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FULL PAPER

The '3CE2CE' Framework—Change Management Towards a Circular Economy: Opportunities for Agribusiness

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Abstract
For the transition towards a circular economy (CE), organisations have to be prepared to adapt to major changes. Thus, the concept and implementation of change management (CM) will be essential to an organisation's success during this transformative period. Studies have shown that organisational CE barriers were more significant than individual CE barriers. To overcome such obstacles, the most appropriate set of managerial practices should be carefully considered. These barriers also have the potential to influence the agricultural sector, which seeks to adopt more sustainable ways of production. The goal of this paper is to propose a solution framework based on CM strategies to overcome organisational challenges posed by a CE, especially for agribusinesses. To accomplish this objectively, a systematic literature review and a content analysis were conducted. The common errors in CM within the implementation process and the main CE barriers were identified and classified. An in-depth analysis of the issue's roots led to a solid understanding of how to tackle such CM problems. This paper presents an overview of organisational CE barriers verified in the agricultural context, the common errors in CM, and the correlation between these findings. The two areas were then combined in a matrix that shows the connection between common errors in CM errors and CE barriers. Based on this result, a solution framework called *3CE2CE* was developed that provides a step-by-step guide on how organisations can successfully undergo transformation processes towards a CE with the principles of CM.

Keywords Circular economy · Change management · Organisational behaviour · Barriers · Agribusiness

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Introduction

Economic incentives have been and will be the key drivers for change [1], with the circular economy (CE) being increasingly debated as one of the promising concepts by scientists, policymakers, and industries to decouple economic growth from natural resource depletion and environmental degradation and, by doing so, to reconcile economic interests with the integrity of the environment [2, 3]. The CE is defined as 'an economic system that is based on business models which replaces the 'end-of-life' concept with the aim to accomplish sustainable development, [..] creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations' [4]. Organisations have to be prepared for major transitions and find effective ways to adapt to such changes because the 'CE must be understood as a fundamental systemic [innovation] instead of a bit of twisting the status quo' [1, 4]. Therefore, the concept and implementation of change management (CM), which is 'the process of continually renewing an organisation's direction, structure, and capabilities' [5], will be essential to survive in this transformative period of time. Due to the large scope of the transformation, the transition towards a CE requires a 'larger portion of change management than previous developments' [1]. In this context, rapid changes and continuous improvement of different aspects of the work are required, which forces changes in people's way of thinking and, with that, resistance to those changes might easily emerge [6]. Unlike some other innovative systems, CE needs to become competitive to an already existing, functioning linear infrastructure, for which managing the upcoming changes becomes even more important.

For many people, the notion of a CE is that it mainly refers to physical and material resource aspects of the economy: It focuses on recycling, limiting, and reusing the physical inputs to the economy as well as using waste as a resource, leading to reduced primary resource consumption. However, change requires not only technical and economic transformations but, equally importantly, a change in mindset. So far, studies have mostly dealt with concept analyses [7], operations management [8], technology [9], CE indicators, business model innovations [10], and policies [11]; however, little emphasis has been put on the social and human side of the CE and on organisational change processes [12, 13].

Studies have found that organisational barriers are more significant than individual barriers towards a CE [14]. Such organisational barriers mainly include the resistance to change that emerges during transformations [15]. To overcome such obstacles, proper CM approaches are required, and it should be considered carefully what set of managerial practices is most appropriate [16].

To avoid the failures of the change process, the common errors of CM during the implementation process and the main organisational CE barriers need to be identified. An in-depth analysis of the roots of the issue would then lead to a solid understanding of how to tackle such CM problems. Only with this knowledge can CM errors be overcome and prevented. As the fields of CE and CM are large, this paper focuses on the barriers/challenges within both subjects, which partially overlap as shown in Fig. 1. The goal of this paper is to propose a solution framework based on CM strategies to overcome organisational challenges posed by a CE, especially for agribusinesses. The guiding research question is the following: What are the CE barriers and CM errors that need to be overcome during an organisational change and, once identified, how can they be overcome?

This paper also presents ways in which the findings can be applied to an agricultural context. The reasons to undertake this approach are twofold: First, it is important to find sustainable ways of producing food to a growing population [17] and changing agriculture to

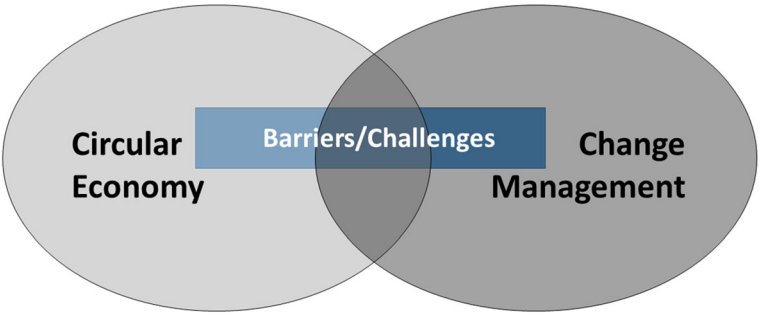

Fig. 1 Venus diagramme of CM and CE with the focus on barriers/challenges within overlapping realms

be less exploitative of natural resources [18]. This can be done by investing in CE, as it can foment sustainability in agriculture by changing the mentality of 'take-make-dispose' into one that values the use of all renewable resources in a circular way [18, 19]. Second, there is the need to be more flexible in order to incorporate new mindsets and technologies [19], which can be supported by applying CM principles. Additionally, according to Schuh et al. [20], farmers find it difficult to change their habits, which contributes to a resistance to incorporate new concepts and technologies to their work. Apart from such major problems during a change process, approaches that deal with 'soft' aspects are not as much discussed as technological issues [17]. In this context, the use of CM principles to tackle resistance of change, which can appear while attempting to implement CE concepts, could be helpful.

