

The Theology of Industrialization: A Hermeneutic Analysis of Production Ethics in Surah Al-Hadid Verse 25

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Abstract:

This study examines the meaning of production in Surah Al-Hadid verse 25 from the perspective of Islamic economics using a qualitative library research approach. The research is motivated by the dominance of materialistic production paradigms that often neglect ethical and social dimensions. Data were collected from classical and contemporary tafsir literature, as well as scholarly works in Islamic economics, and analyzed using descriptive-analytical and content analysis methods. The findings reveal that production in the Qur'anic perspective is not merely an economic activity but a value-driven process grounded in justice, balance, responsibility, and public welfare (masalahah). The verse symbolically links productive power with moral accountability, emphasizing that economic activities must align with social justice and ethical conduct. However, variations in interpretation arise due to differences in methodological approaches, theoretical orientations, and disciplinary backgrounds. This study contributes by offering an integrative framework that bridges normative tafsir and contemporary economic analysis. It highlights the need to contextualize Qur'anic teachings to address modern production challenges. The study suggests that production in Islamic economics should incorporate ethical values to achieve sustainable and equitable development.

Keywords: *Production, Tafsir, Islamic Economics, Economic Justice, Library Research*

Abstrak:

Studi ini meneliti makna produksi dalam Surah Al-Hadid ayat 25 dari perspektif ekonomi Islam menggunakan pendekatan penelitian pustaka kualitatif. Penelitian ini dimotivasi oleh dominasi paradigma produksi materialistis yang sering mengabaikan dimensi etika dan sosial. Data dikumpulkan dari literatur tafsir klasik dan kontemporer, serta karya-karya ilmiah dalam ekonomi Islam, dan dianalisis menggunakan metode deskriptif-analitis dan analisis isi. Temuan menunjukkan bahwa produksi dalam perspektif Al-Qur'an bukan hanya aktivitas ekonomi tetapi proses yang didorong oleh nilai-nilai yang berlandaskan keadilan, keseimbangan, tanggung jawab, dan kesejahteraan umum (masalahah). Ayat tersebut secara simbolis menghubungkan kekuatan produktif dengan pertanggungjawaban moral,

menekankan bahwa aktivitas ekonomi harus selaras dengan keadilan sosial dan perilaku etis. Namun, variasi interpretasi muncul karena perbedaan pendekatan metodologis, orientasi teoretis, dan latar belakang disiplin ilmu. Studi ini berkontribusi dengan menawarkan kerangka kerja integratif yang menjembatani tafsir normatif dan analisis ekonomi kontemporer. Studi ini menyoroti perlunya mengkontekstualisasikan ajaran Al-Qur'an untuk mengatasi tantangan produksi modern. Studi ini menunjukkan bahwa produksi dalam ekonomi Islam harus memasukkan nilai-nilai etika untuk mencapai pembangunan berkelanjutan dan adil.

Kata Kunci: *Produksi, Tafsir, Ekonomi Islam, Keadilan Ekonomi, Riset Perpustakaan*

INTRODUCTION

The issue of production in modern economic systems has become increasingly important as it directly relates to social welfare and resource sustainability (Hariram, et al., 2023). This research is significant for society because it offers an alternative perspective grounded in Islamic values through the interpretation of Surah Al-Hadid verse 25 (Jie, et al., 2023). The main reason is that current production practices are often profit-oriented without adequately considering justice and sustainability (Rees, 2021). Empirical evidence shows excessive exploitation of natural resources and labor within conventional production systems (Arslan, et al., 2022). In this context, the Qur'an provides principles that balance productive power with social responsibility (de Almeida et al., 2024). Therefore, understanding the meaning of production from this verse is crucial to formulating a concept of production that is not only efficient but also equitable and sustainable for society (Tietenberg, & Lewis, 2023).

The general problem faced by society today is the dominance of a materialistic production paradigm that tends to neglect ethical and spiritual dimensions (Eisenmenger, et al., 2020). Modern production systems often treat humans merely as production factors, overlooking human dignity and social justice (Çakmakçı, et al., 2023). In addition, there is a gap between Islamic economic theory and actual production practices in the field (Lovarelli, et al., 2020). Many business actors have not fully understood the concept of production in Islam, particularly those derived from the Qur'an (Schröder, et al., 2020). The lack of integration between religious values and economic practices has led to inequality in the distribution of production outcomes (Aust, et al., 2020). Therefore, an in-depth study is needed to reassess the concept of production based on Qur'anic interpretation in order to provide more ethical and just solutions (Sartal, et al., 2020).

