CHAPTER I

INTRODUCTION

Any problems in Sciences, Engineering, and Economics can transform to the Mathematical models or system of equations. The importance which we need to know from the system of equations is the existence of the system of equations and constructing the methods in order to estimate the solution of system of equations. Fixed Point Theory becomes the crucial techniques and efficient on study such problems. Also, Fixed Point Theory can be widely used to apply in many fields of study which is related to Sciences and technology.

Fixed-point iterations process for nonlinear mappings in Hilbert spaces and Banach spaces including Mann and Ishikawa iterations process have been studied extensively by many authors to approximate fixed point of various classes of operators and to solve variational inequalities in both Hilbert spaces and Banach spaces; see also, for example [5], [15], [18], [40] and the references therein.

Equilibrium problem which were introduced by Blum and Oettli [4]. The Equilibrium problem theory provides a novel and unified treatment of a wide class of problems which arise in economics, finance, image reconstruction, ecology, transportation, network, elasticity and optimization which has been extended and generalized in many directions using novel and innovative techniques, see [4]. Related to the equilibrium problems, we also have the problem of finding the fixed points of the nonexpansive mappings, which is the subject of current interest in functional analysis. It is natural to construct a unified approach for these problems. In this direction, several authors have introduced some iterative schemes for finding a common element of a set of the solutions of the equilibrium problems, the set solutions of the variational inequality problems for a nonlinear mapping and a set of the fixed points of an infinite (a finite) family of nonexpansive mappings. For

the detail, see [10], [43] and the references therein.

In 1952, the original Mann iteration was defined in a matrix formulation by Mann [24]. In 1974, Ishikawa [19] introduced the iterative scheme which later, it is said to be Ishikawa iteration and studied its strong convergence theorem for lipschitzian pseudo-contractive mapping in Hilbert spaces.

In 1989, Nadezhkina and Takahashi[26] introduced the following iterative scheme for finding an element of fixed point problem and variational inequalities and studied the weak convergence theorem for monotone and Lipschitz continuous mapping nonexpansive mappings in a real Hilbert space.

In 1997 Combettes and Hirstoaga [10] introduced an iterative scheme of finding the best approximation to initial data when $EP(F)$ is nonempty and proved a strong convergence theorem.

In 2007, Plubtieng and Punpaeng [28] introduced a new iterative scheme for finding a common element of the set of solutions of an equilibrium problem, the set of solutions of the variational inequality problem and the set of fixed points for a nonexpansive mapping in a real Hilbert space.

Liu, Chang and Zuo [23] introduced a hybrid iterative scheme for finding a common element of the set of solutions of mixed equilibrium problems, the set of common fixed points for nonexpansive semigroup and the set of solution of quasi-variational inclusions with multivalued maximal monotone mappings and inverse-strongly monotone mappings. Very recently, Hao [17] introduced a general iterative method for finding a common element of solution set of quasi variational inclusion problems and of the common fixed point set of an infinite family of nonexpansive mappings.