The study is structured as follows. The 'Theoretical Background' section covers the theoretical background about CE, CM, and the agricultural sector. The 'Methodology' section covers the research methodology, including a systematic literature review, snowballing, and content analysis. The 'Results and Discussion' section presents and discusses the results, which spans from the identification, classification, and connection of CE barriers and CM errors to the theoretical framework *3CE2CE*. Eventually, this leads to the conclusion and future research opportunities in the 'Conclusions and Future Research' section.

Theoretical Background

Circular economy

CE is considered an umbrella concept [21] based on a fragmented collection of ideas derived from a variety of disciplines and schools of thought, such as industrial ecology, cradle-to-cradle, biomimicry, performance economy, natural capitalism, and others [7, 22]. CE is presented as a solution for the unsustainable linear economy since it has the potential to decouple economic growth from resource consumption [2, 23]. Kirchherr et al. [4] affirm that as a trend concept, CE has a lot of divergent definitions and does not have a commonly accepted one. The study from Kirchherr et al. [4] identified 114 definitions of CE from literature, and based on that, they proposed a more holistic and consolidated definition that implies the need for a change process:

'A circular economy describes an economic system that is based on business models which replace the end-of-life concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes, thus operating at the micro

level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations.' Based on this definition, it is possible to understand the variety of aspects that are inserted into the change towards the CE. More than just creating new products/services and optimising value cycles, the CE implementation requires systemic transformations in organisations and systems as a whole.

Homrich et al. [24] say that 'CE is a strategy that emerges to oppose the traditional open-ended system, aiming to face the challenge of resource scarcity and waste disposal in a win-win approach with economic and value perspective'. The CE requires rebuilding and restructuring of processes and systems to achieve effectiveness, resource intellect, supporting infrastructure, societal acceptance, involvement of all actors, and operational as well as technological modifications to flourish [25]. The transformation towards the CE mandates firms to change their organisational structure, capabilities, and strategies [26]. Companies that implement CE concepts usually focus on rethinking products/services, business models, and systems using guiding principles such as BS8001. According to Bertassini et al. [27], organisations should prioritise the CE principles in the following order to achieve a circular system: build resilience through diversified strategies of value optimisation, collaborate and establish long-term partnerships internally and, externally, innovate to create value and enable the sustainable management (stewardship) of business models and ecosystems, be transparent and openly communicate with the stakeholders, and think in systems in order to understand how individual decisions interact and influence the wider system. These CE principles drive the strategies and practices that organisations should adopt. The circular strategies presented in literature aim to optimise the value of products, materials, and components from different perspectives. The strategies focus on the use of fewer products, components, materials, and energy during design and production, and during delivery, use, and recovery [28, 29]. CE strategies are about enhancing the level of use and consumption of products, materials, and components [23, 30]. They are implemented and proposed through circular oriented innovations, which widens the innovation perspective to include the ecosystem, next to a product or a service and the business model [31].

The concept of CE reflects the need for radical changes and innovations in business models and ecosystems. Innovations in business models for CE contribute to the coordination of technological and organisational innovations [32] and the implementation require simultaneous changes in structures, process, technologies, mindsets, culture, and ecosystems [10, 31]. In order to implement circular business models (CBM), organisations should reinvent and adapt themselves in different aspects. Change towards CE requires new ways of doing business [33], aiming at the integration of circularity in the business strategy, and a new way of thinking and creating/capturing value [27]. This can be difficult for many companies as it requires radical changes [34]. However, radical changes towards CE are hard to achieve [28] since some managers sometimes interpret CE as a threat due to its complex and innovative nature [34]. As the implementation of circular oriented innovations requires dramatic changes for the whole company, including the ecosystem, it brings up a lot of barriers. CE barriers are impediments or bottlenecks that obstruct transitions towards a CE [35]. These barriers can be internal or external and can be related to legislations and regulations, culture, economic and financial, and technological [36–38]. Moreover, they exist in all the ecosystem levels such as on the market and institutional level, value chain level, organisational level and employee level

[39–41]. Certain barriers can be overcome using tools and methodology from other research areas, such as CM, which will be described in the following.

Change management

CM is defined as 'the process of continually renewing an organisation's direction, structure, and capabilities to serve the ever-changing needs of external and internal customers' [42]. Bluntly saying, CM is 'the practice of applying a structured approach to transition an organisation from a current state to a future state to achieve expected benefits' [43]. Another definition used to better understand CM comes from Prosci [44], which considers CM as processes, tools, and techniques that can influence people in the search for a desired business objective. In general, CM refers to the implementation of finite initiatives in order to bring about a well-defined shift from the previous way of work [45]. The discipline of CM 'guides how to prepare, equip and support individuals successfully to adopt change in order to drive organisational success and outcomes' [46].

Several CM models have been developed in the last few decades for which in the following, the most famous or relevant ones are presented.

