

## ON EXISTENCE THEOREMS FOR RANDOM VECTOR EQUILIBRIUM PROBLEMS <sup>1</sup>

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**Abstract.** In this paper, using well-known KKM-Fan theorem, we give an existence theorem for the solutions of a random vector equilibrium problem defined by multifunctions. Moreover, we consider a random noncooperative equilibrium problem for vector-valued functions and prove an existence theorem for its solutions.

**Keywords.** Random Vector Equilibrium Problem, Random Noncooperative Vector Equilibrium Problem, Existence Theorems, Topological Vector Space.

**AMS (MOS) subject classification:** 47J20, 49J40.

### 1 Introduction and Preliminaries

Random variational inequalities and random equilibrium problems are of fundamental importance in modern random nonlinear analysis.

Tan ([12]) and Chang *et al.* ([4]-[6]) considered random variational inequalities for real-valued functions, and gave some existence theorems of random solutions for their inequalities. Recently, Lee *et al.* ([11]) considered random vector variational inequalities for vector valued functions and gave some existence theorems for random vector variational inequalities and for random noncooperative vector equilibrium problems for vector valued functions. Very recently, Kalmoun ([8, 9]) considered vector equilibrium problems for vector valued functions, gave some existence theorems for the problems and extended such existence theorems to random vector equilibrium problem for vector valued functions. Lee *et al.* ([10]) investigated a random vector equilibrium problem with multifunctions which is different from our problems which will be treated in this paper.

In this paper, following ideas in Kalmoun ([8, 9]), and using KKM-Fan theorem ([7]), we give an existence theorem for a solution of a random vector equilibrium problem with multifunctions. Moreover, we apply such existence theorem to a random noncooperative equilibrium problem for vector valued functions.

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