LEIZ CASE STUDY #1

Implementing Artificial Intelligence in the SME "Schraube 4.0"

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Relational Economics in Practice.
An Introduction and User Guide

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The research program of relational economics constitutes the core of the Leadership Excellence Institute Zeppelin | LEIZ. Building on the publications of the Springer series "Relational Economics and Organization Governance" and the annual conferences of the emerging relational economic community, a theory is developing and establishing itself that represents a paradigm shift in the field of economics: the unit of analysis is no longer the actor or the market, but the relational transaction in its complex, polyvalent, uncertain, context- and time-dependent constitution. The aim behind this is to come closer to an understanding of the real conditions and consequences of economic action. For this reason, and in view of the fact that the corresponding conceptual description tools are now available, it seems highly plausible and expedient to focus even more on examples of application. If relational economics has the declared aim of depicting economic realities as precisely as possible, then such an undertaking of practical application should not only be productive in terms of concrete recommendations for decisions, but should also, in turn, further confirm the relevance of the theoretical concept.

The series of case studies presented here aims to offer nothing more and nothing less: We invite students, practitioners and colleagues to join us in trying out what relational economics has to offer in its application to real case studies. The analytical tools available for this purpose are briefly presented below in order to provide our readers with a kind of instruction manual without implying that real-world complexity can be dealt with in a one-size-fits-all manner. Rather, the analytical steps proposed here are intended to help describe a relational transaction as a basis for then working out more context-

and time-specific options for action. This is carried out using the stakeholder model as the basic analytical structure, which is complemented in the respective cases by further case-specific methods derived from the toolbox of relational economics.

The attitude of a thorough and competent detective is required if one really wants to capture and describe a relational transaction appropriately: identifying and analysing the stakeholders involved, their resources and interests, and above all their mutual interaction, which, in turn, changes them, play a central role before further theoretical building blocks of relational economics can be applied. Accordingly, this analysis step also forms the common denominator with which the analysis of all the case studies collected here finds its starting point. For this reason, the stakeholder model is placed in the foreground in this user guide and is now briefly explained - other models are then introduced in the individual case studies and discussed in the application of these cases.

Stakeholder Model of Relational Decision Making

The theory of relational economics defines a firm as a nexus of stakeholder interests and invested stakeholder resources and corporate action via relational transactions that combine, in a cooperative and productive manner, the interests and resources of the stakeholders involved. The fact that, in particular, this takes place across cultural and sectoral boundaries is emphasised here and is related to the claim to take the real complexity and uncertainty of economic activity into account – thinking, for example, of global value creation networks or of the requirements from the ESG discussion.
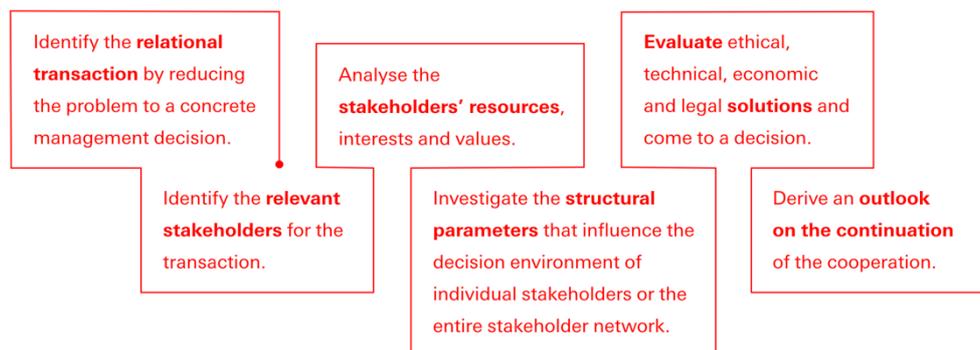
In order to derive a management decision in a specific constellation – for example, in the situations depicted in the LEIZ case studies – the stakeholder model provides the basic framework (Wieland 2020: 97ff.) and is presented here in a condensed form for the given purpose. The application of this model reveals the time- and context-specific microstructures of the relational processes and structures. It comprises six steps:

1. **Reducing the problem to a concrete management decision**. This concrete management decision ideally is a clearly narrowed down yes/no/alternative decision. This decision is the relational transaction that is to be analysed in the subsequent steps.