Lewin's Three-Stage Model

Kurt Lewin believed that human conditions could only be improved by solving social conflicts when they were planned ahead [47, 48]. Hence, he proposed a three-stage model, commonly referred to as Unfreeze-Change-(Re) Freeze [49, 50].

1. Unfreeze: human behaviour was based on an equilibrium that must be taken out of balance (Unfreeze) so that old behaviours could be discarded and new behaviours adopted.
2. Change: In this moving process, the actual change occurs when stakeholders should move to more suitable and acceptable behavioural patterns.
3. (Re)Freeze: After the change process, the aforementioned equilibrium should be restabilised while new behaviours should be incorporated into the new organisational routine.

Schein's extension of the Lewin's Change Model

Schein extended Lewin's Three-Stage Model by indicating how each stage can successfully happen. For stage 1, a sense of dissatisfaction within the organisation is necessary, which is often created by change managers through comprehensive education and communication efforts. However, a sense of dissatisfaction is not enough. Members of the organisation must be able to connect to the dissatisfying information and feel anxious or guilty. Only then, there is a sense of urgency for change. Moreover, change managers need to convey the change as being positive and beneficial; otherwise, members of the organisation might not feel psychologically safe and hence, resist change efforts [51]. For stage 2, Schein calls the change process a 'cognitive restructuring', during which people start to see and respond to things differently. There needs to be new role models to the change that members of the organisation can relate to. In particular, leaders themselves must go through a change process. Schein divides stage 3

in two parts: self and relations with others. For oneself, the change must become entrenched in one's behavioural patterns so that the change has to correspond to one's self-concept. Also, the resulting attitudes and behaviours must be aligned with the overarching system and the relationship to others [52].

Jick's Ten-Step Model

In 1992, Kanter, Jick, and Stein developed an extensive model of change based on ten steps [50]. The ten steps are [52]:

1. Analyse the organisation and its need for change
2. Create a vision and a common direction
3. Separate from the past
4. Create a sense of urgency
5. Support a strong leadership role
6. Line up political sponsorship
7. Craft an implementation plan
8. Develop enabling structures
9. Communicate, involve people and be honest
10. Reinforce and institutionalise change

Later, Kotter developed a more concise and precise model, which has become one of the most well-known ones and will be presented in greater detail as follows.

Kotter's Eight-Step Model

In 1996, Kotter developed a model, which poses many similarities to the Jick's Change Model. He stated that his model would be one of the most holistic approaches to avoid common organisational pitfalls during a change process [50]. His method is divided into eight steps [53]:

1. Establish a sense of urgency: Because people prefer to remain in the current state and often feel uncomfortable about uncertainties, which are commonly associated with changes, change managers must create a sense of urgency within the organisation.
2. Form a powerful guiding coalition: To bring about an effective organisational change, the managing and leading team must assemble a powerful enough group of people to lead the change.
3. Create a vision: An effective change can only happen if a clear goal and therefore, a clear vision is set. Henceforth, specific plans with milestones and strategies can be developed.
4. Communicate the vision: As often stated, communication is key. Thus, every vehicle of communication has to be activated so that each member of the organisation is aware of the benefits and specific steps of the change.
5. Empower others to act on the vision: Once the members of the organisation prefer the change, they must be encouraged and inspired to change. Commonly, different obstacles—whether internal or external—are along the path and need to be eliminated. In this step, every member is encouraged to act upon the vision, take risks, and develop creative ideas to bring about the change.

6. Plan for and create short-term wins: On the long run, people only work effectively when they can perceive regular rewards that motivate them to continue. Regular short-term wins can fulfill this function and are therefore essential.
7. Consolidate improvements and produce more change: After the first change efforts have taken place, the increased credibility can be used to engender more changes. In this step, more employees should be hired, promoted, and developed to reinvigorate the change.
8. Institutionalise new approaches: After the bulk of the change process has already passed, it is essential to incorporate the change into the corporate culture and identity of the organisation. Concretely, change managers should regularly articulate the linkage between the change process and the successes of the organisation. Only then, new behaviours will last.

Kotter's Change Model is one of the most famous ones. Despite being created many decades ago, his model is used very often until today. He defined eight corresponding CM errors, which will be identified and discussed later. After reviewing many more CM models of modern times, this model was chosen and adapted for this paper as it provided the most profound and comprehensive foundation for a successful organisational change process. It proposes a very practical and simple view about the most common errors in implementing change programmes and how to overcome each one of them. It summarises many of the findings from other models and, therefore, lays a strong foundation to illustrate how to overcome CE barriers.

Agricultural sector

The agricultural sector is highly complex due to its multi-layered production chain. Therefore, it is necessary for agribusiness management professionals to be able to align the strategies between the agents involved to obtain better results in the face of changes, arising from a diversity of activities, mindsets, and technologies [54].

The agricultural sector can be defined as the sum of operations for the production, distribution, and storage of agricultural inputs [54, 55]. This set includes all financial services, transportation, marketing, insurance, and exchange of goods, among others, with operations acting as links in the chains that have become increasingly complex with the modernisation of agriculture. On top of that, more services outside the farm have been added, including suppliers of goods and services for agriculture, rural producers, processors, transformers, and distributors and all those involved in the generation and flow of products of agricultural origin until reaching the final consumer [55, 56]. In this context, the main sectors of agribusiness are suppliers of inputs and production goods, agricultural production itself, processing and transformation, distribution and consumption, support services, and information technology [55].

