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UNIVERSITÀ DEGLI STUDI DI SALERNO

**Dipartimento di Scienze Aziendali**

**Management & Innovation Systems**

Dottorato in Data Science, Accounting & Management

XXXVIII Ciclo

Curriculum in Accounting, Management, Organization and Finance

**Tesi di Dottorato in**

# REVERSE LOGISTICS NELL'AUTOMOTIVE: UN FRAMEWORK KNOWLEDGE-RISK DRIVEN APPLICATO AL CASO STELLANTIS EUROPE S.P.A.

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La logistica inversa, definita come i processi di pianificazione, gestione e controllo di raccolta, recupero, rigenerazione e recupero dei prodotti, si è evoluta in passato da interesse residuale delle aziende logistiche a competenza strategica fondamentale (De Brito & Dekker, 2004)[1]. La reverse logistics si è sviluppata in risposta alle pressioni normative industriali, alle crescenti e mutevoli aspettative dei consumatori, allo sviluppo dell'e-commerce e alla maggiore attenzione alla sostenibilità (Schaltegger et al., 2016; Lüdeke-Freund et al., 2019)[2]. Queste condizioni strutturali rendono il settore automobilistico un campo empirico ideale per gli studi sulle catene di fornitura e sulla relativa logistica inversa (Singh et al., 2021)[3]. La gestione dei resi dei prodotti genera una moltitudine di incertezze, variabilità nella qualità degli articoli restituiti, frammentazione delle fonti di reso e necessità di un processo decisionale rapido, accurato e integrato (Petersen & Kumar, 2009; Autry et al., 2001)[4].

La logistica 4.0 e le tecnologie emergenti come l'intelligenza artificiale, l'internet of things, la blockchain, la tecnologia cloud utilizzata nella realtà aumentata e i dati ad alta velocità ridefiniscono i principi e processi per ottimizzare rapidamente la reverse logistics (Kagermann, 2014; Lasi et al., 2014)[5]. Grazie ai progressi tecnologici, la gestione della supply chain ha acquisito un'importanza ancora maggiore rispetto al passato (Scuotto et al., 2017)[6]. La fenomenologia identificata rientra non solo nella gestione operativa e caratteristica delle organizzazioni, ma anche in quella di governo e strategica rivestendo, la reverse logistics, una funzione in grado di minare o favorire la creazione di valore ai fini della sopravvivenza.

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[1] De Brito, M. P., & Dekker, R. (2004). A framework for reverse logistics. In R. Dekker, M. Fleischmann, K. Inderfurth, L. N. Van Wassenhove (Eds.) Reverse Logistics. Springer.

[2] Schaltegger, S., Hansen, E. G., & Lüdeke-Freund, F. (2016). Business models for sustainability: Origins, present research, and future avenues. Organization & environment, 29(1), 3-10; Lüdeke-Freund, F., Gold, S., & Bocken, N. M. P. (2019). A review and typology of circular economy business model patterns. Journal of Industrial Ecology, 23(1), 36-61.

[3] Singh, P., Dulebenets, M. A., Pasha, J., Gonzalez, E. D. S., Lau, Y. Y., & Kampmann, R. (2021). Deployment of autonomous trains in rail transportation: Current trends and existing challenges. IEEE access, 9, 91427-91461.

[4] Petersen, J. A., & Kumar, V. (2009). Are product returns a necessary evil? Antecedents and consequences. Journal of Marketing, 73(3), 35-51; Autry, C. W., Daugherty, P. J., & Richey, R. G. (2001). The challenge of reverse logistics in catalog retailing. International Journal of Physical Distribution & Logistics Management, 31(1), 26-37.

[5] Kagermann, H. (2014). Change through digitization-Value creation in the age of Industry 4.0. In H. Albach, H. Meffert, A. Pinkwart, R. Reichwald, R. (Eds.) Management of Permanent Change. Springer; Lasi, H., Fettke, P., Kemper, H. G., Feld, T., & Hoffmann, M. (2014). *Op. cit*.

[6] Scuotto, V., Caputo, F., Villasalero, M., & Del Giudice, M. (2017). A multiple buyer-supplier relationship in the context of SMEs' digital supply chain management. Production Planning & Control, 28(16), 1378-1388.

Nel presente lavoro, il theoretical backgrund è rappresentato da teorie di taglio manageriale. L'utilizzo di teorie come il Knowledge Management (Nonaka & Takeuchi, 1995)[7], il Risk Management (Neto et al., 2021; Kleindorfer & Saad, 2005)[8], la Stakeholder Theory (Freeman, 1984a, 1984b; Donaldson & Preston, 1995)[9], la Value Co-Creation (Prahalad & Ramaswamy, 2004a, 2004b; Vargo & Lusch, 2008)[10], la Relational View (Pellicano et al., 2016)[11] e la Sostenibilità (Elkington, 1997)[12], sono fondamentali per comprendere le modalità di creazione di valore e le modalità di gestione del rischio nei processi di reverse logistics. L'ultimo pilastro di questa ricerca riguarda la complessità globale della supply chain automobilistica e il modo in cui i prodotti e beni possono essere recuperati, rigenerati o riciclati attraverso l'utilizzo delle tecnologie emergenti.