Field phenomena indicate that production practices in Indonesia are still largely dominated by conventional approaches focused on efficiency and maximum profit (Söderholm, 2020). Many industries neglect environmental sustainability and worker welfare (Yurui, et al., 2021). At the same time, there is a growing awareness among society and business actors regarding the importance of value-based economics, including Islamic economics (Hrustek, 2020). However, understanding of the concept of production in Islam remains limited to technical aspects and has not yet reached its deeper philosophical dimensions (Yu, & Wang, 2021). This phenomenon highlights a gap between the normative concepts found in the Qur'an and the reality of production

practices in society (Yong, et al., 2020). Therefore, research is needed to bridge the sacred text and economic practice in a contextual manner (Machado, et al., 2020).

In the literature, various studies have examined the concept of production in Islamic economics, both from theoretical and fiqh muamalah perspectives (Mourtzis, et al., 2022). However, most of these studies focus on operational aspects and do not specifically explore the meaning of production based on the interpretation of specific Qur'anic verses, particularly Surah Al-Hadid verse 25 (Padilla-Rivera, et al., 2021). Additionally, many studies fail to integrate classical and contemporary tafsir in understanding production concepts (Hajian, & Kashani, 2021). Another limitation is the lack of contextual approaches that connect the meaning of the verse with modern economic conditions (Fallah Shayan, et al., 2022). This indicates a research gap that needs to be addressed, namely the need for an in-depth, integrative, and contextual analysis of production based on Qur'anic interpretation.

The novelty of this research lies in its thematic tafsir approach, specifically analyzing the meaning of production in Surah Al-Hadid verse 25 from the perspective of Islamic economics. This study not only examines the verse textually but also interprets it contextually by considering current economic realities in Indonesia. Furthermore, it integrates both classical and contemporary tafsir sources to generate a comprehensive understanding (Janker, & Mann, 2020). This approach is important because it bridges the gap between normative texts and economic practices. Thus, this research is expected to contribute new insights to the development of a just and sustainable production concept within Islamic economics.

Based on the above explanation, the research problem in this study is how the meaning of production in Surah Al-Hadid verse 25 can be understood within the framework of Islamic economics. The preliminary argument proposed is that this verse contains fundamental principles of production that are not solely result-oriented but also emphasize justice, balance, and social responsibility. Production in Islam is not merely aimed at economic profit but also at achieving collective welfare (maslahah). This study is expected to provide theoretical contributions to the development of Islamic economics as well as practical contributions for business actors in implementing more ethical and just production practices.

RESEARCH METHOD

This study employs a qualitative approach using a library research design (Brito, et al., 2021). The qualitative method is selected because the research aims to explore, interpret, and construct meanings from textual sources, particularly the interpretation (tafsir) of economic verses in Surah Al-Hadid verse 25. Library research is appropriate as the study relies on secondary data derived from authoritative written sources, including classical and contemporary tafsir books, academic journals, books on Islamic economics, and relevant scholarly works (Bendixen, et al., 2021). This approach enables an in-depth and comprehensive understanding of how the concept of production is

articulated within the Qur'anic framework and how it can be contextualized in the Indonesian economic setting.

The data sources in this study are divided into primary and secondary data. Primary data consist of classical and contemporary tafsir works that specifically discuss Surah Al-Hadid verse 25. Secondary data include academic journals, books, and previous research related to Islamic economics, production theory, and economic justice (Lenzen, et al., 2020). The selection of data sources is conducted purposively, focusing on credible, relevant, and widely recognized references in the field. This ensures that the data used are valid, reliable, and capable of supporting a rigorous analytical framework.

Data collection is carried out through documentation techniques, involving the identification, selection, and organization of relevant literature. The researcher systematically reviews selected sources, extracts key concepts related to production, and categorizes them into themes such as production resources, ethical responsibility, balance, and social justice (Zhang, et al., 2022). This process facilitates a structured understanding of how different scholars interpret the verse and its implications for economic practices. All collected data are documented and organized to support further analysis.