Innovation in the agricultural sector is seen as essential, both in terms of sustainability and productivity. Regions that manage to achieve high levels of agricultural production are those that have incorporated new technologies, and thereby, become more efficient and enjoy the desired economic growth [57]. In this sense, agribusiness is not a prohibitive aspect for the existence of organisational innovation [58], but rather a sector that has the use of science and innovative technologies as fundamentals aspects of the sustainable development of its activities [56].

Zhai et al. [55] highlight agribusiness as an area of the economy that has experienced radical change through digital transformation, incorporating innovations such as sensors, drones, robots, machine learning, and the Internet of Things. The change transformation with new technologies, digitalisation, and new mindsets can serve as a basis for the adoption of concepts such as the circular economy in agriculture, a sector, which must deal with population growth and the strain this causes on natural resources [59].

Methodology

To ensure evidence-based, unbiased management of knowledge [60], a systematic literature review (SLR) has been conducted. A SLR is defined as 'a form of secondary study that uses a well-defined methodology to identify, analyse and interpret all available evidence related to a specific question in a way that is unbiased and repeatable' [61]. The searches were conducted in the databases Scopus and Web of Science, using the parameters 'search for title', 'publications in English', and 'only articles and reviews'. The objective of the SLR was to identify the connection between the barriers towards a CE and the common errors within CM. The string was created by combining the constructs with Boolean operators: *(('Circ* Econ*' OR 'Circ* Model' OR 'Sustain* Econ*' OR 'closed loop' OR 'Green Econ*' OR 'Industr* Ecolog*' OR 'resource eff*') AND ('barr*' OR 'challeng*' OR 'imped*' OR 'err*' OR 'problem*' OR 'Issue' OR 'Obstac*' OR 'Limit*' OR 'Fail*' OR 'Mistake' OR 'Hinder*' OR 'Obstruc*' OR 'Deficienc*') AND ('change manag*' OR 'manag* of change' OR 'organis* change' OR 'lean manag*' OR 'green manag*' OR 'organis* behaviour' or 'organis* culture' OR 'reorganis*'))*. The inclusion of the key words 'agriculture' OR 'agricultural sector' greatly limited the number of publications, showing that the combined use of CE and CM in an agricultural context is new and innovative. Due to the main objective of this article is to identify how CM can influence a successful transition to CE, it was decided to conduct the search using the constructs that brought a more significant number of publications. However, given the importance of the agricultural sector to the global economy (and to sustainability as a whole), it was decided that the opportunities of application of this framework in the agricultural sector should be included, even if not it was not in the SLR. Thus, the inclusion of agriculture was made in a qualitative way.

The initial search resulted in 175 publications in September 2019 (renewed SLR in May 2020), which were subsequently imported to the first screening (analysis of the titles, abstracts, and keywords) based on the following inclusion (I) and exclusion (E) criteria: (I) represents the relationship between the CE and CM; (I) represents the relationship between barriers and the CE; (I) represents the relationship between the errors and CM; (E) incomplete or unavailable material. After the initial screening, 132 papers were excluded from the sample. These papers contained at least one of the search keywords, but they did not directly address the inclusion criteria defined. Then, the authors read the introduction and conclusion; the complete paper was subsequently reviewed with additional snowballing, resulting in a sample of 43 publications. The final sample was systematically analysed following the principles of content analysis. According to Krippendorff [62], a content analysis makes inferences drawn from texts that are replicable and valid for a given context being studied. In this article, the focus of the content analysis is qualitative (analysis of certain analytical categories), following the three steps proposed by Bardin [63]:

1. Pre-analysis: Selection of documents based on a bibliographic review
2. Exploration of the material: Coding and aggregation of the data
3. Treatment of results: Discussion of the results observed for the research area

Through the content analysis, different types of CE barriers and CM errors were identified and classified. It also allowed the development of a correlation matrix presented in Table 1, which led to the development of the *3CE2CE* framework as shown in Fig. 2.

Results and Discussion

Barriers Towards a Circular Economy

Change comes along with obstacles, which is also applicable to the transition towards a CE. The main CE barriers can be categorised in social and cultural, economic, technical, infrastructural, political, and legal barriers. The latter three categories were not discussed in further detail because they can hardly be overcome merely through organisational change management. Infrastructural barriers comprise a lack of available and accessible technology and resources, complexity in supply chains, and a lack of recovery leakages. Political barriers are related to a lack of regulatory pressures and political interests. Legal barriers include a lack of proper standards, legal frameworks, and measurement indicators. However, most organisations are small- and medium-sized enterprises (SME) and have little power to influence infrastructural, political, and legal changes. Applied to the agricultural context, a great number of farms are classified as SMEs and are thus in a similar situation when it comes to the influence on politics and legal changes.

Social and cultural, economic, and technical barriers, on the other hand, can be directly addressed through organisational change management and are presented in greater detail in the following. The single barriers may be interrelated so that overlaps occur. In order to better present the nuances of CE when applied to the agricultural sector, this article also presents how the barriers relate to the use of CE in agriculture.