2. **Identifying the relevant stakeholders with reference to the transaction**. This includes the identification and prioritisation of the involved individual or collective stakeholders. Depending on the transaction, the stakeholders can be, for example, employees, management, customers, suppliers, investors, competitors, NGOs, political institutions or the public.

3. **Analysing the respective stakeholder resources, interests and values**. This entails a thorough look at the polyvalent constitution and motivation of each stakeholder. Such resources and interests could be, for example, economic, political, moral or professional, and the values can be, for example, performance values, communication values, cooperation values or moral values, that need to be combined and balanced.

4. **Investigating the problem along the structure of the decision environment**. This requires checking the relational transaction in-depth via the following eight structural parameters (Wieland 2020: 99):

    I. Decision-making stress (for example, due to political or media pressure)

    II. Intrapersonal values conflicts (for example, conflicting values arising from role-based expectations)

    III. Inter-organisational values conflicts (for example, ideals held by the collective actors that are non-negotiable for them)

    IV. Intercultural values conflicts (for example, differences in the moral doctrines of different groups)

    V. Information deficits (for example, regarding the scope and consequences of an assigned task)

    VI. Communication deficits (for example, resulting from the type of communication between the network partners)

    VII. Responsibility diffusion (for example, who is responsible for creating and solving a given problem and on what grounds)

    VIII. Rules deficits (for example, resulting from the lack of private or state regulation, or from its unenforceability).

5. **Evaluating ethical, technical, economic and legal solutions and reaching a decision**. In most cases, this decision combines ethical, technical, economic and legal approaches by evaluating the transaction-specific advantages and disadvantages of the available decision logics and considering their interdependency.

6. **Deriving an outlook concerning the continuation of the cooperation.** The question here is what new commonalities have been formed and to what extent the stakeholders involved have changed as a result of the transaction (Baumann Montecinos 2022).

FIGURE 0

An outline of what such an analysis could look like in general terms

Identify the **relational transaction** by reducing the problem to a concrete management decision.

Identify the **relevant stakeholders** for the transaction.

Analyse the **stakeholders' resources**, interests and values.

Investigate the **structural parameters** that influence the decision environment of individual stakeholders or the entire stakeholder network.

Evaluate ethical, technical, economic and legal **solutions** and come to a decision.

Derive an **outlook on the continuation** of the cooperation.

Source: own illustration.

Thus, the foundations have been laid for working on the LEIZ case studies. We will be delighted if this material is used to promote learning and exploration of relational economics, particularly in its strength of practical application. Feedback from and exchanges between lecturers would be more than welcome.

Literature

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Implementing Artificial Intelligence in the SME "Schraube 4.0"

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Introduction

The case study examines the theoretical concepts of Relational Economics and the governance of Artificial Intelligence, using the example of the machining company "Schraube 4.0" based in Germany. CEO Fiona Frisch is exploring the use of Artificial Intelligence in her company to enable it to remain globally competitive. The opportunities and risks of AI implementation are discussed from the perspective of various stakeholders, including build-or-buy decisions and ethical aspects. Moreover, the significance of a data-driven economy as a new business model is emphasised. The goal of the case study is to consider and develop various approaches to responsible AI implementation within the framework of Relational Economics.

Case Description

Fiona Frisch, CEO of the German SME "Schraube 4.0", has just returned from a business trip to Southeast Asia, after the easing of entry and trade restrictions due to the Coronavirus pandemic. Inspired by her positive experiences in Southeast Asia, the internationally active CEO wants to explore the use of Artificial Intelligence (AI) in her company in the new calendar year 2023. Most processes at company "Schraube 4.0" have already been digitized, however, Fiona believes that this is not sufficient to remain competitive in the international market. As a next step, "Schraube 4.0" must drive automation in the company to continue to survive internationally.

