Big Data Will Save Your 'Slot' And Make Online Shopping Greener

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A new operational strategy mining big data to predict when online shoppers want their weekly food shop delivered will not only improve service for customers but boost retailers' profits by four per cent.

Retailers who offer home deliveries are often working on very tight profit margins since the delivery operation is a significant cost driver; especially if the retailer commits to offering tight delivery time windows in an attempt to increase customer satisfaction and to keep failed delivery attempts to a minimum. Accordingly, they are constantly on the look-out for ways to make deliveries more efficient and greener.

New research by academics from Warwick Business School, Lancaster University Management School and the University of Southampton have devised a new analytic approach that helps retailers to decide when to incentivise customers - by, for example, lowering delivery fees - in which area and in which time slots all in real time. This will make the future delivery operation more efficient and therefore greener as delivery vans will use less fuel.

The new approach was tested using real shopping data from a major e-grocer in the UK over a period of six months and generated a four per cent increase in profits on average in a simulation study, outperforming traditional delivery pricing policies.

According to the Institute for Grocery Distribution, online shopping sales of food and groceries are set to increase by 126 per cent over the next five years, taking sales up to £14.6 billion. As tablet and smartphone usage becomes more widespread, shopping online has become quicker and easier and the speed of delivery has become critical in the online fulfilment race.

The group of researchers, which includes Arne Strauss, Assistant Professor of Operational Research at Warwick Business School, propose an analytic approach that will predict when people want their shopping delivered depending on what delivery prices (or incentives such as discounts or loyalty points) are being quoted for different delivery time slots. It takes into account accepted orders to date as well as orders that are still expected to come in.

Dr Strauss said:

"Traditionally online retailers would collect orders including delivery time requests until a certain cut-off time and plan their delivery schedule accordingly. Therefore, maximising profits is a problem because the final set of orders for a given delivery day are not known until shortly beforehand, yet decisions on the pricing of delivery time 'slots' have to be made in advance based on an estimate.

"With our new approach we demonstrate that analysing the customer data which is already at retailers' fingertips and using it to predict the impact of future expected orders in the estimation of delivery costs produces higher profits than only using orders accepted to date in this estimation.

"Our model can outperform the static two-tier delivery pricing policies that are often found in practice by around four per cent in profit. In an industry that operates on very small margins, this profit potential is significant."
Dr Strauss believes online retailers are missing a number of tricks to make more money from their delivery service including combining demand management with vehicle routing optimisation software, and maximising the use of customer information to segment and target customers.

He also recommends that online retailers try and nudge customers into the most profitable delivery times which could result in a significant increase in profits as demonstrated in the study.

"It is important to incentivise customers and steer them to particular delivery times," said Dr Strauss. "This could be in the form of 'points' or vouchers or even something along the lines of asking the customer to consider the environmental impact.

"If they are not being given incentives when it comes to requesting their delivery times, then this can have a large impact on route planning and efficiency for the delivery team.

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"Business failures such as Webvan who went bankrupt in 2001 after trying to offer a same-day delivery service brought home the message that while small delivery windows appeal to customers, they do cost the retailer money."

Dr Strauss now intends to perform research into the new shift in online grocery shopping, same day delivery.
The full paper Choice Based Management and Vehicle Routing in E-fulfilment is available here.

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Notes to editors:

1. Warwick Business School, located in central England, is the largest department of the University of Warwick and the UK's fastest rising business school according the Financial Times. WBS is triple accredited by the leading global business education associations and was the first in the UK to attain this accreditation. Offering the full portfolio of business education courses, from undergraduate through to MBAs, and with a strong Doctoral Programme, WBS is the complete business school. Students at WBS currently number around 6,500, and come from 125 countries. Just under half of faculty are non-UK, or have worked abroad. WBS Dean, Professor Mark P Taylor, is among the most highly-cited scholars in the world and was previously Managing Director at BlackRock, the world's largest asset manager.

2. Dr Arne K Strauss is Assistant Professor of Operational Research in the ORMS Group at Warwick Business School. Previously, he held a position as Senior Research Associate under the LANCS Initiative at Lancaster University's Department of Management Science where he completed the PhD programme in 2009. From October 2009 until September 2010, he held an EPSRC PhD Plus fellowship (now re-named as EPSRC Doctoral Prize) at Lancaster. Before beginning his doctoral studies, he obtained a Masters degree in mathematics from Virginia Tech, USA, as well as a diploma (equivalent to Masters degree) in mathematics and business administration from the University of Trier, Germany, in 2006. During his doctoral studies, his main research area was revenue optimisation involving models of customer choice; an interest that he continues to pursue with various on-going projects, including industrial collaborations, eg with Lufthansa Systems. He won the doctoral prize of the Operational Research Society for the best PhD dissertation 2009, the Goodeve Medal for the best paper in the ABS 3* Journal of the Operational Research Society in 2012, and various other awards. He is a member of the organizing committee of the 11th International Conference on Applied Mathematical Optimization and Modelling that will take place at Warwick in April 2014. He serves as referee for various international journals such as Operational Research, Production & Operations Management or Manufacturing & Service Operations Management.

3. Warwick Business School has in-house broadcasting facilities for TV and radio. We have an ISDN line for radio and for television interviews we have the Globelynx TVReady network, a list of Warwick experts is available. If you are looking for an expert in an area that is not listed, please contact Ashley Potter. Our ISDN number is 024 7647 1287.?

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