Table 1. Data Collection Technique (Library Research)

No	Analysis Stage	Technique/Method	Process Description	Purpose
1	Data Reduction	Content Selection	Selecting relevant data from tafsir and economic literature	To focus on data aligned with research objectives
2	Data Classification	Thematic Coding	Grouping data into themes (justice, balance, production ethics, social responsibility)	To organize data systematically
3	Data Interpretation	Descriptive-Analytical	Interpreting meanings of the verse based on tafsir perspectives	To construct conceptual understanding
4	Data Comparison	Comparative Analysis	Comparing classical and contemporary tafsir interpretations	To identify similarities and differences
5	Synthesis	Integrative Analysis	Integrating findings into a unified conceptual framework	To develop a comprehensive model of production in Islamic economics
6	Conclusion Drawing	Reflective Analysis	Formulating conclusions based on analyzed data	To answer research questions and provide contributions

Source: Authors' own work

The data analysis technique in this study uses qualitative content analysis combined with a descriptive-analytical approach. The process begins with data reduction by selecting relevant information from various tafsir and economic sources. The data are then classified using thematic coding to identify key concepts related to production in Islamic economics. Next, the researcher interprets the data descriptively to understand the meaning of Surah Al-Hadid verse 25 from different scholarly perspectives. A comparative analysis is conducted to examine differences between classical and contemporary interpretations. The findings are then synthesized into an integrative framework that explains the concept of production within Islamic economics. Finally, conclusions are drawn to address the research problem and highlight the theoretical and practical contributions of the study.

FINDINGS AND DISCUSSION

FINDINGS

Trends in Research Findings

The synthesis of at least ten scientific sources reveals a consistent trend that the interpretation (tafsir) of Surah Al-Hadid verse 25 positions production as an ethical and social activity rather than merely an economic process. Classical exegetes emphasize that the verse highlights the balance between divine guidance, justice, and material resources such as iron, which symbolizes industrial capacity and productive power. Contemporary scholars extend this interpretation by linking production with social justice, arguing that economic activities must align with moral responsibility and equitable distribution. Across the literature, production is consistently framed as a means to achieve *maslahah* (public welfare), not just profit maximization. This indicates a convergence of thought that Islamic production integrates material efficiency with ethical accountability. However, while agreement exists at the conceptual level, differences arise in how these principles are translated into modern economic systems.

Another notable trend is the shift from literal to contextual interpretation of production within the verse. Earlier studies tend to interpret "iron" (*hadid*) symbolically as a representation of strength and tools for human benefit, focusing on its theological implications. In contrast, recent research adopts a more interdisciplinary approach, linking the verse to industrial development, technological advancement, and sustainable production systems. Scholars increasingly argue that the verse provides a framework for balancing economic growth with social justice and environmental responsibility. This shift reflects an effort to make Qur'anic economic teachings more relevant to contemporary challenges, such as inequality and ecological degradation. Nevertheless, some studies remain confined to normative discourse without offering operational frameworks, suggesting that while theoretical development has progressed, practical application remains limited and requires further analytical integration.

Differences in results between researchers

Table 1 Differences Among Researchers

No	Researcher Orientation	Key Interpretation of Production	Focus of Analysis	Implication
1	Classical Tafsir Scholars	Production as divine mandate and justice tool	Normative-textual	Emphasis on moral obedience
2	Contemporary Islamic Economists	Production as welfare-oriented activity	Socio-economic	Focus on distribution and equity
3	Interdisciplinary Scholars	Production as sustainable development process	Economic + environmental	Integration with modern industry
4	Reformist Thinkers	Production as contextual ethical system	Contextual-interpretative	Adaptation to modern economic systems

Source: Authors' own work

Differences among researchers arise primarily from variations in interpretative frameworks and disciplinary approaches. Classical scholars tend to prioritize textual fidelity, interpreting production as a divine mandate closely tied to justice and moral responsibility. In contrast, contemporary Islamic economists expand this understanding by incorporating socio-economic dimensions such as welfare distribution and poverty alleviation. Interdisciplinary scholars further broaden the scope by linking the concept of production to sustainability and environmental ethics. Reformist thinkers, meanwhile, emphasize contextual reinterpretation, arguing that Qur'anic guidance must adapt to modern economic realities. These differences do not necessarily indicate contradiction but rather reflect the dynamic nature of tafsir. However, they also create fragmentation in the literature, as each approach emphasizes different aspects of production, resulting in diverse and sometimes incompatible conclusions.

