Circular Economy Production Policies and the Impact on Labour Market

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Abstract: The paper focuses on the rising importance of circular economy practices and policies, especially in the production behaviour and the impacts of such policies on the labour market. Currently, there is a rising debate regarding whether the incorporation of circular economy production policies creates jobs or causes unemployment. This debate has been addressed in this paper, based on information collected from literature as well as from surveying different employees, from extractive and construction industries. From the insights developed in this paper, the circular economy production policies are having mixed impacts on the labour markets. While the jobs in the extractive, construction, transport, warehousing and other labour-intensive non-renewable energy and plastic industries are facing increase threats of redundancy of jobs and job loss due to fall in the demand, there are also considerable prospects of new job creation in different industries and business operations in the current period. Recommendations to address the negative impacts of the circular economy production policies have also been discussed in this article.

Keywords: Circular economy, circular economy production policies, construction industry labour demand, circular economy and unemployment, circular economy, extractive industries, job creation and sustainability in production.

INTRODUCTION

In the current era, the global economy, civilization, and environment experience several crucial issues of concern. Amongst the several concerns, issues like wastage, environmental degradation, pollution, global warming, and issues related to the depletion of natural resources have become immense priorities to be addressed. These issues have aggravated over the years, mainly due to the non-sustainable consumption and uneven production trends across the globe to satiate the never-ending demands of the human population (Sillanpaa and Ncibi, 2019). Over the decades, industrial activities across the globe have increased substantially, contributing to the economic development and trading activities of different countries to facilitate job creation, infrastructure development, and other conveniences for the global human population. However, all of these have been accrued to the global human population, mainly at the cost of severe environmental degradation and natural resource depletion. This has led to a substantial increase in global attention to focus on sustainability and responsible production and consumption activities of different businesses, industries, and the global population in general. As observed by Valko (2018), different international organizations, like the United Nations and others, are trying to adapt to the changing needs and sustainable practices.

However, with the rising awareness across the globe regarding these issues, the importance of sustainability in every aspect of life is being increasingly felt. This has, in turn, led to rising focus and initiatives across the globe and in different industries to embrace the elements of circular economy, especially in production operations. These elements of circular economy primarily include reduction of wastage, more recycling and reuse practices, agile and sustainable supply chain and distribution operations and usage of sophisticated technologies and innovations to facilitate the incorporation of sustainable practices in all the aspects of the operational framework of the businesses (Valko, 2018). With the increasing incorporation of the elements of circular economy activities and practices in different industries, there are visible impacts on the labour markets. This has ignited considerable debates regarding the nature of the impacts of CE (Circular Economy) production policies on the labour markets. These debates have been addressed in the concerned article, thereby developing recommendations for policy directions in this domain. The article has tried to specifically focus on the impacts of the CE production policies on the labour markets for the extractive industries and the construction industry, given the labour-intensive nature of these industries. Such industries currently face low demands for their products and thereby lower demands for labour due to the incorporation of CE policies like recycling, waste minimisation, and a shift towards sustainable products and operations. The article is based on an extensive assessment of previous research studies, existing evidence and the findings of a survey conducted with the workers in the extractive industry and construction businesses in Australia in the current period.

BACKGROUND FOR THE STUDY

The constant degradation of the global environment and depletion of natural resources have had negative impacts on the current and future generations. This has emphasised the importance of sustainable practices in every aspect of human lives.

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Fig. (1). Sustainable development Goals by United Nations.
(Source: Pedersen, 2018)

Considering these, the United Nations in 2025, had developed 17 Sustainable Development Goals which are interconnected and comprehensive objectives to be attained for ensuring global peace and prosperity and welfare for the people and the planet in the coming years (Pedersen, 2018). These 17 SDGs can be shown as above:

As evident from the above figure, the SDGs encompass a strong interconnection of environmental, economic, and social aspects for sustainability across the globe. These ambitious goals cannot be achieved without collaborative efforts and different initiatives. One initiative that has shown substantial promise to achieve these SDGs is the concept of ***Circular Economy***. With the efficient implementation of the CE practices, different SDGs, including SDG 7 (Clean Energy), SDG 8 (Economic growth and decent work), SDG 12 (Sustainable production and consumption) and others, are expected to be achieved within the scheduled timeline (Sharma et al., 2021). With the rising importance of the circular economy concept and its manifestation, different consumption and production policies are being developed across regions in alignment with the principles of CE. These policies are expected to have considerable positive impacts on the global environment and population in the long run, but there are several short-term issues around these policies which should be tackled effectively (Geng, Sarkis and Bleischwitz, 2019). One such issue is the mixed impact of the CE policies on the labour market, especially across different industries and businesses, that must be addressed to ensure positive impacts of the CE policies for all sections of the population across the globe. These issues have been addressed in the concerned article.

INSIGHTS OBTAINED FROM PREVIOUS STUDIES AND EXISTING EVIDENCE

There have been extensive studies on the importance of the circular economy, the CE consumption and production policies, especially the CE production policies in different. Sectors and their impacts on different aspects like environmental, social, and environmental scenarios of global businesses. The existing knowledge in this domain, to some extent, also discusses and addresses the debate regarding the positive or negative impacts of the CE production policies on the labour market. These valuable insights from the previous studies areput forward in this section of the article.

Circular Economy: Concept, Definition, and Increasing Importance

Conventionally, the circular economy can be defined as the production and consumption practices that utilize most of the resources through the involvement of sharing, reusing, leasing, recycling, refurbishing and through efficient disposal of wastes after ensuring minimization of waste creation. The difference between the traditional linear economy and circular economy practices can be explained with the help of the following figure:

As evident from the figure above, while the linear economy is based on the "take-make-waste" model of production, the circular economy practices are inclined towards utilization of resources by recycling and reusing them to preserve their values as much as possible. This less wasteful economic model is thus, considerably important in all kinds of production and business models, especially in the current period, where the world is not only facing an environmental crisis but also a substantial resource crisis (Geng, Sarkis and Bleischwitz, 2019).

Development of CE Production Policies in Different Sectors

As evident from the existing literary works and databases, with the increasing importance of CE, different CE strategies and especially CE production strategies are being developed and incorporated in different sectors across the globe. These strategies can be classified under the following broad functional groups, the functions being mostly part of the

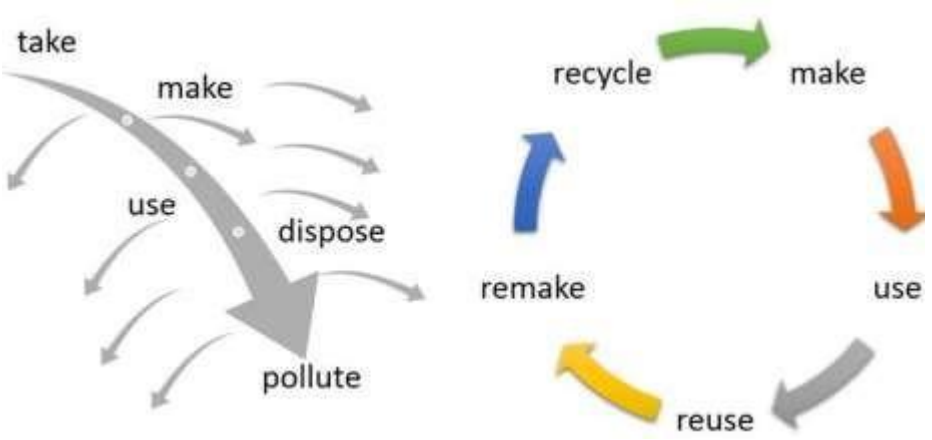

Fig. (2). Differences between linear economy and circular economy. (Source: Sharma et al., 2021)**.**

operational processes and value chains of businesses in different sectors:

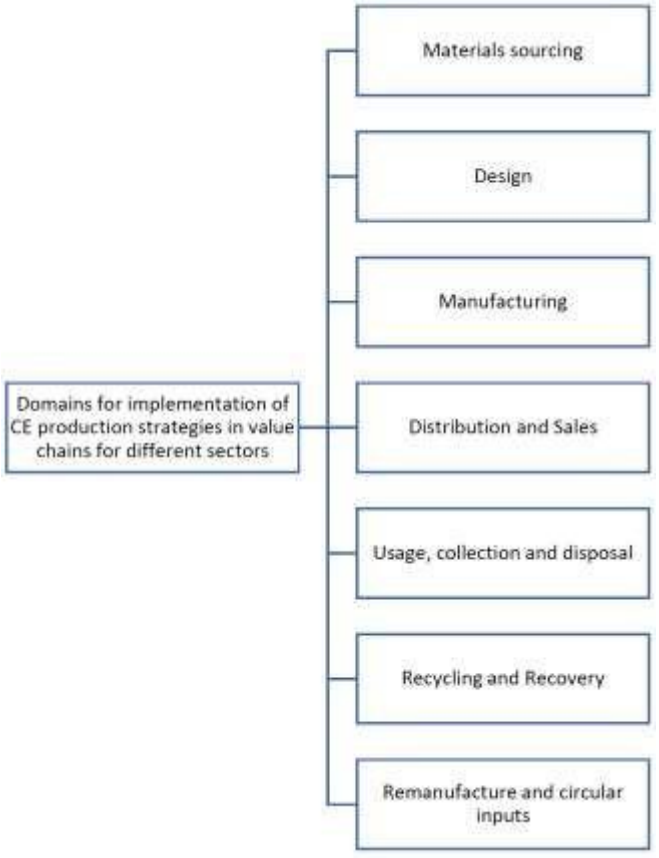

Fig. (3). Areas of the sectoral value chains where CE production policies are being developed and implemented
(Source: Kalmykova, Sadagopan and Rosado, 2018).

As highlighted in the above figure, there is rising importance of incorporation of elements of circular economy in all these components of the value chain of different sectors. Due to this, different types of CE policies are being incorporated in the production operations and value chains of different sectors. The most prominent CE production policies in this context are the following:

- ***Green procurement-*** Different businesses in the public and private sectors are trying to procure goods and materials that have the same functions in their production process but with lower environmental and mental impacts.
- ***Life Cycle Assessment-*** Many businesses are conducting LCA for assess the environmental and health impacts as well as the contribution to resource depletion issues by their products and services (Hartley, van Santen and Kirchherr, 2020).
- ***Material substitution-*** This is a common CE production policy especially incorporated in sectors like manufacturing and construction in the present period, where the usual raw materials are being substituted by more renewable and less environmentally harmful and more sustainable materials.
- ***Tax credits and subsidies-*** The governments of different countries are providing different incentives to industries to incorporate CE production policies which include reduction of tax on green and renewable resources like bio-based materials and products, thereby reducing their usage and demand for conventional and polluting materials (Heshmati, 2017).
- ***Just-in-time production and agile supply chain-*** Businesses are also reducing their inventories and moving towards JIT Production to reduce wastage and incorporate recycling and reusage of their materials and production methods thereby incorporating CE in their production operations (Zhu et al., 2019).
- ***Energy efficiency-*** This is one of the primary CE production policies where businesses are trying to reduce their energy consumption while keeping their production and service provision at the same level, mostly through usage of clean and renewable energy sources.
- ***Redistribution and reselling-*** These policies are also gaining increasing importance, both in the production and consumption scenario, thereby leading to more extensive usage of products and thereby

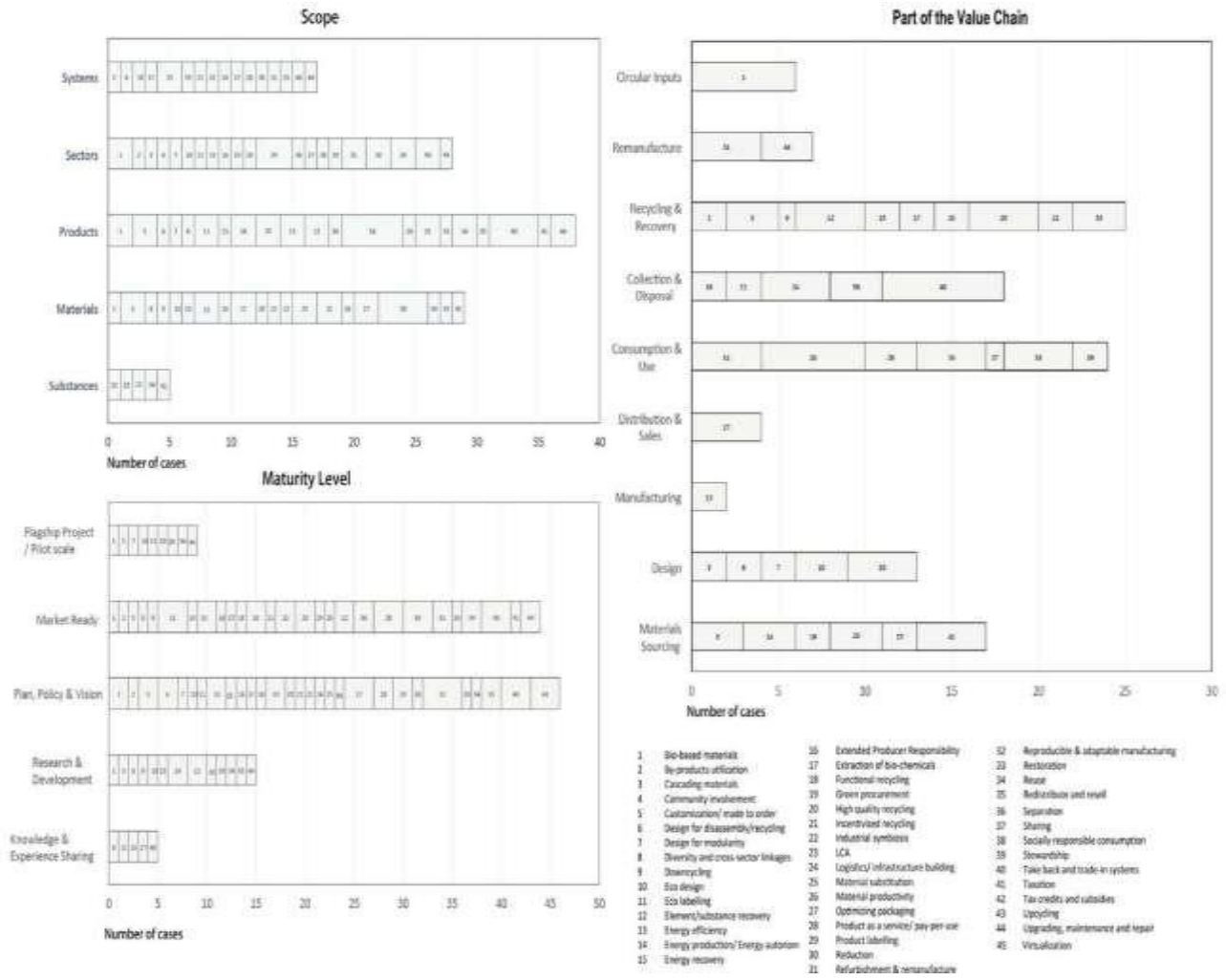

Fig. (4). Different CE production policy implementation scenario. (Source: Kalmykova, Sadagopan and Rosado, 2018).

leading to lower needs for production of new commodities.