Fiona's impressions of the upbeat mood regarding the implementation of AI in Southeast Asian companies are underscored by the study "Racing toward the future:

artificial intelligence in Southeast Asia" (2020) by the consulting firms EDBI and Kearney. Together, they examined the corporate readiness in Southeast Asia regarding AI implementation based on over 110 surveyed users and providers of, and investors in AI as well as representatives of various companies and governments (Chua et al. 2020). They emphasise the inclusion of all stakeholders as a key element and predict possible GDP growth of one trillion dollars by 2030 across Southeast Asia if AI is successfully implemented (ibid.). Despite the predicted GDP growth, Southeast Asia is still in an early stage of AI adoption. The study categorises the progress made in Southeast Asia as being in the early stages of AI technology development. Moreover, to date, 83% of companies invest less than 0.5% of their income in AI-based applications (ibid.).
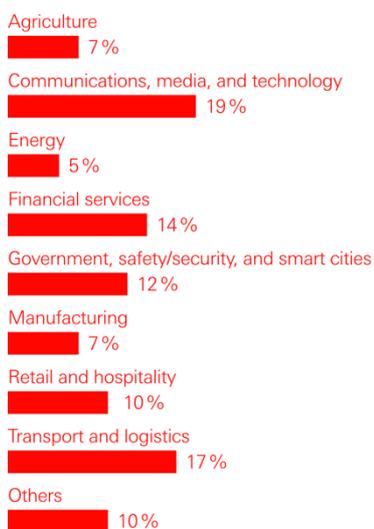
More than 80 percent of the region is in the early stages of AI adoption

Stages of AI (by % of respondents, region, or country)

	Stage 1 Not interested in inventing in AI	Early stages: 83 % of ASEAN		Advanced stages*: 15 % of ASEAN	
		Stage 2 Keen to invest/ developing AI strategy	Stage 3 Piloting initiatives within discrete activities	Stage 4 Scaling initiatives across discrete activities	Stage 5 End-to-end scaled implementation of AI
Southeast Asian nations	2 %	27 %	56 %	9 %	6 %
Singapore	2 %	22 %	58 %	12 %	7 %
Malaysia	–	26 %	60 %	9 %	6 %
Indonesia	2 %	28 %	57 %	9 %	4 %
Thailand	5 %	28 %	55 %	8 %	5 %
Philippines	7 %	26 %	54 %	4 %	9 %
Vietnam	–	36 %	49 %	11 %	4 %

* Advanced stages by sectors

Agriculture
7 %

Communications, media, and technology
19 %

Energy
5 %

Financial services
14 %

Government, safety/security, and smart cities
12 %

Manufacturing
7 %

Retail and hospitality
10 %

Transport and logistics
17 %

Others
10 %

Note: Percentages may not resolve because of roundings

Source: EBDI & Kearney 2020

In sum, the study highlights the global trend towards increasing AI implementation in businesses, a trend Fiona does not want to ignore while revising her own company's digital strategy.

As a family business that enjoys a high reputation in the region, Fiona is particularly interested in the company's continued existence. The company "Schraube 4.0", founded in 1973 by Ottmar Frisch, has been family-owned ever since and is a leading tool manufacturer in the machining sector. As a manufacturer of cutting tools, "Schraube 4.0" supplies various industries worldwide, such as the automotive and aerospace industries as well as medical technology. Since 2010, the company has been run by Ottmar Frisch's grandchildren, Fiona and Philipp Frisch, who together hold all the shares in the company. Nowadays, the company employs about 150 people and has an annual turnover of 35 million euros. "Schraube 4.0" has three sites in the Lake Constance region, where it locally handles its own production of precision tools.

In contrast to Fiona's enthusiastic attitude towards a possible AI implementation in the company, her brother Philipp, the company's marketing director, is more sceptical, although he is aware of the benefits of AI. Philipp Frisch's opinion aligns with the general sentiment in the German market, as highlighted by a trend study from IU International University of Applied Sciences[1]. The study looks at the future of AI in German companies and anonymously surveyed 500 employees and executives of small companies with up to 20 employees, medium-sized companies with 21 to 500 employees, and large companies with more than 500 employees in October 2020 (IU 2021). As for its relevance, AI is generally perceived as an important growth factor for companies, and 43% of the more than 500 surveyed employees and executives considered AI important in the company at the time of the survey, and more than 60% deemed AI to be relevant for the future (ibid.). Despite its acknowledged importance, thus far, AI has mainly been a "strategic management issue" (IU 2021: 4) and adoption rates remain low, among other reasons, due to the risks associated with the implementation of AI solutions.