Social and cultural

a) Lack of environmental awareness Currently, awareness of CE within the public and among stakeholders is still very slim [64, 65]. Hence, the current norm of infinite resource consumption still dominates in society [1]. This applies to leaders and members of the organisation as well as to stakeholders such as investors, suppliers, and customers. Despite the fact that, in general, the public opinion has become more concerned with the environmental impact of agricultural practices, this rise in environmental concern has not resulted in a parallel growth of circular product consumption, which can explain a lack of environmental awareness in the agriculture field as a whole [66].

b) Lack of commitment In general, change only happens when there is a committed group that leads the transition. Usually, the group becomes a source of drive for the change so that the organisation's members are convinced and incentivised to join the transition [67–69], which can be tricky in a field such as agriculture, where farmers find it difficult to implement changes to their way of work [20].

c) Lack of clear vision Even if there is a clear commitment to make the change happen, it cannot be successful unless the end goal is specified and the underlying vision is clear to all stakeholders involved in the process [14]. Not only does a lack of clear vision affect the implementation of the organisational change, but it also negatively impacts the organisation's image from an outside perspective. If the organisation is not clear about its values, it will have difficulties in conveying its vision and mission in a convincing manner to customers and cooperation partners. Vanhamäki et al. [70] emphasise the need of a clear vision in order to implement a CE in an agricultural context, showing in a broad way that the success of a CE initiative depends on a clear business vision in various levels, from the farmers to the stakeholders and government.

d) Lack of communication Many change efforts have failed because the leadership team neglected to communicate the change adequately to members and stakeholders of the organisation, leading to misunderstandings, distrust, dissatisfaction, and eventually failure of the process [52]. This holds true to the context of agriculture, where changes that can increase sustainability partially depend on the success of communication between farmers and stakeholders [71, 72].

e) Lack of cooperation Within an organisation, cooperation is needed across all organisational levels and departments. Apart from cooperation within the CM team, studies have revealed that participation in a change process raises a sense of commitment within individual members of an organisation [15]. However, many leaders still do not adhere to this principle, for which resistance to change as an internal obstacle is likely inevitable. Moreover, there is a need for cooperation between different organisations and stakeholders [69]. Nowadays, many industries are fragmented, which severely affects the integrity of the whole CE concept. Therefore, it is important that different players both within and across industries join forces for a successful transition. Similarly, in order to reach sustainable production in the agricultural field, it is necessary to incorporate sustainable practices into agro-industrial systems, which can be done through cooperatives and cooperation programmes [73]. In the agricultural scenario, there is an emphasis on the importance that cooperatives have to increase profits and sustainability in small- and medium-sized farms, which on the surface gives the impression that the agricultural field is better at cooperation. However, farmers have found the formalisation of cooperation to be challenging, just as they experienced difficulties in cooperation with consumers and institutions [74]. Thus, alike in an industrial context, in agriculture, the need of different players to work together for a successful transition remains.

f) Lack of demand and consumer resilience There is a lack of demand among consumers due to the traditional ownership culture, the unwillingness to purchase reused/recycled products, higher costs of circular products, and lack of environmental awareness. This leads to financial constraints on an organisation which strives to sell CE-compatible products, resulting in a lack of economic incentives to undergo the change process towards a CE. The same is true for the agricultural sector, where the circular product consumption has not increased in the same way that the public opinion on circular products appears to have [66].

Economic

a) Lack of economic incentives Usually, circular products are not as cost-competitive compared to 'traditional' products. Thus, most customers do not buy circular products, causing decreased

economic incentives for organisations to offer such products [1, 67]. Adopting circular business models usually promises more long-term benefits rather than short-term profits. Commonly, the most efficient changes are driven by high short-term outputs because they are more rewarding and motivating [14, 69]. Similarly, the lack of economic incentives is a main hindrance towards a CE in the agricultural sector as circular products are yet to be as competitive as traditional ones [75, 76].

b) Lack of financial resources Most organisations lack access to financial resources [14, 64, 65, 77]. The expenses that organisations cannot afford consist of research and innovation, the acquisition and integration of new technology, the training of staff members, major structural changes, and the education of stakeholders, which takes up high advertisement and information costs. In the agriculture sector, the lack of financial resources is also one of the main challenges to implement circular principles since both the development and use of sustainable materials imply high investment and an increase in costs [78].

c) Risk of investments Implementing the CE requires extensive financial support and the belief in the economic success of the circular business model so that organisations are willing to invest in spite of high upfront costs [14]. Overall, few stakeholders and shareholders have embraced the benefits of a CE yet. As the transformation is very large-scale and disruptive, the outcome of this change is unknown and therefore, too risky in the eyes of many economic actors. This risk results in an unwillingness to invest in the CE transition [1]. In a similar way, the high investment cost that can be involved in the implementation of CE concepts is seen as a risk factor in the agricultural sector [19].

Technical

a) Lack of knowledge and competencies Many leaders and employees do not have the knowledge of how to implement, manage, and/or operate the new technologies and incorporate the models into their customary work [65, 69]. Moreover, there is a lack of workers training for sustainable operations such as using an Environmental Management System according to the ISO 14000 and ISO 14001 [8]. For agribusinesses, many farmers deal with lack of knowledge and skills, especially in relation to the use of new technologies, which creates a need to invest in the training of people to be able to implement and use new (and existing) technologies [17].

b) Difficulties in technology integration Many kinds of technologies already exist such as the Environmental Management System or Enterprise Resource Planning, but organisations find it hard to integrate these technologies into their routine work. As for the agricultural sector, the transferring of information and the use of new technologies are seen as significant challenges to the full implementation of CE concepts [17, 79].

c) Conservative design, production, and recycling Because designing products to be CE-compatible requires much research and innovation efforts and is usually more costly than traditional alternatives, many products are not designed eco-friendly, leading to unnecessary waste and difficulties in separating the product into its components for proper recycling. Since eco-friendliness has not yet been an important factor, the cheapest and most practical design was usually chosen. Hence, few organisations choose circular production methods during production processes, which is also the case in the sectors that deal with bio-based products [80].

