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Logistic Models Towards Smart and Sustainable Farming Practices

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Agriculture is one of the broadest economic sectors and essential for the economic development of a country. However, as the world population grows and the demand for food and biofuels increases, agricultural systems face the pressures from resource depletion and environmental damage caused by the intensive use of often inefficient and harmful agricultural practices (Fao, 2017). Monocropping and intensive farming techniques with high pesticide and fertiliser use, have, for example, contributed significantly to global greenhouse gas emissions, soil degradation and water depletion. Addressing the current agricultural challenges, thus, closely aligns with several of the sustainable development goals set by the United Nations, aimed at countering hunger, poverty and inequality as well as a number of environmental threads, such as deforestation, water use, soil depletion and climate change (UN, 2015). The use of automated vehicles, such as drones and robots, in combination with precision farming and pixel cropping holds, furthermore, potential to better monitor and respond to the need of individual crops, while also allowing for more crop diversity which in turn improves soil fertility. However, to fully harvest the benefits from these technologies and ensure efficient and smooth operations in the field, sound decision making and logistics planning is an essential requirement. Following from this, the overall aim of this PhD project is to propose adequate optimisation models and solution methods for logistics planning in the field of automated agriculture, with particular focus on pixel cropping and precision farming.