- ***Incentivised recycling and by-product usage-*** Businesses in different sectors are not only recycling their materials, equipment and tools for production and service provision, but the governments across the countries are also incentivising recycling for both the businesses and the consumer population, thereby also leading to the need for less commodity production and more sustainable business operations (Heshmati, 2017). Additionally, earlier the by-products of manufacturing operations, which were used to be discarded, are now being used in their relevant domain of functionality thereby reducing wastage and demands for raw materials to a considerable extent in different industries.
- ***Extended Producer Responsibility-*** The producers in several industries are now required to extend their responsibilities in the post-consumption stages of the life cycle of the products to make the products sustainable, durable and less waste-creating on the part of the producers.
- ***Green infrastructure building-*** Other businesses, especially construction businesses, are focusing on developing green buildings that are sustainable and self-sufficient in terms of energy consumption. - manufacturing businesses are also changing their procurement, production packaging and distribution processes and energy consumption by investing in the development of green infrastructures (Zhu et al., 2019).
- ***Upcycling and industrial symbiosis-*** Materials are being converted to high-quality materials for more functionality, and they consequently demand less from the suppliers the CE production policy of industrial symbiosis is facilitating the sharing and exchanging of resources and services across businesses and industries.

In short, the circular economy production policies implementation scene in terms of scope, maturity level, and parts of the value chain of businesses in different sectors can be shown with the help of the following Fig. (**4**):

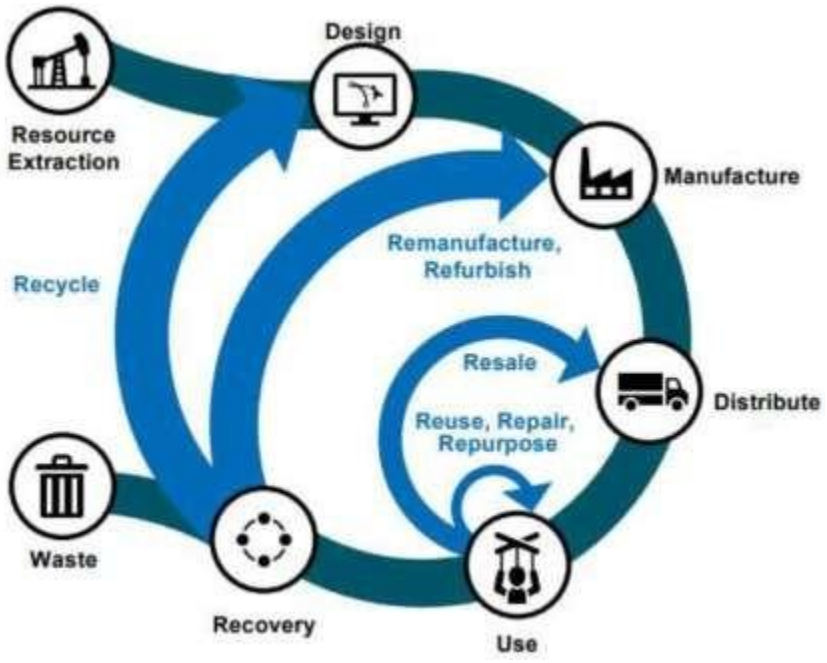

Fig. (5). Effects of incorporation of CE practices on resource usage. (Source: Agarwal, 2023).

The above figure makes it evident that in the current period and in future, there is a high potential for implementing CE production policies in different segments of operations and value chains of various businesses and industries across the globe.

Impacts of the CE Production Policies on the Labour Markets: Variations in Impacts

With the rising implementation of CE production policies of different types, its impacts are also becoming evident in the global business environment, and the impacts are mostly positive, especially when the long run social, environmental, economic, and overall welfare of the world is taken into consideration. However, there are considerable implications for the incorporation of different types of circular economy production policies on the labour markets across the globe. While these policies threaten some jobs and skills in certain sectors, they also showcase a general shift towards circular economy as different businesses are also creating new job prospects in different sectors and domains of operations (Laubinger, Lanzi and Chateau, 2020). Thus, it is crucial to study the mixed impacts of the CE production policies on the labour markets and especially the sectors experiencing positive and negative impacts. These aspects have been discussed in this section of the concerned article while considering the existing assertions and studies.

Negative Impacts and Industries at Risk

The incorporation of CE production practices in different industries, especially in different types of extractive industries, implies the reduction in the demand for raw materials to a considerable extent. This can be mostly attributed to the fact that with the involvement of the CE practices, the production process will involve more of reusing, refurbishing, and recycling of resources, which are the basic elements of the circular economy (Aguilar-Hernandez, Rodrigues, and Tukker, 2021). This can be shown in Fig. (**5**).

As evident from the figure and from the above discussion of the different CE production policies that are being implemented in various segments of operations and value chainsof different businesses, there is considerable fall in the demand for conventional raw materials and resources within various sectors. For instance, the shift towards green products and substitution of conventional raw materials of green, durable, and less-polluting materials is leading to the fall in the demand for the previously used materials and resources, thereby negatively impacting those businesses and industries which provide raw materials to different business-es (Laubinger, Lanzi and Chateau, 2020).

On the other hand, different businesses are also trying to incorporate the just-in-time approach for production and distribution of products to match supply and demand. This will in turn reduces the need to maintain high volumes of inventory and storage, thereby reducing the demands for storage facilities and people working in this domain. Additionally, recycling, reuse and industrial symbiosis collectively lead to sharing and exchanging of resources. This results in loss of demand for the usual volumes of materials and resources needed in different industries. This also causes fall in demand for labours especially in industries that provide raw materials to other businesses (Drakulevski and Boskov, 2019). Meanwhile, there is a visible trend of reduction in usage of non-renewable energy and fossil fuels, with the emphasis of the CE policies of businesses to use clean and green energy. This suggests that the demand for the fossil fuels, and such energy is also falling, thereby creating threats for human resources who work in such fossil fuel extraction and energy production facilities. Thus, the demand for la- bourse for extracting these resources or for manufacturing operations are also expected to fall to a considerable extent