Common Change Management Errors

The discipline of CM involves a clear grasp of the big picture, delicate considerations, and a realistic action plan. There are many claims that most CM processes fail [81], which is also applicable to the agribusinesses [20, 82, 83]. In order to reduce the prevalence of these failures, the most common CM errors are first identified.

Since it is one of the most comprehensive articles about CM errors, Kotter's paper 'Leading the Change: Why Transformation Efforts Fail' [53] has been used as the main basis of this research and expanded with contributions of more recent works. This analysis has led to the following common CM errors in chronological order: **#1 Lack of awareness and sense of urgency**: Due to a lack of awareness and education of the CE benefits and opportunities, many organisations do not sense the urgency for change. **#2 Lack of a powerful team to guide the change**: Change requires the commitment of an influential and powerful core team of change makers, which many organisations lack. **#3 Lack of a clear vision**: Without a clear vision, changes often dissolve in incompatible and ineffective projects. **#4 Undercommunication of the vision**: An organisational transformation is a group effort of the majority. Organisations that neglect to communicate the vision will most likely fail. **#5 Not removing obstacles to the new vision**: Various obstacles might hinder changes for which these must be identified and eliminated at an early stage. **#6 Not systematically planning for short-term results**: Without short-term wins, members of the organisations might quickly stop believing in the vision. **#7 Lack of consolidation of changes**: New approaches are subject to regression for which little changes such as new employees, promotions, and projects need to be invigorated continuously. **#8 Not institutionalising the change into the corporation's culture**: Unless the change does not deeply sink into the organisation's culture, the transformation will most likely be reversed after a few years.

Correlation Matrix—CE Barriers and CM Errors

After the CE barriers and the common CM errors are identified, a possible correlation between these areas can be measured as shown in Table 1. The last two CM errors were not included since they are applicable after an organisation has gone through certain changes, which is not the matter of investigation in this study.

Table 1 Correlation between barriers towards a CE and common CE errors

	CE barriers	CM errors					
		#1	#2	#3	#4	#5	#6
Social and cultural	Lack of environmental awareness	•			•		
	Lack of commitment		•				
	Lack of cooperation		•			•	
	Lack of a clear vision and plan			•			•
	Lack of communication				•		
	Lack of demand and consumer resilience				•	•	
Economic	Lack of economic incentives	•					•
	Lack of financial resources					•	
	Lack of investments				•	•	
Technical	Lack of knowledge and competences					•	
	Difficulties in technology integration					•	
	Difficulties in design, production and recycling					•	

Going one by one through the different types of CE barriers, the reason for each correlation is given below. These theoretical correlations were established based on overlaps between CE barriers and CM errors and conclusions drawn from literature as well as real-world practices.

Social and cultural barriers

Lack of environmental awareness Due to a lack of awareness regarding environmental destruction, many invest in the current linear economy and do not regard the CE as profitable; they do not sense the urgency to accelerate the CE transition. Hence, the lack of awareness and lack of sense of urgency are closely interlinked [40, 84].

Lack of commitment In order to form a powerful team towards a CE, commitment is required [85]. As many stakeholders do not recognise the benefits of a CE or the urgency to transition yet, it is difficult for them to be committed to achieve a systemic change within and outside an organisation.

Lack of cooperation At times, organisations, both in the industrial and in the agricultural sectors, neither cooperate internally nor cooperate externally [84] so that strong guiding teams cannot be formed. As a powerful team to guide the change is dependent on strong cooperation, the CE barrier and CM error are connected. Moreover, a lack of cooperation within an organisation can lead to resistance to change because employees might not be involved in the transformation process and, therefore, refuse the change. The resistance to change is considered as an obstacle to be removed and is therefore linked to CM Error 5. If employees take initiative and work together with the top management, they can be a driving factor [86].

Lack of a clear vision and plan A lack of clear vision can be a barrier towards a CE as well as a CM error, for which they are interrelated. A clear vision is a requirement for the successful implementation of change efforts towards a CE [85] and needs to be set at the beginning before change efforts can happen. However, having a vision is only one side of the coin; the concrete implementation requires a well-considered action plan, which continuously motivates the workers. Hence, 'Lack of a clear vision and plan' was also linked to CM Error 6 (Not systematically planning for short-term results).

Lack of communication There often exists much difficulty (or neglect) in sharing and communicating the same vision to everyone involved inside as well as outside an organisation. Especially within an organisation, communication is considered to be the top priority in order to incentivise employee engagement [85]. Because undercommunication as a CM error and lacking communication as a CE barrier are overlapping topics, they are connected within the correlation matrix.

Lack of demand and consumer resilience Consumer behaviour might be exceptionally difficult to change, which requires increased communication efforts of the new vision [65, 87] as well as the removal of financial and technical obstacles to lower the overall prices of circular products.

Economic barriers

Lack of economic incentives Many organisations prefer to operate on the business-as-usual basis because new business models based on CE principles seem to not be lucrative enough [84]. Only with economic incentives to generate continuous revenue would organisations feel the sense of urgency to change their current practices. Furthermore, the CE concept often does not show short-term returns, which are essential to keep the organisation motivated through little successes and rewards.