This also holds true for Philipp, who sees himself and the company facing various risks following a possible implementation of AI. For one, there is scepsis among its staff regarding the implementation of automated AI solutions and, second, unintended consequences coming with the use of AI solutions could lead to reputational losses, which is why Philipp is unsure about adopting AI in his company. Technical issues

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1 https://res.cloudinary.com/iubh/image/upload/v1615985363/Presse%20und%20Forschung/White%20Papers/202010_AI-Studie_Whitepaper_vtnn4i.pdf (last usage: 26.03.2023).

might be particularly hard to foresee and manage since there is an acute shortage of skilled workers in the Lake Constance region, especially employees with the necessary AI competencies to maintain and monitor potentially deployed AI solutions. Hence, he fears that negative consequences could threaten the long-standing and well-established reputation of "Schraube 4.0" in the region.

He emphasises that only a few of the professionals already employed at "Schraube 4.0" possess the relevant technical know-how. This aspect is also addressed by the study from IU International University. According to the study, 70% of the surveyed executives have extensively dealt with AI, but only 17.9% state that their company has all the necessary competencies in the field of Artificial Intelligence. Additionally, there is a lack of willingness to invest in the corresponding know-how. This is also emphasised by over two-thirds of the surveyed employees, who stated that they do not have enough expertise. Furthermore, less than a third are willing to acquire the necessary knowledge, partly because the appropriate training programs are lacking (IU 2021).

In general, it is difficult to recruit new qualified professionals. Statistical findings from the Institute for SME Research Bonn from the year 2020 highlight the shortage of skilled workers in the field of information and communication technology in German small and medium-sized enterprises (SMEs). It shows that only 17% of German SMEs, and 18% in the EU, employ professionals in information and communication technology (ICT), while the figure is over 78% and 76% for German and European large enterprises, respectively.[2]

In addition to Philipp's concerns, Fiona is under pressure from the CFO, Susanne Schmid. Susanne, like Philipp, recognises that successful AI implementation can make company processes more efficient and that it could be a "godsend"; however, an AI solution is not as simple to implement as a software program, and any investment will not pay off directly in the next quarter. Therefore, according to Susanne Schmid, a classic cost-benefit analysis is proving to be very challenging when it comes to AI implementation.
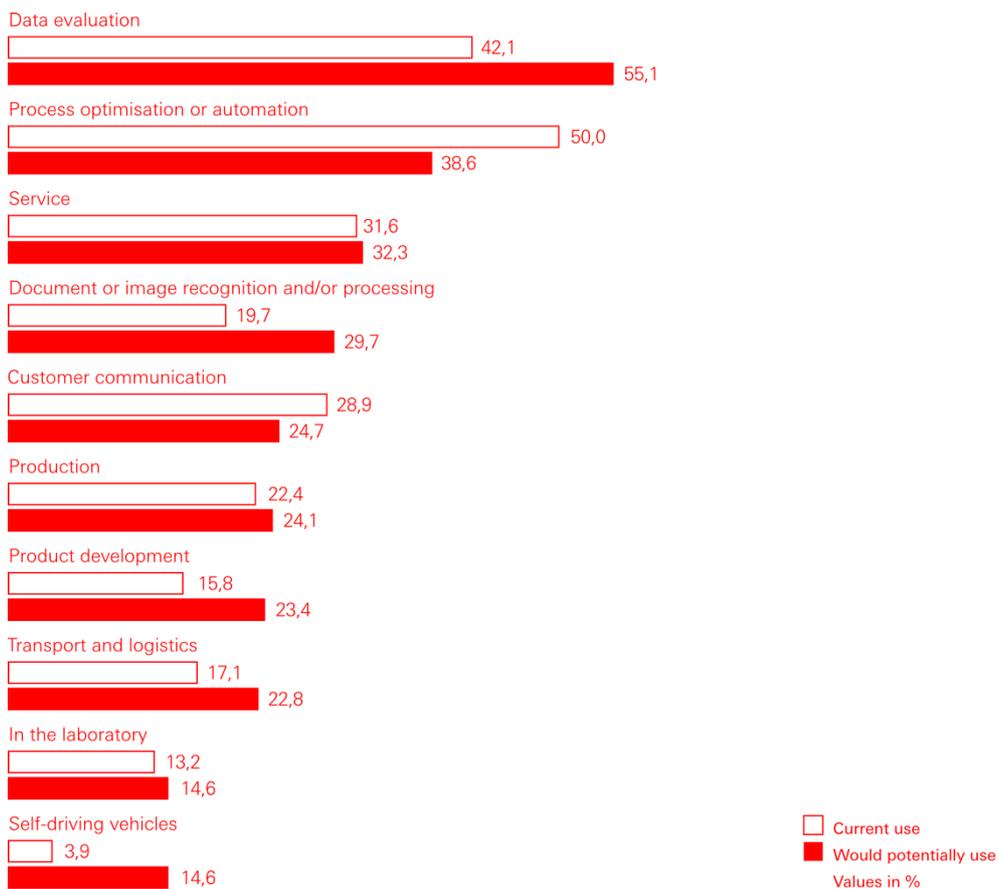
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2   https://www.ifm-bonn.org/statistiken/mittelstand-im-einzelnen/digitalisierung-der-kmu-im-eu-vergleich (last usage: 23.12.2022)