La tesi si compone di tre capitoli. Nel primo capitolo vengono discussi i fondamenti teorici e concettuali della reverse logistics. Questo capitolo integra, altresì, le teorie manageriali e discute come queste teorie contribuiscano a spiegare la complessità, la relazionalità e i processi di creazione di valore della logistica inversa. Il secondo capitolo presenta un'analisi completa della trasformazione tecnologica nel settore della logistica prendendo in considerazione il settore della logistica a livello mondiale, europeo e italiano. Il paradigma della logistica 4.0 e le tecnologie emergenti sono discussi descrivendo i modi in cui la tecnologia modifica i processi logistici tradizionali per migliorare e sostenere i sistemi di logistica inversa. Infine, il terzo capitolo di questa tesi si concentra su Stellantis N. V., una delle più grandi aziende automobilistiche al mondo

[7] Nonaka, I., & Takeuchi, H. (1995). The knowledge-creating company. Oxford University Press.
[8] Neto, A., Perkusich, M., Dantas, E., Ramos, F., Costa, A., Almeida, H., & Perkusich, A. (2021). Knowledge-based Risk Management: A Systematic Literature Review. Proceedings of the XXXV Brazilian Symposium on Software Engineering, Association for Computing Machinery, New York; Kleindorfer, P. R., & Saad, G. H. (2005). Managing disruption risks in supply chains. Production and Operations Management, 14(1), 53-68.
[9] Freeman, R. E. (1984a). Strategic Management: A Stakeholder Approach. Pitman; Freeman, R. E. (1984b). Strategic management: A stakeholder theory. Journal of Management Studies, 39(1), 1-21; Donaldson, T., & Preston, L. E. (1995). The stakeholder theory of the corporation: Concepts, evidence, and implications. Academy of Management Review, 20(1), 65-91.
[10] Prahalad, C.K. & Ramaswamy, V. (2004a). Co-creating unique value with customers, Strategy & Leadership, 32(3), 4-9; Prahalad, C.K. & Ramaswamy, V. (2004b). The Future of Competition: Co-creating Unique Value with Customers, Harvard Business School Press; Vargo, S. L., & Lusch, R. F. (2008). Service-dominant logic: continuing the evolution. Journal of the Academy of Marketing Science, 36(1), 1-10.
[11] Pellicano, M., Perano, M. & Casali, L. (2016). The enterprise relational view (ERV): exploring future in strategic management. In F. Caputo (Eds.) Governing Business Systems: Theories and Challenges for Systems Thinking in Practice-4th Business Systems Laboratory International Symposium Book of Abstracts. Business Systems Laboratory.
[12] Elkington, J. (1997). Cannibals with Forks: The Triple Bottom Line of 21st Century Business. Capstone.

e, in particolare, su Stellantis Europe S.p.A., filiale italiana del Gruppo Stellantis, fornendo un caso di studio pertinente e ricco per esplorare come la logistica inversa venga configurata, implementata e potenziata dalle tecnologie digitali nel settore dell'automotive e, in particolare, in Stellantis.

**Keywords**: Reverse logistics; Logistica 4.0; Automotive; Theoretical framework; Case Study

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Reverse logistics, defined as the processes of planning, managing, and controlling the collection, recovery, remanufacturing, and recovery of products, has evolved from a residual interest of logistics companies to a core strategic competence (De Brito & Dekker, 2004)[1]. Reverse logistics has developed in response to industry regulatory pressures, growing and changing consumer expectations, the development of e-commerce, and increased attention to sustainability (Schaltegger et al., 2016; Lüdeke-Freund et al., 2019)[2]. These structural conditions make the automotive sector an ideal empirical field for studies on supply chains and related reverse logistics (Singh et al., 2021)[3]. Managing product returns generates a multitude of uncertainties, variability in the quality of returned items, fragmentation of return sources, and the need for rapid, accurate, and integrated decision-making (Petersen & Kumar, 2009; Autry et al., 2001)[4].

Logistics 4.0 and emerging technologies such as artificial intelligence, internet of things, blockchain, cloud technology used in augmented reality, and high-speed data are redefining the principles and processes for rapidly optimizing reverse logistics (Kagermann, 2014; Lasi et al., 2014)[5]. Thanks to technological advances, supply chain management has become more important (Scuotto et al., 2017)[6].The identified phenomenon falls not only within the operational and characteristic management of organizations, but also within governance and strategy, with reverse logistics playing a role that can undermine or foster value creation for survival purposes.

