TECHNISCHE UNIVERSITÄT
IN DER KULTURHAUPTSTADT EUROPAS
CHEMNITZ

MAIN

Research out of the box

Transdisciplinary Master Thesis

Evaluation of supply chains with respect to credence attributes and extrapolation of viable technology solutions for their implementation

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Study Courses:	(Econo-)Physics, Information and Communication Systems, Embedded Systems, Micro and Nano Systems, Advanced Functional Materials, etc.

Rationals:

- Qualification of state-of-art misconducts (and conducts) within supply chains,
- derivation of critical issues associated with current security technologies within the supply chains,
- evaluation and quantification of the efficiency and the added value offered by Internet-of-Things, Miniaturized Smart Systems or Smart Materials (IoT/SD/SM) solutions for implementing attributes of security, sustainability and trust in technology.

Suggested tasks, deliverables and milestones:

- Research on small- and large-scale misconducts (illegal activities) or conducts (attributes securing trust) within supply and manufacturing chains starting from raw non-packaged goods producers up to the final retailer using available literature, e.g. court reports and news outlets. Prepare a corresponding table with categories of misconducts and attributes, short notes describing the core idea and clear references to the sources
- Research on existing technologies applied to protect supply and manufacturing chains from these misconducts improving sustainability and trust at each step.
- Research on qualitative and quantitative methodology on design and evaluation of supply and manufacturing chains (e.g. “House of Quality”, “Quality Function Deployment”, “Design Thinking” etc.) and derivation of a list of criteria relevant for attributes of sustainability and trust, prepare a corresponding table indicating quantitatively fulfillment of these criteria by the applied technological solutions
- Research on new technical implementations of attributes of sustainability and trust in supply and manufacturing chains (e.g. tagging and marking, blockchain technology, etc.)
- Estimate of involved data volumes (static, dynamic), encryption algorithms and required data transfer rates for the existing technologies for different critical application scenarios
- Extrapolation of the obtained knowledge to prospective viable IoT/SD/SM solutions for manufacturing and supply chains (of relevance) offering better implementation of attributes of sustainability and trust, compared to existing solutions.

Initial literature suggestions:

[1] T. Staake et al. “Anti-Counterfeiting and Supply Chain Security”, In: P. Cole, D. Ranasinghe (eds.): “Networked RFID Systems and Lightweight Cryptography”. Berlin, Heidelberg: Springer (2008). DOI 10.1007/978-3-540-71641-9_2

[2] A. Bhattacharya, J. Geraghty, P. Young: “Supplier-selection paradigm: An integrated hierarchical QFD methodology under multiple-criteria environment”, *Applied Soft Computing* **10** (4), 1013-1027 (2010). DOI 10.1016/j.asoc.2010.05.025

[3] Y. Xia, X.-X. Zu, C.-M. Shi: „A profit-driven approach to building a people-responsible supply chain”, *European Journal of Operational Research* **241** (2), 348-360 (2015). DOI 10.1016/j.ejor.2014.08.041

[4] S. Hajmohammad, S. Vachon: “Mitigation, Avoidance, or Acceptance? Managing Supplier Sustainability Risk”, *Journal of Supply Chain Management* **52** (2), 48-65 (2016). DOI 10.1111/jscm.12099

[5] KPMG LLP (Corporate authorship): “Supply Chain Fraud – a holistic approach to prevention, detection, and response”, *KPMG Technical Report* (2017). URL https://assets.kpmg

[6] B. Massimino, J. V. Gray, Y.-C. Lan: ”On the Inattention to Digital Confidentiality in Operations and Supply Chain Research”, *Productions and Operations Management* **27** (8), 1492-1515 (2018). DOI 10.1111/poms.12879

[7] A. Litke, D. Anagnostopoulos, T. Varvarigou: “Blockchains for Supply Chain Management: Architectural Elements and Challenges towards a Global Scale Deployment”, *Logistics* **3** (1), 5 (2019). DOI 10.3390/logistics3010005

[8] F. Longo et al. “Blockchain-enabled supply chain: An experimental study”, *Computers & Industrial Engineering* **136**, 57-69 (2019). DOI 10.1016/j.cie.2019.07.026

[9] A. Rejeb et al.: “Blockchain Technologies in Logistics and Supply Chain Management: A Bibliometric Review”, *Logistics* **5** (4), 72 (2021). DOI 10.3390/logistics5040072

[10] S. Hajmohammad, A. Shevchenko, S. Vachon: “Addressing Supplier Sustainability Misconducts: Response Strategies to Non-Market Stakeholder Contentions”, *International Journal of Operations & Production Management* **41** (8), 1272-1301 (2021). DOI 10.1108/IJOPM-01-2021-0018

[11] H.-Y. Cui et al. “Analysis of the innovation strategies for green supply chain management in the energy industry using the QFD-based hybrid interval valued intuitionistic fuzzy decision approach”, *Renewable and Sustainable Energy Reviews* **143**, 110844 (2021). DOI 10.1016/j.rser.2021.110844

[12] P. F. Skilton, E. Bernardes: “Normal misconduct in the prescription opioid supply chain”, *Journal of Supply Chain Management* (Early View) (2022). DOI 10.1111/jscm.12286

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