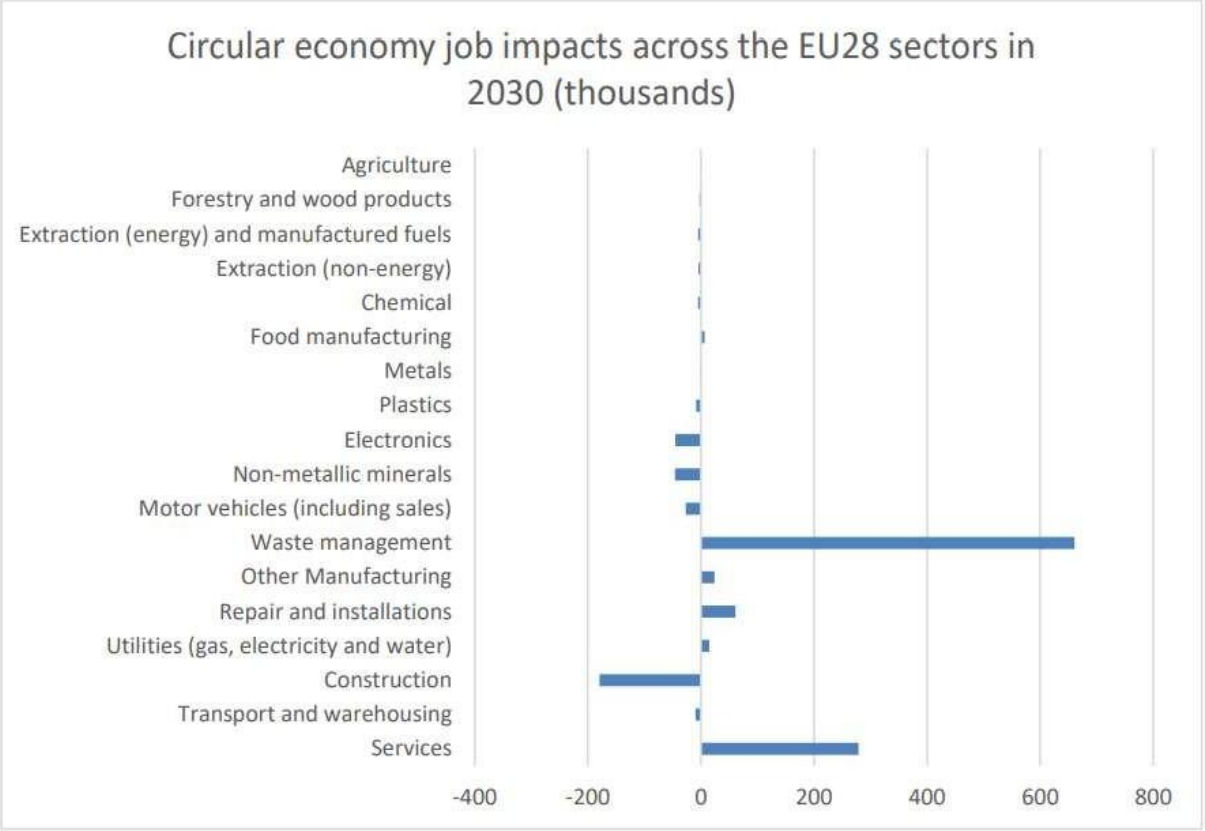

Fig. (6). Job loss and job creation in different sectors in the EU due to circular economy production policies. (Source: Econometrics, 2018).

with the fall in demand for resources and raw materials, especially in the future years. This leads towards a negative impact on certain sections of the labour market (Horbach, Rennings and Sommerfeld, 2015).

However, the impacts of development and implementation of the CE production policies are not same or uniform across labour market. The effects are more detrimental on the businesses that are linked to the production of raw materials, and provision of services that were previously required by businesses but are now being replaced by greener and sustainable options due to the implementation of the CE production policies. For example, taking the case of European Union, the impacts of circular economy policies on sector-wise job loss and job creation can be shown with the help of the following Fig. (**6**).

The above figure highlights that with the implementation of the CE production policies there is considerable loss of jobs in the construction sector as well as in industries dealing with plastics, electronics, non-metallic mineral and other material extraction processes and transport and warehousing operations (Siderius and Zink, 2022). On the other hand, the jobs in mining industries that extract minerals, iron ore, oil, coal, and other raw materials for energy generation have been affected adversely due to the increasing implementation of the circular economy production policies in different segments operations, production, and value chain of these businesses (IISD, 2020). These sectors are considerably labor-intensive sectors and most of the workers in these sectors have subsistence skills and knowledge to upgrade themselves for more sophisticated and complicated roles created with the implementation of the sustainable practices in business operations in the circular economy. There is also increasing emphasis on incorporation of technologies and innovations for reducing wastage, improving production processes and for ensuring circular economy practices. However, labour population is not being able to incorporate such practices in their operations due to the lack of knowledge or expertise in this domain (Burger et al., 2019). Thus, from this evidence, it can be highlighted that the incorporation of the circular economy production policies in various businesses and industries is causing adverse impacts on job creation and employment in different sectors, thereby havingnegative implications for certain sections of the labour markets.

Positive Impacts and Prospective Sectors

The incorporation of CE production policies is also expected to increase labour demand in certain sectors or operations, like waste management operations in different industries. This is evident from Figure 5 above, which shows that the emphasis on circular economy and, thereby, the development of circular economy production policies and their implementations are leading to new types of job creation and the development of new industries across the globe. There is a substantial rise in the demand for labourers with waste management skills, with almost all types of businesses requiring waste minimisation in their supply chain and production operations (Econometrics, 2018). On the other hand, with the

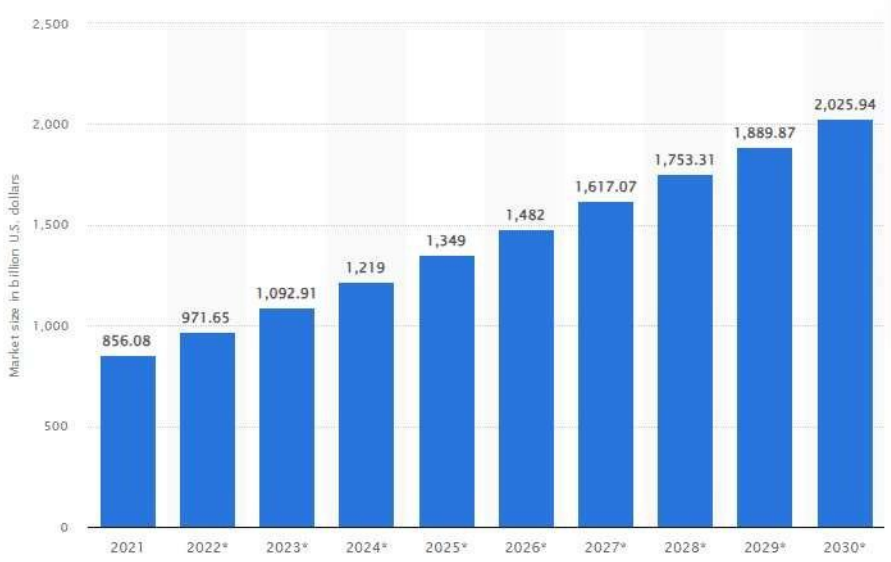

Fig. (7). Increasing market size for renewable energy across the globe and potential increase till 2030.

(Source: Statista, 2023).

major shifts of businesses towards green energy, there is also visible growth in the renewable energy market across the globe, which can be shown (Fig. **7**).