Factors that influence these differences

One major factor influencing these differences is the diversity of interpretative methodologies employed by scholars. The use of classical, thematic (maudhu'i), or contextual tafsir significantly affects how production is conceptualized. Classical approaches emphasize linguistic and historical analysis, often resulting in normative conclusions. In contrast, thematic and contextual approaches integrate broader Qur'anic principles with contemporary socio-economic realities, producing more applicable frameworks. Additionally, the selection of specific verses and analytical focus can shape conclusions, as some studies isolate verse 25 while others connect it with related economic verses. This methodological diversity leads to variations in emphasis, ranging from moral obligations to structural economic implications. Therefore, the

interpretative method plays a crucial role in determining the direction and scope of research findings.

Another influencing factor is the socio-economic and academic background of researchers. Scholars trained in traditional Islamic studies often prioritize doctrinal consistency, while those with backgrounds in economics or social sciences emphasize practical applicability. Institutional context also plays a role; research conducted in environments with strong Islamic economic systems tends to highlight successful implementation, whereas studies in secular contexts focus on challenges and limitations. Furthermore, access to interdisciplinary knowledge and modern economic theories enhances the depth of analysis. Researchers who integrate insights from sustainability studies, development economics, and ethics produce more comprehensive interpretations. Thus, differences in academic orientation, institutional environment, and intellectual resources significantly shape the diversity of findings in the literature.

The analysis reveals a significant research gap in the lack of integrative frameworks that connect the normative interpretation of Surah Al-Hadid verse 25 with practical models of production in contemporary economic systems, particularly in Indonesia. While many studies provide valuable theoretical insights, few offer concrete strategies for implementation within modern industrial and economic contexts. Additionally, there is limited synthesis between classical and contemporary tafsir, resulting in fragmented understandings of production. Empirical validation is also largely absent, as most studies rely on textual analysis without testing their applicability in real-world settings. This gap highlights the need for research that integrates theological interpretation with economic practice, bridging the divide between normative principles and empirical realities. Addressing this gap is essential for developing a holistic and applicable model of production grounded in Islamic economics.

DISCUSSION

Differences in research findings regarding the meaning of production in Surah Al-Hadid verse 25 can be explained through the diversity of theoretical foundations employed by scholars (Nguyen, et al., 2023). Some studies are grounded in normative tafsir, positioning production as part of human obedience to God, emphasizing ethics, trust (amanah), and public welfare (masalahah) (Settembre-Blundo, et al., 2021). In contrast, other studies adopt contemporary Islamic economic approaches that highlight production as a mechanism for fulfilling needs, creating value, and ensuring equitable distribution. These differing paradigms lead to varying conclusions. Normative studies tend to emphasize the moral message of the verse, whereas economic-oriented studies focus on its practical implications within modern production systems (Yang, et al., 2023). Thus, the variation in findings does not necessarily indicate contradiction but reflects the richness of meaning embedded in the verse, interpreted through different epistemological lenses.

Differences also arise from the varying emphasis placed on textual and

contextual elements. Some researchers interpret the term al-hadid (iron) as a symbol of strength, tools of production, and civilizational development, concluding that production must support social progress (Hoang, et al., 2021). Others focus more on the historical context of the verse, linking it to themes of justice, power, and social order, thereby interpreting production in a broader symbolic sense rather than strictly economic terms (Sarkis, et al., 2020). Consequently, some studies conceptualize production as a material activity guided by Islamic values, while others view it as part of a broader civilizational mandate (Boix-Fayos, & De Vente, 2023). These interpretative differences result in diverse conclusions. Within the framework of library research, such diversity is significant, as it demonstrates that economic tafsir cannot be reduced to a single interpretation but must be understood as a multidimensional discourse.

