Industrial Maths study groups – problem announced for the Clean and Sustainable Growth event

How can Mathematical Sciences solve a problem around cut flowers?

A Clean and Sustainable Growth study group will allow researchers to look at four-five problems over a three-day period. One of these will be looking at quality control processes for cut flowers. The organisers, KTN, alongside the University of Nottingham, are looking for researchers to work on the following conundrum:

Challenge context: Established 11 years ago, MM Flowers is the UK's leading, fully integrated cut flower supplier, unique within the UK cut flower industry in ownership and practices. MM Flowers is owned by the Munoz Group, a leading breeder, grower and distributor of citrus and grapes; Vegpro, East Africa's largest flower and vegetable producer; and Elite, the leading flower grower and breeder in South America. MM Flowers supplies many of the major high street retail brands whether in store estate or directly to consumers. The UK cut flower industry can be challenging, where customers expect high quality flowers at competitive prices. The vast majority of species utilised are highly perishable, short life products, which are transported from many different regions around the world. Pre-harvest management, logistics and environmental control are all factors that can positively or negatively impact upon flower quality. In many instances, there are substantial datasets generated around these processes, but the produce sector has been slow to adapt to more innovative approaches to accurately managing and analysing data.

Challenge Statement: The cut flower industry is no exception to this, generating a vast amount of data, from farm environmental and production information, through to consumer complaints and sales data. Traditionally, this data is often underused and is generally considered in isolation to the other elements of the supply chain. However, the data generated presents an opportunity to challenge and optimise many of the historic processes. There is a dramatic increase during periods such as Valentine's and Mother's Day. To ensure the quality of product is delivered successfully and is of the required

standards for bouquet production, a dedicated quality control (QC) team undertake daily inspections of the flowers received, and in turn generate a vast array of data. The data recorded includes quality assessments, grower information and vase performance data. The QC team play a significant role in the business. Daily inspections can directly prevent quality challenges, whilst the data generated has been used to help identify the source of quality challenges, although often in isolated instances. There are questions regarding the methodology applied by the QC team to optimise the inspections that are undertaken. Therefore, can historical data throughout the supply chain be utilised to drive areas of investigation for the QC team. In addition, it would be important to link this data with other aspects of the business/supply chain in an attempt to reduce waste levels.

Desired Outcomes: A review of the process behind the QC sampling protocols. This would include understanding the current sampling process and associated datasets, with innovative and robust application of statistical methodology to develop and optimise future sampling techniques. This novel approach should target resources more efficiently to identify areas of greatest risk and result in waste reduction throughout the supply chain.

Datasets Available:

- Grower environmental and agronomic data.
- Grower productivity and waste data
- Daily quality inspection (QC) data
- Daily waste data at MM Flowers
- MM Flowers vase performance

If you are a UK researcher and wish to register for this Study Group, please register here.

Study Group Background: Driving translation of mathematical and statistical research advances into high value applications in industry is vital to unlocking key societal and economic challenges in clean growth and sustainability.

Representatives from industry will present their problems on the first day. Researchers in mathematics, statistics, engineering, computer science and related areas will work together

towards practical solutions, and first steps in approaching problems. Early stage career academics, Ph.D students, and postdocs are particularly welcome.

This Study Group is fully funded by the University of Nottingham Leverhulme Doctoral Scholarships programme "Modelling and Analytics for a Sustainable Society" with Support from Innovate UK's Knowledge Transfer Network; as such, there is no cost for industry to bring a problem to the Group.

Why take part? Study Groups are a great way to; get new problems, expand research portfolios, make vital contact with industry and meet other academics from different fields.