The above figure makes it evident that with the rising demands for renewable and green energy across the globe and in different industries, there are also rising employment scopes in this industry, especially for people with skills, knowledge and expertise in the domain of green energy production and management. There are also increasing numbers of recycling centres as well as training facilities and different upcycling brands and companies developing innovative technologies for recycling, reuse, reverse logistics and other circular economy practices. This reflects that different CE practices are coming into existence in the worldwide. These new businesses and industries require trained and expert workers to handle the new types of job roles, thereby creating employment in these sectors (More-no-Mondejar, Triguero and Cuerva, 2021). The excess demand and limited supply of workers with the requisite knowledge in these domains of operations are also leading to an increase in prospects and monetary benefits for those suitable for such jobs in the labour market.

On the other hand, the existing businesses in construction industries, different types of manufacturing industries and other businesses are trying to incorporate the CE production policies and sustainable operations in their value chain, for which they require people with relevant skills. This also creat job prospects for the workers with skills relevant and aligned to the CE production policies in these industries (Plastic Expert, 2023). As per the above discussion, it can be asserted that the impacts of the CE production policies in different industries are heterogeneous on the global labour market. While some sectors, industries and job roles are becoming redundant due to a lack of demand, thereby leading to loss of prospects for some sections of the workers in the labour market, the CE production policy implementations are also leading to job growth in some industries. There is also a creation of new job roles and skill requirements to incorporate circular economy practices in businesses successfully, and there is the creation of high demand and prospects for those sections in the global labour market who have the requisite skill, knowledge, and experience (Horbach, Rennings and Sommerfeld, 2015).

Findings from the Survey

As evident from the above discussion highlights the insights from previous studies and pieces of evidence, the CE production policies have mixed impacts on the labour market. However, the previous studies also reveal that the impacts are mostly adverse for industries like the construction industry, warehousing and transport, extractive industries for non- renewable fuels and minerals and those industries that pro-raw materials for manufacturing purposes of different other industries focusing on the production of end products. The findings also reveal considerable threats to the jobs of mostly subsistence workers with limited skills in such industries (Mukherjee, 2019). To develop stronger insights in this domain, the article has included primary research including workers in Australia and their opinions about the CE production policies and its impacts on the labour market.

Methods Used for Data Collection and Analysis

The research has been conducted especially with the help of information collected from primary sources, consisting of people working in such industries, the concerned article has included the results of a survey that had been conducted with 60 respondents currently working in different industries vulnerable to job losses due to CE production policies, in

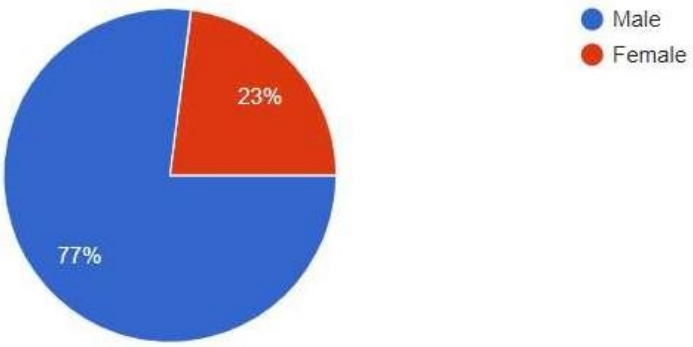

Fig. (8). Gender distribution of the study sample.

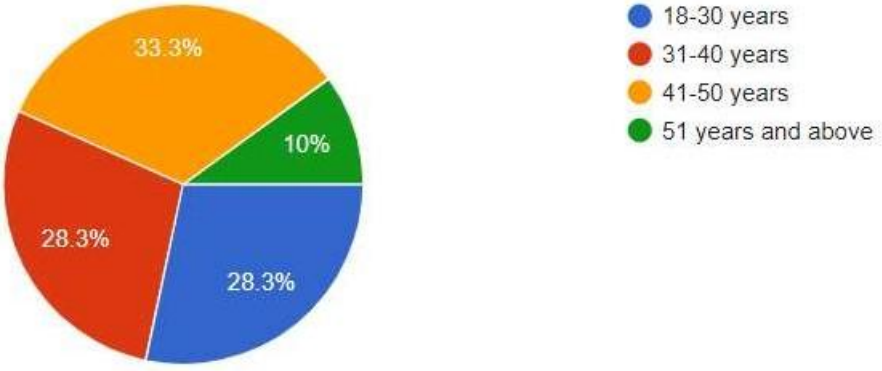

Fig. (9). Age distribution of the study respondents.

Australia. The respondents have been selected with the help of purposive sampling, mainly focusing on construction industry, storage and transport industry, extractive industries of different kinds, plastic production industry and others (Bairagi and Munot, 2019). Their perceptions towards the impactsof the CE production policies on their job securities and regarding the prospects of job creation and training and supports required by them to sustain the changes have been collected with the help of the survey conducted with them. A structured questionnaire with close-ended questions has beenused and the surveys have been conducted only after obtaining informed consents from the selected study respondents (Patel and Patel, 2019). The perceptions have been recorded using the Five-Point Likert Scale where the numbers have the following meanings:

Table 1. Five-Point Likert Scale.

1	Strongly Disagree
2	Disagree
3	Neither Agree nor Disagree
4	Agree
5	Strongly Agree

The perceptions of these respondents have been highlighted in the following section using relevant visual representations. Apart from this, statistical analysis has also been conducted to assess whether there is significant impact of the implementation of the CE production policies on the labour market, especially for these particularly vulnerable industries. The findings from the survey have been discussed in the following section of the article.

DISCUSSIONS OF THE OUTCOMES OF THE STUDY

Demographics of the Respondents

As evident from the following figure, the sample of respondents selected for this study has been considerably biased towards male population although the bias was unintentional, indicating the major presence of male workforce in the considered industries:

The respondents are also found to be belonging to different age groups as evident from the following figure:

As evident from the above figure, 33.3% of the study participants belong to the age group of 41-50 years, while another 28.3% belong to 31-40 years of age and 28.3% belong to the age group of 18-30 years indicating towards the fact that people from all age groups in the labour market have been considered in this study. The article has also considered workers from different industries, particularly those vulnerable to job losses due to the CE production policy implementation in the current period, as shown in the following figure:

Perceptions of the respondents regarding impacts of CE production policies on labour market

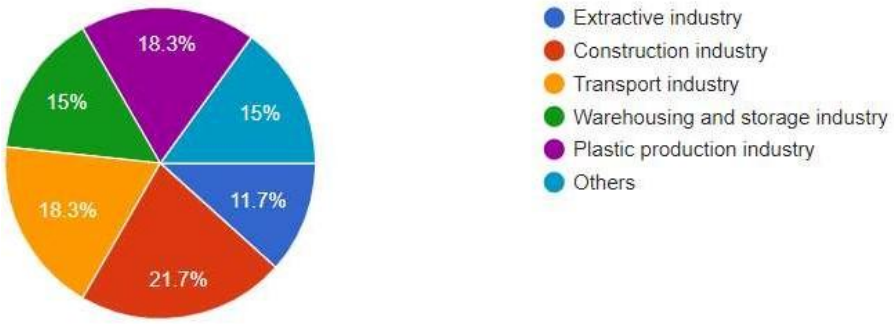

Fig. (10). Respondents from different industries.