To convince her brother Philipp and the CFO of a possible AI implementation, Fiona commissions the company's CTO, Michael Blum, to conduct a risk analysis. Michael Blum has been with the company since 2010 and is serving as the CTO for "Schraube 4.0", handling the digitisation process since the Frisch siblings recruited him. Like Fiona, he sees numerous opportunities for the company if it were to implement AI. The trend study from IU International University, discovered by Fiona, confirms the potential of AI in German companies:

FIGURE 2

In which areas do you currently use AI in your company?
In which areas would you potentially use AI in your company?

Data evaluation
Current use: 42,1
Would potentially use: 55,1

Process optimisation or automation
Current use: 50,0
Would potentially use: 38,6

Service
Current use: 31,6
Would potentially use: 32,3

Document or image recognition and/or processing
Current use: 19,7
Would potentially use: 29,7

Customer communication
Current use: 28,9
Would potentially use: 24,7

Production
Current use: 22,4
Would potentially use: 24,1

Product development
Current use: 15,8
Would potentially use: 23,4

Transport and logistics
Current use: 17,1
Would potentially use: 22,8

In the laboratory
Current use: 13,2
Would potentially use: 14,6

Self-driving vehicles
Current use: 3,9
Would potentially use: 14,6

☐ Current use
■ Would potentially use
Values in %

Source: IU Internationale Hochschule 2021

In addition to process optimisation, AI in German companies is primarily used to evaluate the data collected in their own production or value creation process, as the statistics show (IU 2021). As Fiona is increasingly under pressure from the CFO and other stakeholders in the company to improve performance, she hopes to achieve such an increase in revenue and a cost optimisation through the implementation of AI.

Questions

Discuss the following questions in the context of the case study, especially from the perspective of network and AI governance.

1. Which stakeholders are affected by the planned innovations? How can the interests of all stakeholders be safeguarded and added value be created for all participants? Perform a stakeholder analysis to address this question.
2. What formats can be implemented with the participation of employees to achieve a common understanding of values?
3. What accompanying management measures must be developed as part of the AI implementation to maximise opportunities and minimise risks?
4. What considerations should be taken into account regarding the company's "build-or-buy" decision, meaning whether to build their own AI solutions in-house or to deploy standardised solutions from an external provider?

Discussion

In the course of the risk analysis, Michael Blum examines the different viewpoints of all responsible parties and creates a stakeholder analysis. Looking at the company, he identifies various risks and challenges associated with the implementation of AI. He notes that technical aspects, such as the need for robust data and the danger of biases in their own datasets, which can arise among other things through interaction with users, must not be ignored. Since the core of successful AI implementation lies in the quantity and quality of available data, Michael Blum questions whether the current data strategy of "Schraube 4.0" has already collected sufficient data for flawless functioning of AI-based applications.

In addition to production, item, quantity, and machine data, information on deadlines as well as personnel and customer data are needed. Despite having introduced central data storage internally, Michael Blum is unsure about the amount of data already collected. Even if the initial data situation would suffice for successful AI implementation, qualified personnel are needed, which is why the company must either hire new employees or resort to an 'off-the-peg' solution.