Lack of financial resources and Lack of investments The sources of funding for circular business propositions are still limited and the upfront investment costs are high [88, 89]. These two barriers are both obstacles that need pragmatic, technical, and economic approaches to be removed and are therefore related to CM Error 5. However, the lack of investments is also sometimes related to CM Error 4 (Lack of communication) because organisations neglect to properly inform investors about the benefits of the CE, leading to lack of investments.

Technical barriers

Lack of knowledge and competences and Difficulties in technology integration and Difficulties in design, production, and recycling All the technical barriers are related to CM Error 5 (Not removing obstacles to the new vision) as they represented obstacles that can directly be removed with measures such as educational training (lack of knowledge) [64] since new practices require new skills [65], further technological development for better adaptations (Difficulties in technology integration), and redesign of processes and standards (Difficulties in design, production and recycling) [84, 88].

The 3CE2CE Framework

Due to the major disruption towards a CE, organisations must reinvent themselves and adopt realistic and effective step-by-step plans to do so. Based on the matrix of Table 1, the *3CE2CE* framework has been developed to overcome common organisational challenges towards a CE as shown in Fig. 2. The name *3CE2CE* is an abbreviation of the first action item letters (in total three times 'C' and 'E'), the similar pronunciation of '2' and 'to(wards)' and CE, which stands for circular economy. According to the six CM errors, six action steps towards the CE are needed in the initial implementation phase (remark: the second 'C' of step 2 has been omitted). This model was done in a way to have the flexibility of being applied in industrial business and agribusiness.

The barriers have been listed in the order proposed by Kotter [53]. Each set of CE barriers might reflect different 'heights of stairs', which vary from organisation to organisation. The chronology of 'stairs', however, will be similar. For each 'stair' the *3CE2CE* framework requires these action steps:

1. **Expand the mindset**: To establish a sense of urgency, the mindset of organisations has to be expanded to embrace the ecological and economic need for the transition towards a CE.

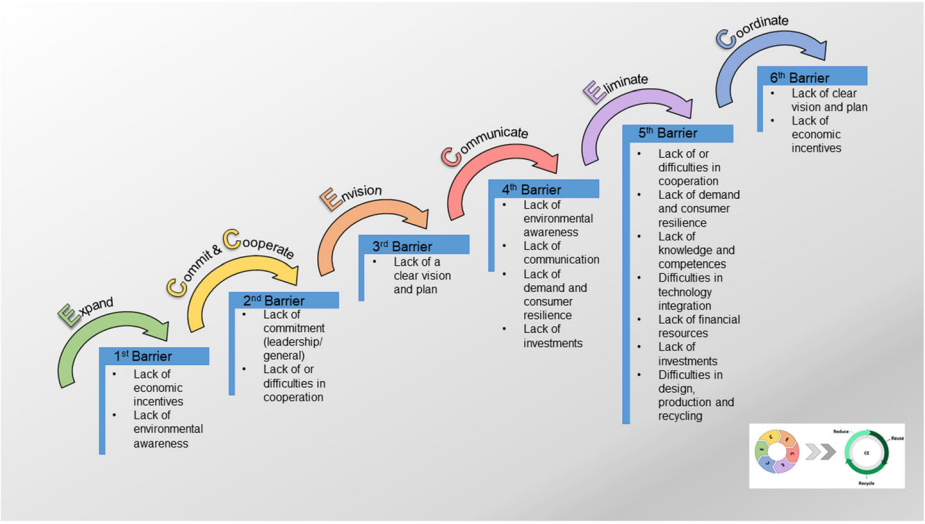

Fig. 2 The *3CE2CE* framework to overcome organisational barriers towards a CE

Apart from environmental concerns, organisations should recognise the economic opportunity that lies behind the concept of CE [90]. As the CE is a way to decouple economic growth from natural resource depletion and environmental degradation [2, 3], the win-win situation should be embraced and the need for the transition towards a CE internalised. It is important for organisations to secure their market position and financial performance for which organisations have to expand their horizon beyond near-term earnings. These considerations are especially important for the agricultural sector on different stakeholder levels. Farmers should expand their mindsets as they often resist change to a more digitised and sustainable system, which makes it difficult to translate new technologies [17] and models [18, 19] into actual value. To expand the mindset of consumers, on the other hand, well-considered marketing strategies can be helpful to, e.g., increase the acceptance of food banks (used to distribute discarded food, that are still healthy and proper for consumption), to later sell it at a discounted price, thus increasing circularity [91]. In terms of governments, another strategy would be to provide incentives to open discussions on the advantages of circular practices and disruptive technologies [92], which should foster the sense of urgency needed to transition to CE within farmers, while at the same time, increase their sense of security on these new practices and expand their mindset.

2. **Commit and cooperate**: Literature has shown that leadership commitment and strong coalitions for change are key drivers that render change efforts successful [93]. Employees need guidance from the management board to see their roles within the transformation and stay confident about the process. With proper managerial practices and support, the change is more likely to occur as resources are more likely to be allocated for this purpose. Collaborations with stakeholders, based on shared values and deep trust, are also crucial [16]. The importance and the use of concepts such as cooperation and collaboration are not new in agriculture [58, 94]. If there is deep trust and a sense of

commitment towards changing managerial practices into more circular and sustainable practices, the chances of a successful implementation of circularity in agriculture will increase. One way to increase cooperation would be to invest in blockchain technology to improve current information systems because that would increase the speed and transparency of the shared information to all actors involved in agribusiness [95].