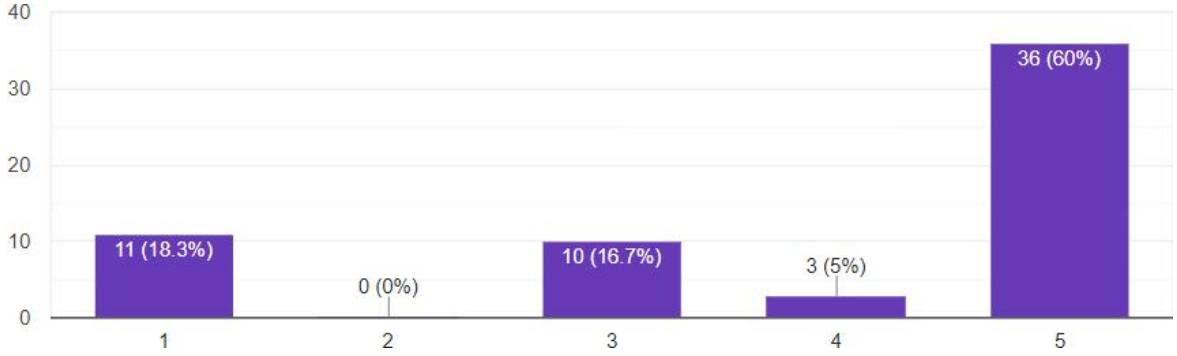

Fig. (11). Perceptions regarding the rising efforts for implementation of CE production policies and sustainability initiatives.

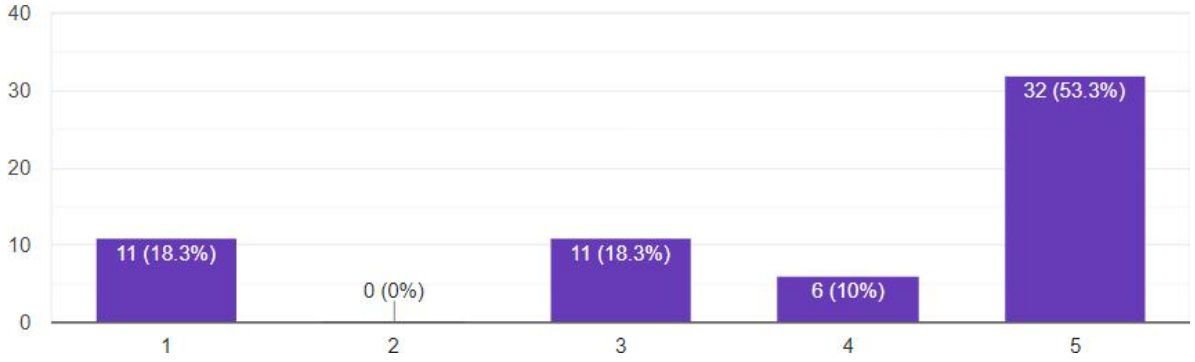

Fig. (12). Perceptions regarding the impacts of the CE production policies on demands in their industries.

The study participants have been asked about their perceptions regarding the extent of incorporation of CE policies and sustainability initiatives in different industries and the impacts of the same on the demands for the products and services of the industries where they work, and thereby on their job securities. They were asked about the areas of job creation due to CE production policies and the types of skills and supports needed to adapt to such changes. The information obtained from them has been discussed and presented in this section of the concerned article. Most of the workers were found to have knowledge about the increasing implementation of circular economy production policies and sustainability initiatives and practices across different industries in the current period as evident from the following figure:

More than 60% of the workers participating in this study have agreed to the rising efforts of incorporation of circular economy practices in the contemporary business and industrial environment. The above figure highlights the presence of knowledge among the workers in the contemporary labour market of the country, regarding the increasing relevance of CE production policies and their implementation in different business operations and value chain across the globe. When asked about the impacts of such policies on the demand for the products and services which their industries offer, the following responses were obtained:

According to majority (63%) of the study participants, the increasing incorporation of the CE policies in different industries is adversely affecting the demand for the products and services which they produce. This indicates the overall loss of relevance of the businesses where they work in the current period. However, 18% of the respondents do not support this view, highlighting that the demands for their

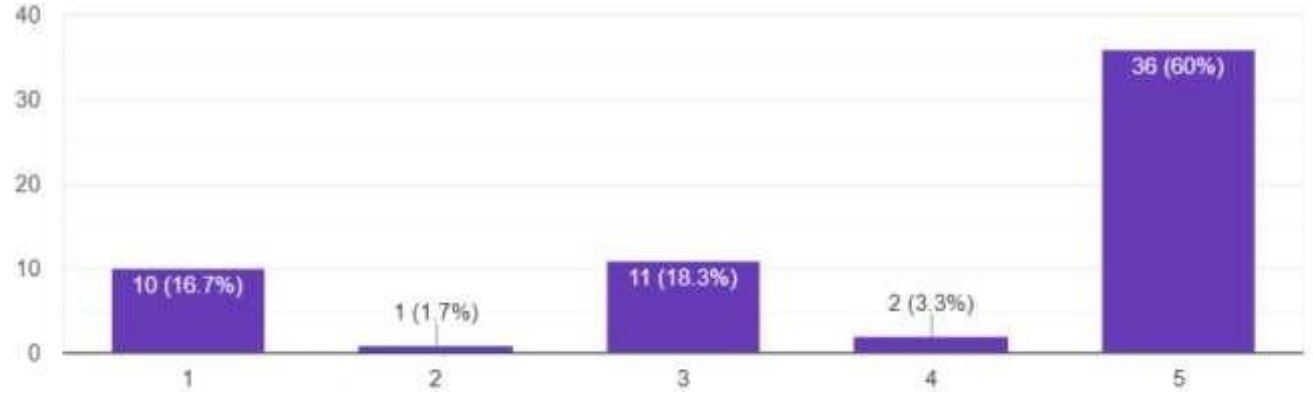

Fig. (13). Increased threats of job loss due to fall in demand in the industries due to CE production policies.

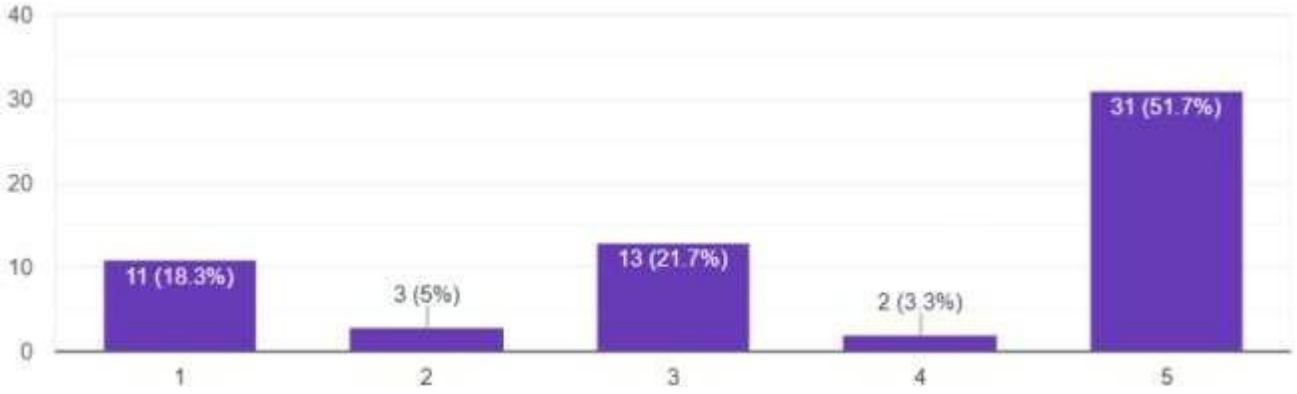

Fig. (14). Perceptions regarding creation of new job prospects due to implementation of the CE production policies.

services and products have not been affected by the shift towards the circular economy.

