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## *Abstract*

Faculty of Science

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Doctor of Philosophy

### **Coalition formation in a virtual buying cooperative: A case for formal grammars**

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We report on a study that investigates the applicability of formal grammars in modelling coalition formation. This particular coalition formation is amongst a group of physically distributed enterprises intending to purchase items from a supplier as a single entity, termed a virtual buying cooperative (VBC). We investigate several grammars with regard to their appropriateness in modelling the interaction strategy amongst the enterprises during the formation of a VBC. A regular grammar, context-free grammars, a random permitting context grammar, random forbidding context grammars, and random context grammars are used to model the formation of a VBC in this study. The adequacy and limitations in modelling the formation of a VBC by these grammars is explored. The results demonstrate that random context grammars are adequate in modelling a VBC environment. In addition to generating the specified languages representing a formed coalition, the production rules of all the three random context grammars investigated in this study, at every derivation step, adhere to the interaction strategy of a VBC during its formation. The strategy excludes enterprises that have not been invited to join the coalition from participating in the coalition. Furthermore, if an enterprise has been invited to join the coalition by multiple enterprises, it can only accept one invitation. This study aims to bridge the gap between formal grammars and technological applications.