The main aim of the project entitled "Operator theory and its applications" is the solution of nontrivial hypotheses and to prove valuable results making contributions in the following areas: theory of polynomials, function spaces, partial differential equations, the theory of linear and multilinear operators, theory of interpolation, theory of s-numbers, and modules and measures of non-compactness of operators. In terms of the subject related to polynomials, the principal aim will be to justify polynomial inequalities associated to the concept of the Bohr radius. These inequalities will form the basis to develop new methods for the Fourier analysis of Boolean functions, which play an important role in information technology, cryptography, random graph theory, and statistical physics. In the area of function spaces the main aim will be a description of the interpolation between Hardy's space on infinitely dimensional polytorus. In addition we will study the abstract Morrey spaces defined in the project. Here, the main goal is to prove interpolation theorems for those spaces. The main motivation to study these spaces is for the theory of Navier–Stokes equations. In the fields associated with harmonic analysis and the theory of operators we plan to give a characterization of boundedness and compactness of singular operators defined on a regular Carleson curves, singular multiliner operators, and in particular, multilinear Hilbert transforms defined on a new class of extrapolation spaces of the Lorentz–Zygmund type. The important field of research will be the factorization of multilinear operators belonging to new classes defined in description of research tasks. Here, the issue focuses on, among other things, the study of new ideals defined in multilinear operators in this project, which in special cases for linear operators coincide with known Banach ideals. The main aim is to prove original variants of Pietsch domination and Pisier's factorization theorems. In the case of linear operators, the main purpose is to investigate asymptotic behaviour of the Grothendieck numbers of operators and moduli of entropy numbers between Banach spaces with applications to study eigenvalues of operators. The important purpose in here is to develop the theory of Fredholm operators between interpolation spaces, and show original applications in particular to PDEs. Described aims of the project will be implemented in the framework of research primary in the area of important sectors of modern analysis related to the following topics research:

- The Bohr radius and polynomial inequalities with applications to analysis of Boolean functions
- Fredholm operators on interpolation spaces and applications to PDEs
- Abstract Morrey spaces
- Hardy spaces on infinite dimensional polytorus
- Summability properties and factorization of multilinear operators
- Factorization of translation invariant operators and polynomials
- Semi-integral multilinear operators generated by Orlicz spaces
- Spectral properties of weighted composition operators on spaces of analytic functions
- Boundedness and compactness of singular operators on function spaces
- Interpolation of measure of non-compactness of multilinear operators
- Interpolation of s-numbers and entropy numbers of operators
- Grothendieck numbers and surjective local entropy moduli of operators

We are strongly motivated by applications to advanced problems in modern analysis. Thus the main reason to take the research topics associated with the theory of operators is its originality, as it provides powerful tools to solve weighty problems of classical analysis, especially in the theory of function spaces and the theory of partial differential equations. In view of the fact that operator theory is an important division of functional analysis and any impact which brings to this theory spectacular results contributes to deepen it. The aim of the project is to achieve such results which in fact motivates take the mentioned research topics