In this thesis, structures defined via modular operads and properads are generalized to their non-commutative analogs.

We define the connected sum for modular operads. This way we are able to construct the graded commutative product on the algebra over Feynman transform of the modular operad. This forms a Batalin-Vilkovisky algebra with symmetry given by the modular operad. We transfer this structure to the cohomology via the Homological perturbation lemma. In particular, we consider these constructions for Quantum closed and Quantum open modular operad.

As a parallel project we introduce associative analog of Frobenius properad, called Open Frobenius properad. We construct the cobar complex over it and in the spirit of Barannikov interpret algebras over cobar complex as homological differential operators. Furthermore we present the IBA_∞-algebras as analog of well-known IBL_∞-algebras.