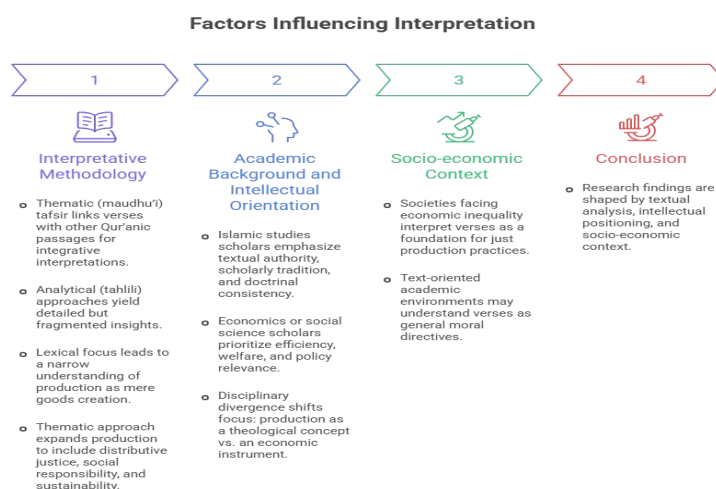


Figure 1 : Factors Influencing Interpretation

Source: Authors' own work

One key factor influencing these differences is the interpretative methodology applied (Padilla-Rivera, et al., 2020). Studies employing thematic (maudhu'i) tafsir tend to produce more integrative interpretations by linking the verse with other related Qur'anic passages, while analytical (tahlili) approaches often yield more detailed but fragmented insights (Iacovidou, et al., 2021). If researchers focus solely on lexical meaning, production is understood narrowly as the act of producing goods. However, when a thematic approach is used, production expands into a broader concept encompassing distributive justice, social responsibility, and sustainability (Oztemel, & Gursev, 2020). Therefore, the chosen methodology directly shapes the scope and depth of conclusions. Differences in findings are often less about the content of the verse itself and more about how the verse is analyzed and interpreted within a particular methodological framework.

Another influencing factor is the academic background and intellectual orientation of researchers. Scholars trained in Islamic studies tend to emphasize textual authority, scholarly tradition, and doctrinal consistency, whereas those from economics or social sciences prioritize efficiency, welfare, and policy relevance (Streimikiene, et al., 2021). This disciplinary divergence shifts the analytical focus: one group frames production as a theological concept, while

the other treats it as an economic instrument. Additionally, the socio-economic context in which research is conducted also affects interpretation. In societies facing economic inequality, the verse is often interpreted as a foundation for just production practices. In more text-oriented academic environments, it may be understood as a general moral directive. Thus, research findings are shaped not only by textual analysis but also by intellectual positioning and socio-economic context.

Previous studies demonstrate several strengths, particularly in establishing a strong normative foundation for understanding production in Islamic economics. Many have successfully shown that the Qur'an provides guidance not only for ritual practices but also for economic activities, including production. These studies enrich Islamic economic thought by embedding it within ethical and theological frameworks, thereby preventing purely materialistic interpretations of production. Furthermore, some research connects the verse with broader principles such as justice, public welfare, and ecological balance, making it relevant to contemporary challenges. The use of classical tafsir literature also strengthens academic legitimacy. However, these strengths are often confined to conceptual discussions, with limited translation into practical or operational models for real-world economic systems.

On the other hand, significant weaknesses can be identified in previous research. A major limitation is the predominance of descriptive and normative approaches, with insufficient analytical depth in terms of application. Many studies assert that production should align with Islamic principles without specifying how such alignment can be implemented in modern economic structures. Additionally, some interpretations are overly broad, leading to conceptual ambiguity. Another weakness is the lack of critical comparison between classical and contemporary tafsir, resulting in repetitive findings without meaningful synthesis. Moreover, as most studies rely on library research, their contextual validity remains untested in practical settings such as industry, small enterprises, or public policy. This indicates a need for more rigorous, integrative, and application-oriented research to advance the field.

The implications of these findings for knowledge development are significant. This study emphasizes that production in Islamic economics should not be reduced to a purely technical process of generating goods and services. Through Surah Al-Hadid verse 25, production must be understood as an activity embedded with moral, social, and civilizational dimensions. This contributes to expanding Islamic economic studies beyond fiqh muamalah toward a more philosophical and integrative tafsir-based approach. It also opens opportunities for developing value-based production models that combine efficiency, justice, and sustainability. Therefore, the interpretation of economic verses should not be treated merely as religious text but as an epistemological foundation for constructing a more humane and welfare-oriented economic system.

