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Alice de Lapparent, Sophie Martin, Rodolphe Sabatier

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## Commitments between managers in order to guarantee viability of a collective installation with different activities

**Alice DE LAPPARENT<sup>1</sup>, Sophie MARTIN<sup>2</sup>, Rodolphe SABATIER<sup>1</sup>**

<sup>1</sup> INRAE, UR 767 Ecodéveloppement, 84000 Avignon, France

<sup>2</sup> INRAE, UR LISC, Laboratoire d'ingénierie des Systèmes Complexes, 63178 Aubière, France

Diversification of farm activities can be adopted as a way to reduce risk and improve farm resilience in a context of climate change and increased uncertainties (Barbieri and Mahoney, 2009; Gonçalves et al., 2021; Paut et al., 2019). However, it raises many challenges such as an increase of workload or the necessity of knowledge and know-how acquisition (Duru et al., 2015). A solution can be found through collective installation, sharing workload and competences among the associates. It implies finding a way to organize individual and collective management of activities. Indeed, management decisions about one activity can affect the others, on the short but also long term.

In our study, we used the framework of Viability Theory in order to model a collective installation of a market gardening activity and a restaurant. In the computation of a guaranteed viability kernel of each activity, results from the second activity are considered as tyochastic uncertainty. In order to reduce this uncertainty, the two managers can agree on commitments about vegetable production and economic results. This results in a reduction of the range of tyochastic uncertainty. Different organizations of collective management have been implemented. Thus, our model represents a variety of solutions in the trade-off between exhaustive knowledge, resulting in heavy mental load, and ignorance of the other manager's results. In the field of mathematical modelling, this trade-off can be translated by the separation of activities into different modules, resulting in a decrease of computation times at the cost of a loss of information.

The size of the guaranteed viability kernels depends on the way the two activities are organized, and on the levels of commitments the two managers agree on. In other words, simultaneous viability of both activities can be more or less difficult to achieve.

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