The primary purpose of the article has been of assessing the impacts of the CE production policies on the labour market, and especially on the job losses and job creations. The impacts of the CE policies on the threats of job redundancy in the above-mentioned vulnerable industries especially as per the perceptions of the workers in these industries, can be shown in (Fig. **13**):

As evident from the above figure, more than 63% of the workers in industries like construction, warehousing, extractive, transport, plastic industries and similar industries perceptive that with the increased incorporation of the CE pro- duction policies and shift towards sustainability in various industries, the threats on their job securities are increasing and much of this is attributed to the fall in demand for the products and services which their industries or current employers offer, especially to other industries and businesses. While 18% could not provide any conclusive view in this domain, approximately 17% did not find the implementation of such policies threatening the labour market or their jobs in the current scenario. This, in turn, highlights the presence of some negative impacts of the CE production policies on certain sections of the labour market, at least in the short run. However, there are also some positive impacts of these policies and new sustainability initiatives on the labour markets, as per the perceptions of these workers, which have been put forward in the following in (Fig. **14**):

As per the majority (55%) of the workers participating in this study, there are opening of new employment scopes and job roles and prospects in different industries and in new industries that are being formed due to the rising needs for the businesses to be sustainable and to align their operations with the circular economy practices. However, this view is not supported by a non-negligible 23% of the workers who do not believe that there are prospects for new job creations due to the circular economy policy implementations in the different industries in the current period. There are also considerable confusions and ambiguities as well as lack of knowledge among a visible section of the workers (21.7%) who could not provide definite perceptions regarding whether the CE production policies are creating job prospects or not, in the current period. The perceptions of the workersalsoseemed to vary considerably when asked about the typesof jobs that are being created or are in demand due to the increasing adoption of circular economy practices by businesses in different industries. This can be shown with the help of the (Fig. **15**):

According to the survey findings, the most prominent job roles that are being created and are in demand in different industries include different of recycling and remanufacturing jobs can be attributed to the increasing demand for recycling services by different businesses and the creation of increasing number of recycling centres and facilities in the current period. There is also rising demand for workers having experience in sustainable supply chain and

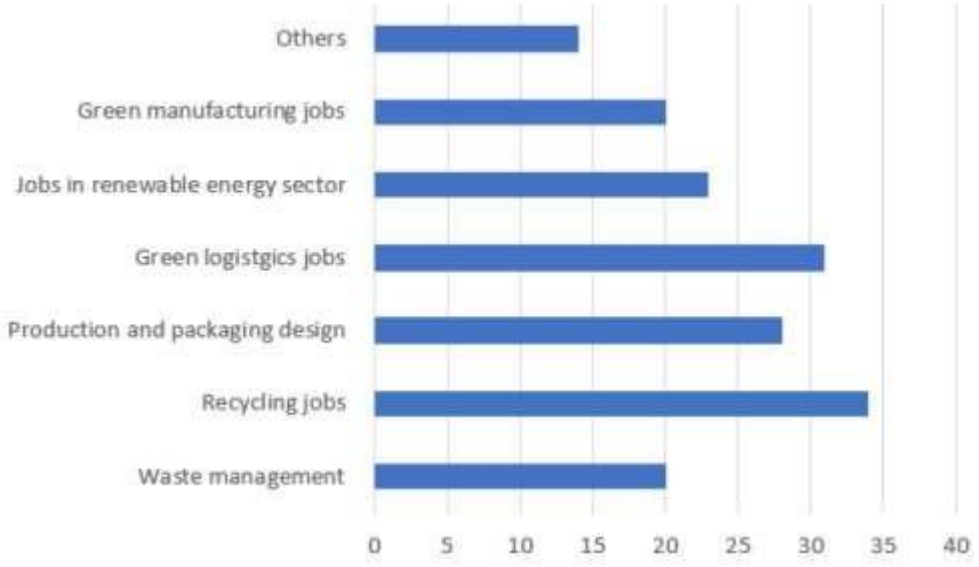

Fig. (15). Types of jobs created due to the implementation of the circular economy production policies.

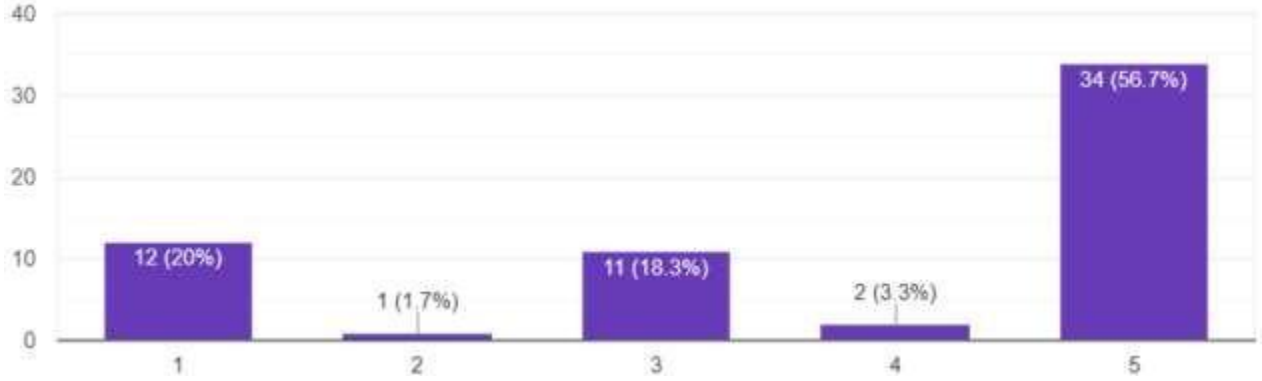

Fig. (16). Need for skill development to adapt to the changing business environment.

green logistics operations and those working in sustainable production and packaging design. This can be attributed to the fact that the businesses are trying to change their packaging and distribution operations towards a more sustainable and waste-minimised framework, in the current period. The findings of the survey also highlight the rise in the waste management jobs in the current period, and rising number of jobs in the renewable energy sector and green manufacturing sector, which is attributed to the rising demands for these services and products, especially in the contemporary business environment and production scenarios. Thus, a mixed impact of the CE production policies on the labour market can be observed also in terms of the perceptions of the workers participating in the study. The findings have revealed the need for considerable training and skill upgradation for these workers to adapt and secure their jobs in the circular economy based business environment and this is shown in (Fig. **16**):

According to most of the workers (60%) participating in this study, they need supports in terms of training and relevant skill development to sustain in the changing business environment to ensure that the incorporation of the CE production policies does not affect their job prospects and job security adversely. The reason behind the need for new skill development and training is that of maintaining relevance of their skills and expertise in the changing business environment, where the elements of CE and sustainability are being extensively incorporated. However, more than 21% of the workersbelieve that they do not need any skill upgrade to sustain in the labour market in the current period when the CE production policies are being incorporated in businesses and in different industries. However, considerable variations in opinions can be found to be existing in terms of the types of skill development, training, and support that the workers in the vulnerable segments of the labour market, need to adapt efficiently to the CE practices and the skill requirements in the current business environment. These can be shown in (Fig. **17**):