CONCLUSION

This study concludes that the meaning of production in Surah Al-Hadid

verse 25, when examined through a library research approach, extends beyond a purely technical-economic activity and embodies a comprehensive framework integrating moral, social, and civilizational dimensions. The synthesis of classical and contemporary tafsir demonstrates that production in Islamic economics is fundamentally grounded in principles of justice, balance, responsibility, and public welfare (*maslahah*). These principles position production not merely as a means of generating profit, but as a value-laden activity that must align with ethical norms and societal well-being. Thus, the Qur'anic perspective offers a holistic conception of production that challenges the reductionist tendencies of conventional economic paradigms.

Furthermore, the study reveals that variations in previous research findings are primarily influenced by differences in theoretical orientation, interpretative methodology, and disciplinary background. While classical tafsir ensures doctrinal authenticity and continuity, contemporary and interdisciplinary approaches enhance contextual relevance and applicability in addressing modern economic challenges. However, the literature remains fragmented, with limited integration between normative interpretation and practical implementation. This indicates that the development of a cohesive and operational model of production based on Qur'anic principles is still an ongoing challenge within Islamic economic scholarship.

From a theoretical perspective, this research contributes to the advancement of Islamic economics by proposing a more integrative understanding of production grounded in tafsir. It reinforces the argument that economic concepts in Islam are dynamic and must be continuously reinterpreted in light of changing socio-economic conditions. Practically, the findings suggest that policymakers and business practitioners should incorporate ethical and social considerations derived from Qur'anic interpretation into production processes, ensuring that economic activities contribute to equitable and sustainable development.

Nevertheless, this study has limitations, particularly its reliance on secondary data and the absence of empirical validation. Future research is recommended to adopt empirical or mixed-method approaches to examine the applicability of tafsir-based production concepts in real-world contexts, such as industries and small enterprises. Comparative studies across different socio-economic settings are also needed to enhance the generalizability of findings. In conclusion, the interpretation of production in Surah Al-Hadid verse 25 holds significant potential as a foundational framework for developing a just and sustainable economic system, provided that it is approached critically, contextually, and integratively.

REFERENCES

- Arslan, H. M., Khan, I., Latif, M. I., Komal, B., & Chen, S. (2022). Understanding the dynamics of natural resources rents, environmental sustainability, and sustainable economic growth: new insights from China. *Environmental Science and Pollution Research*, 29(39), 58746-58761. <https://doi.org/10.1007/s11356-022-19952-y>

