In this thesis, we propose a transaction framework to provide comprehensive and flexible transaction support for contract-driven, service-oriented business processes.

The research follows the research method outlined below. Initially, a thorough investigation on current state of affairs was made. Afterwards, we carried out a case study, which we utilized to identify the problems that are likely to occur during the execution of business processes. As the result of the solution design, the concepts, scenarios, life cycles, reference architectures, and mechanisms were proposed to address the problems. The design took place on the conceptual level, while the coding/programming and implementation is out of the scope of this thesis. The business-oriented solution design allows for transaction qualities to be specified and guaranteed by a contractual approach named as TxQoS (Transactional Quality of Service). The technology-oriented design enables flexible composition of ATCs (Abstract Transaction Constructs) as a transaction schema to support the execution of complex processes. As the last step of research, we validated the feasibility of our design by a utility study conducted in a large telecom project, which has complex processes that are service-oriented and contract-driven. Finally, we discussed the contributions and limitations of the research.

The main contribution of the thesis is the BTF (Business Transaction Framework) that addresses process execution reliability. The TxQoS approach enables the specification of transaction qualities in terms of FIAT (Fluency, Interference, Alternation, Transparency) properties. This business-friendly approach allows the providers and users to agree on transaction qualities before process execution time. The building blocks of the proposed framework, ATCs, are reusable and configurable templates, and are abstracted and generalized from existing transaction models. The various transaction requirements of sub-processes and process chunks can be represented by corresponding ATCs, which allow for a flexible composition. Integrated, the TxQoS and ATC approaches work together to form a TxQoS-aware business transaction framework.