He thus considers whether external infrastructure should be purchased or whether it might be advisable to join forces with other companies to obtain a larger data pool and 'train' the algorithm according to their own needs. Due to the lack of adequately trained employees within "Schraube 4.0" and the acute shortage of skilled workers in the Lake Constance region, Michael Blum is inclined to buy a standardised solution. This decision affects the fundamental question of whether AI solutions should be purchased as "pre-trained" and standardised or developed "in-house". Michael Blum wants to discuss the decision of whether a management decision for "build" or "buy" should be made concerning their own AI implementation with all responsible parties first.

Moreover, he is concerned with the ethical risks involved in the implementation of AI, which a company must address as part of its AI governance strategy (Wiesmüller 2023), since AI-based technologies can have unintended side effects (Mueller 2022). Various use cases have already highlighted such side effects and the therefore required ethical dimension of AI development and implementation, such as the reproduction of bias or racism due to a skewed data basis (see the COMPAS scandal in the USA[3]) or safety risks in the use of AI applications in traffic (e.g., rear-end collisions of Tesla vehicles with the "Full Self-Driving" add-on[4]). In the course of an AI implementation, therefore, first, the possible side effects and challenges of AI implementation must be considered, and second, all relevant stakeholders must be involved to maintain a common understanding of values within the company. This is because mere technical impact assessments are difficult to make – a fact also known as the "Collingridge Dilemma" (Collingridge 1982), which explains the difficulties in forecasting the effects of new

3   https://massivesci.com/articles/machine-learning-compas-racism-policing-fairness/ (last usage: 13.03.2023).

4   https://www.theguardian.com/technology/2022/dec/22/tesla-crash-full-self-driving-mode-san-francisco (last usage: 13.03.2023).

technologies and their regulation. Therefore, a strategy for responsible AI usage requires more elements and dimensions than a mere cost-benefit analysis. This needs to be addressed within the framework of corporate value management. The ethics of AI must be considered not only within the company but also need to include societal stakeholders.

Despite all potential risks, the management level of "Schraube 4.0" has decided to implement AI. However, in the course of the discussions already conducted about value management and the ethical dimensions, the CFO sees the need for a well-thought-out management strategy within the compliance department. In newer corporate approaches such as "Corporate Social Responsibility (CSR)" and "Corporate Digital Responsibility (CDR)", Susanne and Fiona see the potential to promote more responsible business activities in the digital area.

They emphasise the approach of "Shared Value Creation" (Wieland 2020, 2014; Wiesmüller 2023). Since companies use AI for their own benefit, such as profit generation, the need for an ethical evaluation is closely tied to market logic (Wiesmüller 2023), and the various uncertainties associated with AI implementation pose significant challenges to companies.

Fiona sees the ethical questions of AI as a complex challenge, especially as CEO. AI-based risks affect us as individuals, society, and companies, since irresponsible AI implementation could lead to reputation loss or false AI-based predictions could result in massive financial losses. Since AI value management is very important to Fiona, she is considering internal regulations such as a Code of Conduct. From a regulatory perspective, there are various framework standards to approach the topic, including the EU's AI Act[5], ISO standards[6] like ISO/IEC 23894, the Bertelsmann Foundation's[7] certification label, or the IEEE standards. However, thus far, there is no uniform legal regulation for the use of AI, placing the responsibility in the hands of the companies themselves.

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5   https://artificialintelligenceact.eu (last usage: 31.03.2023).

6   https://www.iso.org/standards.html (last usage: 31.03.2023).

7   https://www.bertelsmann-stiftung.de/de/unsere-projekte/ethik-der-algorithmen/projektnachrichten/from-principles-to-practice-wie-wir-ki-ethik-messbar-machen-koennen (last usage: 31.03.2923).

After lengthy discussions by the management of "Schraube 4.0", they are confident that AI is one of the most important drivers of innovation and that companies play a key role as promoters of AI-based innovations. Therefore, they decide that the implementation of AI in their own company is worth the risk, as the advancing developments towards a more data-driven economy can no longer be ignored without missing out on significant business potential.

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AI governance, network governance, transformation management, relational economy

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