- Aust, I., Matthews, B., & Muller-Camen, M. (2020). Common good HRM: a paradigm shift in sustainable HRM?. *Human resource management review*, 30(3), 100705. <https://doi.org/10.1016/j.hrmr.2019.100705>
- Bendixen, M., Iversen, L. L., Best, J., Franks, D. M., Hackney, C. R., Latrubesse, E. M., & Tusting, L. S. (2021). Sand, gravel, and UN Sustainable Development Goals: Conflicts, synergies, and pathways forward. *One Earth*, 4(8), 1095-1111. <https://doi.org/10.1016/j.oneear.2021.07.008>
- Boix-Fayos, C., & De Vente, J. (2023). Challenges and potential pathways towards sustainable agriculture within the European Green Deal. *Agricultural Systems*, 207, 103634. <https://doi.org/10.1016/j.agsy.2023.103634>
- Brito, L. F., Bédère, N., Douhard, F., Oliveira, H. R., Arnal, M., Peñagaricano, F., ... & Miglior, F. (2021). Genetic selection of high-yielding dairy cattle toward sustainable farming systems in a rapidly changing world. *Animal*, 15, 100292. <https://doi.org/10.1016/j.animal.2021.100292>
- Çakmakçı, R., Salık, M. A., & Çakmakçı, S. (2023). Assessment and principles of environmentally sustainable food and agriculture systems. *Agriculture*, 13(5), 1073. <https://doi.org/10.3390/agriculture13051073>
- de Almeida Barbosa Franco, J., Franco Junior, A., Battistelle, R. A. G., & Bezerra, B. S. (2024). Dynamic capabilities: unveiling key resources for environmental sustainability and economic sustainability, and corporate social responsibility towards sustainable development goals. *Resources*, 13(2), 22. <https://doi.org/10.3390/resources13020022>
- Eisenmenger, N., Pichler, M., Krenmayr, N., Noll, D., Plank, B., Schalmann, E., ... & Gingrich, S. (2020). The Sustainable Development Goals prioritize economic growth over sustainable resource use: a critical reflection on the SDGs from a socio-ecological perspective. *Sustainability Science*, 15(4), 1101-1110. <https://doi.org/10.1007/s11625-020-00813-x>
- Fallah Shayan, N., Mohabbati-Kalejahi, N., Alavi, S., & Zahed, M. A. (2022). Sustainable development goals (SDGs) as a framework for corporate social responsibility (CSR). *Sustainability*, 14(3), 1222. <https://doi.org/10.3390/su14031222>
- Hajian, M., & Kashani, S. J. (2021). Evolution of the concept of sustainability. From Brundtland Report to sustainable development goals. In *Sustainable resource management* (pp. 1-24). Elsevier. <https://doi.org/10.1016/B978-0-12-824342-8.00018-3>
- Hariram, N. P., Mekha, K. B., Suganthan, V., & Sudhakar, K. (2023). Sustainalism: An integrated socio-economic-environmental model to address sustainable development and sustainability. *Sustainability*, 15(13), 10682. <https://doi.org/10.3390/su151310682>
- Hoang, A. T., Nižetić, S., Olcer, A. I., Ong, H. C., Chen, W. H., Chong, C. T., ... & Nguyen, X. P. (2021). Impacts of COVID-19 pandemic on the global energy system and the shift progress to renewable energy: Opportunities, challenges, and policy implications. *Energy Policy*, 154, 112322. <https://doi.org/10.1016/j.enpol.2021.112322>
- Hrustek, L. (2020). Sustainability driven by agriculture through digital transformation. *Sustainability*, 12(20), 8596. <https://doi.org/10.3390/su12208596>
- Iacovidou, E., Hahladakis, J. N., & Purnell, P. (2021). A systems thinking approach to understanding the challenges of achieving the circular economy. *Environmental Science and Pollution Research*, 28(19), 24785-24806. <https://doi.org/10.1007/s11356-020-11725-9>
- Janker, J., & Mann, S. (2020). Understanding the social dimension of sustainability in agriculture: a critical review of sustainability assessment tools: J. Janker, S.

- Mann. *Environment, Development and Sustainability*, 22(3), 1671-1691. <https://doi.org/10.1007/s10668-018-0282-0>
- Jie, H., Khan, I., Alharthi, M., Zafar, M. W., & Saeed, A. (2023). Sustainable energy policy, socio-economic development, and ecological footprint: The economic significance of natural resources, population growth, and industrial development. *Utilities Policy*, 81, 101490. <https://doi.org/10.1016/j.jup.2023.101490>
- Lenzen, M., Malik, A., Li, M., Fry, J., Weisz, H., Pichler, P. P., ... & Pencheon, D. (2020). The environmental footprint of health care: a global assessment. *The Lancet Planetary Health*, 4(7), e271-e279. [https://doi.org/10.1016/S2542-5196\(20\)30121-2](https://doi.org/10.1016/S2542-5196(20)30121-2)
- Lovarelli, D., Bacenetti, J., & Guarino, M. (2020). A review on dairy cattle farming: Is precision livestock farming the compromise for an environmental, economic and social sustainable production?. *Journal of Cleaner Production*, 262, 121409. <https://doi.org/10.1016/j.jclepro.2020.121409>
- Machado, C. G., Winroth, M. P., & Ribeiro da Silva, E. H. D. (2020). Sustainable manufacturing in Industry 4.0: an emerging research agenda. *International journal of production research*, 58(5), 1462-1484. <https://doi.org/10.1080/00207543.2019.1652777>
- Mourtzis, D., Angelopoulos, J., & Panopoulos, N. (2022). A Literature Review of the Challenges and Opportunities of the Transition from Industry 4.0 to Society 5.0. *Energies*, 15(17), 6276. <https://doi.org/10.3390/en15176276>
- Nguyen, T. T., Grote, U., Neubacher, F., Do, M. H., & Paudel, G. P. (2023). Security risks from climate change and environmental degradation: implications for sustainable land use transformation in the Global South. *Current Opinion in Environmental Sustainability*, 63, 101322. <https://doi.org/10.1016/j.cosust.2023.101322>
- Oztemel, E., & Gursev, S. (2020). Literature review of Industry 4.0 and related technologies. *Journal of intelligent manufacturing*, 31(1), 127-182. <https://doi.org/10.1007/s10845-018-1433-8>
- Padilla-Rivera, A., do Carmo, B. B. T., Arcese, G., & Merveille, N. (2021). Social circular economy indicators: Selection through fuzzy delphi method. *Sustainable Production and Consumption*, 26, 101-110. <https://doi.org/10.1016/j.spc.2020.09.015>
- Padilla-Rivera, A., Russo-Garrido, S., & Merveille, N. (2020). Addressing the social aspects of a circular economy: A systematic literature review. *Sustainability*, 12(19), 7912. <https://doi.org/10.3390/su12197912>
- Rees, W. E. (2021). Achieving sustainability: reform or transformation?. In *The Earthscan reader in sustainable cities* (pp. 22-52). Routledge. <https://doi.org/10.4324/9781315800462-3>
- Sarkis, J., Cohen, M. J., Dewick, P., & Schröder, P. (2020). A brave new world: Lessons from the COVID-19 pandemic for transitioning to sustainable supply and production. *Resources, Conservation and Recycling*, 159, 104894. <https://doi.org/10.1016/j.resconrec.2020.104894>
- Sartal, A., Bellas, R., Mejías, A. M., & García-Collado, A. (2020). The sustainable manufacturing concept, evolution and opportunities within Industry 4.0: A literature review. *Advances in Mechanical Engineering*, 12(5), 1687814020925232. <https://doi.org/10.1177/1687814020925232>
- Schröder, P., Lemille, A., & Desmond, P. (2020). Making the circular economy work for human development. *Resources, Conservation and Recycling*, 156, 104686. <https://doi.org/10.1016/j.resconrec.2020.104686>