In this work, the theoretical background is represented by managerial theories. The

[1] De Brito, M. P., & Dekker, R. (2004). A framework for reverse logistics. In R. Dekker, M. Fleischmann, K. Inderfurth, L. N. Van Wassenhove (Eds.) Reverse Logistics. Springer.
[2] Schaltegger, S., Hansen, E. G., & Lüdeke-Freund, F. (2016). Business models for sustainability: Origins, present research, and future avenues. Organization & environment, 29(1), 3-10; Lüdeke-Freund, F., Gold, S., & Bocken, N. M. P. (2019). A review and typology of circular economy business model patterns. Journal of Industrial Ecology, 23(1), 36-61.
[3] Singh, P., Dulebenets, M. A., Pasha, J., Gonzalez, E. D. S., Lau, Y. Y., & Kampmann, R. (2021). Deployment of autonomous trains in rail transportation: Current trends and existing challenges. IEEE access, 9, 91427-91461.
[4] Petersen, J. A., & Kumar, V. (2009). Are product returns a necessary evil? Antecedents and consequences. Journal of Marketing, 73(3), 35-51; Autry, C. W., Daugherty, P. J., & Richey, R. G. (2001). The challenge of reverse logistics in catalog retailing. International Journal of Physical Distribution & Logistics Management, 31(1), 26-37.
[5] Kagermann, H. (2014). Change through digitization-Value creation in the age of Industry 4.0. In H. Albach, H. Meffert, A. Pinkwart, R. Reichwald, R. (Eds.) Management of Permanent Change. Springer; Lasi, H., Fettke, P., Kemper, H. G., Feld, T., & Hoffmann, M. (2014). *Op. cit*.
[6] Scuotto, V., Caputo, F., Villasalero, M., & Del Giudice, M. (2017). A multiple buyer-supplier relationship in the context of SMEs' digital supply chain management. Production Planning & Control, 28(16), 1378-1388.

use of theories such as Knowledge Management (Nonaka & Takeuchi, 1995)[7], Risk Management (Neto et al., 2021; Kleindorfer & Saad, 2005)[8], Stakeholder Theory (Freeman, 1984a, 1984b; Donaldson & Preston, 1995)[9], Value Co-Creation (Prahalad & Ramaswamy, 2004a, 2004b; Vargo & Lusch, 2008)[10], Relational View (Pellicano et al., 2016)[11] and Sustainability (Elkington, 1997)[12] are fundamental to understanding the methods of value creation and risk management in reverse logistics processes. The final pillar of this research concerns the global complexity of the automotive supply chain and how products and goods can be recovered, regenerated, or recycled through the use of emerging technologies.

The thesis consists of three chapters. The first chapter discusses the theoretical and conceptual foundations of reverse logistics. This chapter also integrates managerial theories and discusses how these theories contribute to explaining the complexity, relationality, and value creation processes of reverse logistics. The second chapter presents a comprehensive analysis of technological transformation in the logistics sector, examining the logistics sector at the global, european and italian levels. The logistics 4.0 paradigm and emerging technologies are discussed, describing the ways in which technology is modifying traditional logistics processes to enhance and support reverse logistics systems. Finally, the third chapter of this thesis focuses on Stellantis N.V., one of the largest automotive companies in the world, and, in particular, on Stellantis Europe S.p.A., the italian subsidiary of the Stellantis Group. This provides a relevant and rich

[7] Nonaka, I., & Takeuchi, H. (1995). The knowledge-creating company. Oxford University Press.

[8] Neto, A., Perkusich, M., Dantas, E., Ramos, F., Costa, A., Almeida, H., & Perkusich, A. (2021). Knowledge-based Risk Management: A Systematic Literature Review. Proceedings of the XXXV Brazilian Symposium on Software Engineering, Association for Computing Machinery, New York; Kleindorfer, P. R., & Saad, G. H. (2005). Managing disruption risks in supply chains. Production and Operations Management, 14(1), 53-68.

[9] Freeman, R. E. (1984a). Strategic Management: A Stakeholder Approach. Pitman; Freeman, R. E. (1984b). Strategic management: A stakeholder theory. Journal of Management Studies, 39(1), 1-21; Donaldson, T., & Preston, L. E. (1995). The stakeholder theory of the corporation: Concepts, evidence, and implications. Academy of Management Review, 20(1), 65-91.

[10] Prahalad, C.K. & Ramaswamy, V. (2004a). Co-creating unique value with customers, Strategy & Leadership, 32(3), 4-9; Prahalad, C.K. & Ramaswamy, V. (2004b). The Future of Competition: Co-creating Unique Value with Customers, Harvard Business School Press; Vargo, S. L., & Lusch, R. F. (2008). Service-dominant logic: continuing the evolution. Journal of the Academy of Marketing Science, 36(1), 1-10.

[11] Pellicano, M., Perano, M. & Casali, L. (2016). The enterprise relational view (ERV): exploring future in strategic management. In F. Caputo (Eds.) Governing Business Systems: Theories and Challenges for Systems Thinking in Practice-4th Business Systems Laboratory International Symposium Book of Abstracts. Business Systems Laboratory.

[12] Elkington, J. (1997). Cannibals with Forks: The Triple Bottom Line of 21st Century Business. Capstone.

case study to explore how reverse logistics is configured, implemented, and enhanced by digital technologies in the automotive sector and, in particular, at Stellantis.

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