The most important training required for relevant skill development for the vulnerable workers and labour market sections, in the current business environment, where CE practices are being increasingly incorporated, is the training on clean energy usage and management and green supply chain management. Training and support like the support to shift to other more prospective industries and the support for knowledge development on recycling operations

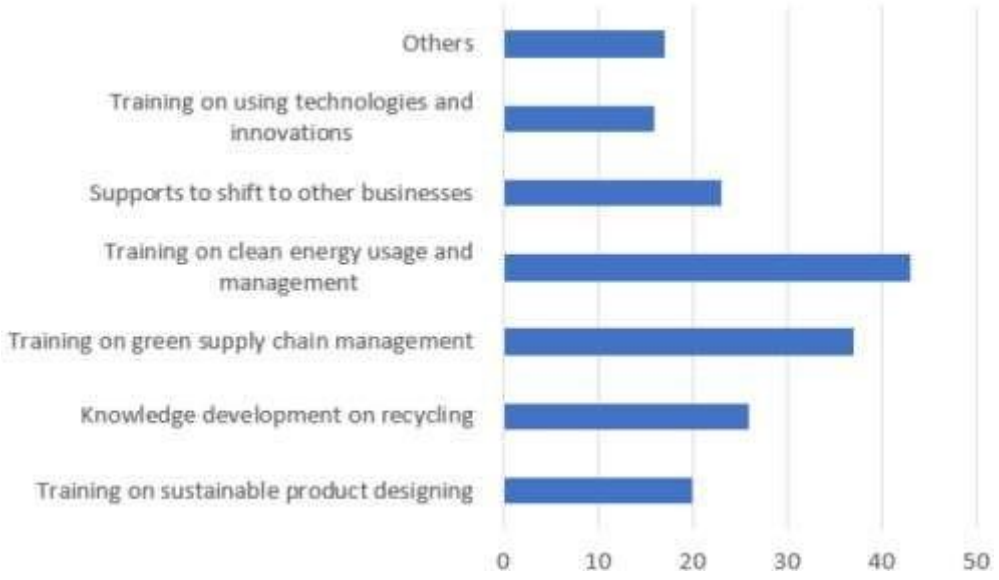

Fig. (17). Types of training and support required for sustaining in the circular economy.

Table 2. Regression Analysis for impacts of CE production policy on threats of job loss.

SUMMARY OUTPUT									
Regression Statistics									
Multiple R			0.9860						
R Square			0.9722						
Adjusted R Square			0.9718				-		
Standard Error			0.2589						
Observations			60						
ANOVA									
	df	*SS*	*MS*	*F*	*Significance F*				
Regression	1	136.2943	136.2943	2032.6580	0.0000		-		
Residual	58	3.8890	0.0671						
Total	59	140.1833							
		Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept		0.1077	0.0900	1.1948	0.2370	-0.0728	0.2882	-0.0728	0.2882
Increasing implementation of CE production policies		0.9722	0.0216	45.0850	0.0000	0.9291	1.0154	0.9291	1.0154

and sustainable production processes are also required to ensure the minimisation of adverse impacts of the CE practices on the labour market, especially in terms of job loss.

Statistical Analysis of the Data Collected

Apart from developing insights about the perceptions of the study respondents, who are members of the vulnerable segments (in terms of the CE production policies and their implementation in different businesses) of the labour market, the study has also tried to test the statistical linkage and the significance of the relationship between incorporation of the CE production policies and threats of job loss in the considered industries (Cichoń, 2020). For this purpose, a regression analysis has been conducted by considering the increasing efforts of CE production policy implementation as the independent variable and the threats of job loss as the dependent variable. A regression analysis has been conducted to assess the relationship between the concerned variables, the result of which is shown with the help of the following table **2**:

Table 3. Regression analysis for studying impacts of CE policies on job creation in different sectors.

SUMMARY OUTPUT									
Regression Statistics									
Multiple R		0.8536							
R Square		0.7287							
Adjusted R Square		0.7240							
Standard Error		0.8311							
Observations		60							
ANOVA									
	df	*SS*	*MS*	*F*	*Significance F*				
Regression	1	107.5901	107.5901	155.7725	0.000				
Residual	58	40.0599	0.6907						
Total	59	147.6500							
		Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept		0.2955	0.2894	1.0209	0.3115	-0.2838	0.8747	-0.2838	0.8748
Increasing implementation of CE production policies		0.8638	0.0692	12.4809	0.0000	0.7253	1.0024	0.7253	1.0024

The R-Square for the above analysis is 0.97, which implies that 97% of the threats of job loss and redundancies of jobs in the construction, warehousing, transport, plastic, and extractive industries, in the current period, is attributed to the incorporation of the CE production policies and sustainable practices in different industries across the globe. This can be attributed to the loss of demand for the products and services offered by the businesses in these industries, with the shift towards sustainable resources and production, packaging and distribution policies and waste minimisation. The relationship between rising implementation of CE production policies and threats of job loss in the considered industries is both direct and statistically significant, with the p-value for this relation being less than 0.05. This highlights that:

With the rising implementation of CE production policies there are certain sections of the labour market that are experiencing negative impacts in terms of higher threats of skill redundancy and job loss.

However, to test the scopes for new jobs in different other industries, due to the CE production policy implementation, the following regression is conducted, using rise in CE production policies as the independent variable and job creation in different sectors as the dependent variable:

In this case also, as evident from the R-Square, 73% of the job creations in new domains and different industries is attributed to the rising incorporation of the CE production policies. The relationship between these two variables is positive and statistically significant and thus, this implies that:

With the rise in the incorporation of CE production policies, there are rising scope for job creation in different industries.

As per the above analysis, it can also be asserted that the CE policies are creating adverse impacts for those workers in the labour market who work for construction, non-renewable energy, plastic, warehousing and transporting industries and similar industries. On the other hand, the above tables also highlight that there is rising scope for job creation in new industries or new domains of operations aligned with the CE practices.

CONCLUSION AND RECOMMENDATIONS FOR MORE EFFICIENT POLICY DIRECTIONS TO TACKLE ISSUES IN LABOUR MARKETS

As evident from the above sections, including both previous studies and the findings obtained from the survey conducted for this article, there is rising emphasis on the development and implementation of CE production policies in different businesses and industries across the globe. These policies are having mixed impacts on the labour markets. While the jobs in the extractive, construction, transport, warehousing and other labour-intensive non-renewable energy and plastic industries are facing increase threats of redundance of jobs and job loss due to fall in the demand, there are also considerable prospects of new job creation in different industries and business operations in the current period. To address the negative impacts of these policies on the labour market, the following recommendations have been developed:

- Extensive training and skill development support is required to be provided to the vulnerable sections of the labour market that are facing increasing threats of job loss due to the incorporation of the CE production policies. The training should focus on the types of job roles that are expected to be

come more important in the circular economy practices in the long run.

- Training as per new job roles and technologies and innovations required for adoption of the circular economy practices, should also be provided to the relevant works in the contemporary labour market.
- Different industries and sectors are expected to become redundant with the rising incorporation and implementation of CE production policies. The workers in such industries are required to be trained and made capable enough to switch to different prospective business operations.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

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We confirm that neither the manuscript nor any parts of its content are currently under consideration or published in another journal. All authors have approved the manuscript and agree with its submission to the Review of Economics and Finance.

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