- Settembre-Blundo, D., González-Sánchez, R., Medina-Salgado, S., & García-Muiña, F. E. (2021). Flexibility and resilience in corporate decision making: a new sustainability-based risk management system in uncertain times. *Global Journal of Flexible Systems Management*, 22(Suppl 2), 107-132. <https://doi.org/10.1007/s40171-021-00277-7>
- Söderholm, P. (2020). The green economy transition: the challenges of technological change for sustainability. *Sustainable Earth*, 3(1), 6. <https://doi.org/10.1186/s42055-020-00029-y>
- Streimikiene, D., Svagzdiene, B., Jasinskas, E., & Simanavicius, A. (2021). Sustainable tourism development and competitiveness: The systematic literature review. *Sustainable development*, 29(1), 259-271. <https://doi.org/10.1002/sd.2133>
- Tietenberg, T., & Lewis, L. (2023). *Environmental and natural resource economics*. Routledge. <https://doi.org/10.4324/9781003213734>
- Yang, M., Chen, L., Wang, J., Msigwa, G., Osman, A. I., Fawzy, S., ... & Yap, P. S. (2023). Circular economy strategies for combating climate change and other environmental issues. *Environmental chemistry letters*, 21(1), 55-80. <https://doi.org/10.1007/s10311-022-01499-6>
- Yong, J. Y., Yusliza, M. Y., Ramayah, T., Chiappetta Jabbour, C. J., Sehnem, S., & Mani, V. (2020). Pathways towards sustainability in manufacturing organizations: Empirical evidence on the role of green human resource management. *Business strategy and the environment*, 29(1), 212-228. <https://doi.org/10.1002/bse.2359>
- Yu, X., & Wang, P. (2021). Economic effects analysis of environmental regulation policy in the process of industrial structure upgrading: Evidence from Chinese provincial panel data. *Science of the Total Environment*, 753, 142004. <https://doi.org/10.1016/j.scitotenv.2020.142004>
- Yurui, L., Xuanchang, Z., Zhi, C., Zhengjia, L., Zhi, L., & Yansui, L. (2021). Towards the progress of ecological restoration and economic development in China's Loess Plateau and strategy for more sustainable development. *Science of the Total Environment*, 756, 143676. <https://doi.org/10.1016/j.scitotenv.2020.143676>
- Zhang, L., Xu, M., Chen, H., Li, Y., & Chen, S. (2022). Globalization, green economy and environmental challenges: state of the art review for practical implications. *Frontiers in Environmental Science*, 10, 870271. <https://doi.org/10.3389/fenvs.2022.870271>