3. **Envision**: Managers should never neglect the importance of defining a clear vision that they can easily and concisely communicate and that is attractive to stakeholders. It might take up some time to develop a clear vision but eventually, time, reasoning, and a bit of idealism will lead to the ultimate definition of the vision. After the overall vision has been defined, the detailed strategies and methods in the form of a plan should be specified, too—but not the other way around [52]. The importance of a clear vision allied with a detailed and strategic plan to implement CE is also found in the context of agriculture, with farmers having the job to not only define a clear vision of their business, but also understand that vision before communicating it to others and committing to their vision [70, 96].
4. **Communicate**: Undercommunication is one of the key roots of failures during organisational changes. All stakeholders must be regularly informed to make sure that they are aware of and eventually share the same values. For members of the organisation, change leaders must ensure room for participation and innovation. For customers, organisations must use different channels, e.g. websites, social media sites, interactive initiatives, and public participation. For stakeholders such as investors and suppliers, organisations should remember the best practice of communicating their newly defined vision honestly and frequently and ending the cooperation if their partner does not share similar visions in the long run. As stated before, collaboration is a key value in agriculture [54, 55], and a successful collaboration must begin with good and clear communication [71, 72]. Therefore, we recommend that all actors (stakeholders, agroindustries, farmers, distributors, and consumers) should communicate their specific needs. A good way to do so would be to invest in the use of information and communication technologies (ICT) and thereby, facilitate communication between the agribusiness actors.
5. **Eliminate obstacles**: While obstacles can be manifold, the main types of barriers identified were technical and economic. These can be overcome by, e.g., introducing educational training programmes to develop skills and generate knowledge. Furthermore, the social barrier 'resistance to change' can be overcome by involving employees/stakeholders in the change process, communicating with them clearly, and educating and supporting them. Educational programmes that aid farmers with the more technical and technological aspects of change [17, 54] as well as the involvement of all actors in the process of change are also effective in agribusiness to overcome challenges (both technical/technological and economic/social) that affect the acceptance of CE models in the agricultural sector.
6. **Coordinate the change**: Generating short-term wins from the change process towards a CE is indeed possible and will more likely result in continuous incentivisation of organisations to keep up with the transition. Considering this effect, careful planning and coordination of the long-term as well as short-term change process must be done. Generally, the long-term goal might remain the same; however, an emphasis on portion-wise goals is necessary to maintain the sense of urgency. To coordinate the change in agribusiness, Sents recommends the use of the 'Rollercoaster of Change', a technique that analyses the expectations of workers (in regard to the changes to be implemented) and

helps farm leaders to help their employees to accept and implement meaningful changes [96]. The 'Rollercoaster of Change' predicts the different stages of emotions during a change process and helps to guide involved stakeholders through the different 'rollercoaster' stages smoothly.

The *3CE2CE* framework assists organisations at each stage of the initial CM process to thereby not commit common CM errors and eventually overcome major CE barriers successfully. After the initial implementation phase, however, organisations should consolidate the change and anchor the new values into their corporate culture over many years. The *3CE2CE* framework is designed to be universally applicable across sectors—especially for industrial corporations and, as highlighted in the previous examples, for agribusinesses in light of the similar CE barriers and CM errors that agribusinesses face.

Conclusions and Future Research

This paper presents an overview of organisational CE barriers, common CM errors, and the correlation between both findings. Additionally, insights on how those concepts can be related to agribusiness are presented. To identify the connection between challenges within the CE and CM, a systematic literature review, snowballing, and content analysis have been conducted. Thereby, the social and cultural, economic, technical, infrastructural, political, and legal barriers towards a CE as well as common CM errors could be identified. Both areas were then combined in a matrix to illustrate parallels and correlations. Based on these results, a theoretical framework was developed that provides a step-by-step guide on how organisations can successfully undergo transformation processes towards a CE with the principles of CM. The common CM errors can be overcome with the newly developed *3CE2CE* framework, which stands for *Expand the mindset, Commit and Collaborate, Envision, Communicate, Eliminate obstacles, and Coordinate the change*. This paper was conducted purely with theoretical methods, which means the *3CE2CE* framework still needs to be empirically assessed and verified. As such, it makes sense to apply the theoretical results in case studies and interviews with experts and analyse the outcomes thereafter. First attempts were made by applying the findings to the agricultural sector, from which many parallels could be drawn. Overall, more research needs to be done at the intersection of CE and CM, especially in the field of agriculture. In addition, studying the applicability of the other CM models available in literature for the implementation of CE is an opportunity for future research. The CE has mostly been discussed from an economic and technical perspective but the social aspects of the transition towards a CE have usually been neglected. As there has not been enough academic research to analyse the organisational change process towards a CE, this topic will most likely continue to be of growing interest. Thus, research efforts at the intersection between CE and CM will remain highly relevant.

Availability of Data and Material Not applicable

Code Availability Not applicable

Author Contribution Nan-Hua Nadja Yang initiated the paper, developed the framework, and conducted the main research. Ana Caroline Bertassini served as the CE expert and Jéssica Alves Justo Mendes contributed mainly with her agribusiness expertise. Mateus Cecílio Gerolamo contributed with his CM expertise as the leader of the CM research at EESC-USP.

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Declarations

Conflict of Interest The authors declare no competing interests.

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