in the same markets where they compete with capitalist companies. Accordingly, the scope of democratic deliberation is constrained by its coexistence with the capitalist economy. The focus on technology as a means of remaining competitive, which we observed throughout our interviews, testifies to this, as the range of technological options is limited to those that are largely compatible with competitive pressures. Despite, and considering their material interests as shareholders partly even due to, the qualitatively more extensive forms of participation and democratic codetermination that worker-owners enjoy at Mondragon, the cooperatives' labor organization and technology use converge with the practices of private businesses, albeit in a more humane form. Our research, however, shows that cooperatives can be competitive in capitalist markets, highlighting that democratic control over strategic decisions is not incompatible with decisions related to operational management and how these two areas can be reconciled.

A similar convergence to that of technology use and labor organization can also be observed with regard to ecological sustainability. While worker-owners appear quite willing to take the ecological

impacts of their operations into account (see, for example, the case of the recycled aluminum discussed above), their primary concerns regarding business strategy are economic and, indirectly, ecological in nature. The economic viability of their cooperatives, and thus their jobs and income, take precedence. This underscores the importance of reforming the economic framework under which private businesses must account for ecological impacts, even in a context that otherwise represents a remarkable challenge to the inherent logics of capitalist enterprises. This reinforces the importance of structural reforms to address the grand challenges of our time, such as climate change, in addition to changes at the level of individual economic entities (e.g., democratization of corporate ownership and governance structures), which can give individual workers more influence over business strategies [12].

Notwithstanding these limitations, the success of the Mondragon model under current conditions suggests that basic democratic decision-making structures can be combined with economic efficiency. Consequently, the model of the Mondragon cooperatives has been emulated by private companies in the Basque Country to adopt some of the participatory approaches found in cooperatives according to the Basque Statistics Office data (Eustat) [61, 62]. This is partly motivated by the hope of attracting mission-driven workers who are more interested in having a say in the workplace and in increasing innovativeness – although this practice is still limited [63]. More generally, the success of these cooperatives demonstrates that the call for more active participation of workers in the governance of technological change is not only normatively justified – its widespread realization can also be economically feasible.

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Declarations

Competing interests The authors declare that they have no competing interests related to this research. Although one author is a researcher at Mondragon University and the latter is part of the broader Mondragon cooperative ecosystem, the university maintained an independent and neutral role throughout the study. The organisation had no influence on the research design, data analysis, interpretation of the findings, preparation of the manuscript, or the decision to publish the results.

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