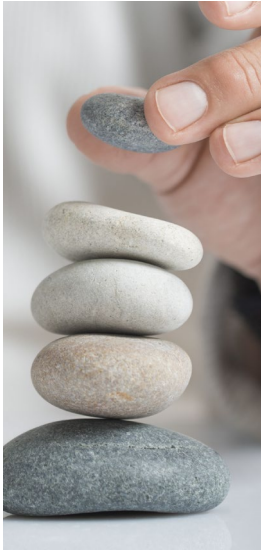


# MICRO FULFILLMENT

SUPPLY CHAIN ORCHESTRATION  
STRATEGIES FOR OMNICHANNEL  
RETAILERS



### The TGW MFC concept

Overview of the TGW multi-store hybrid micro fulfillment concept



### Central Orchestration

Overview of the benefits of central orchestration



### TGW Hybrid Benefits

A perspective on the unique benefits of the TGW MFC.



### Labour Reductions

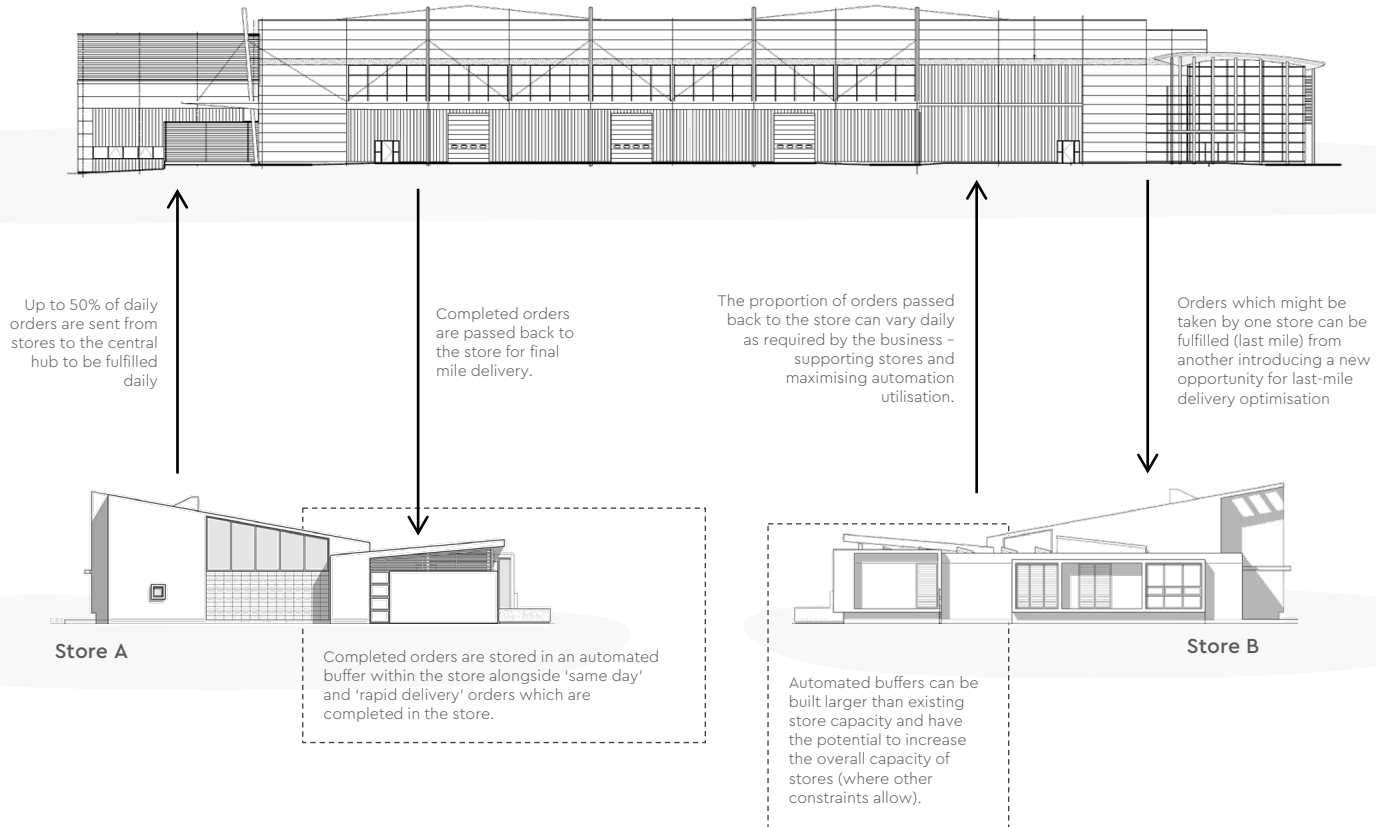
How TGW can support the long term reduction of labour costs

# TGW Hybrid MFC concept






Fig. 18  
Utilising a multi-point hybrid distribution network for micro-fulfillment

A central hub is set up to support a number of stores by taking a proportion of their orders each day.

Central order fulfillment centre (1000m<sup>2</sup> – 1400m<sup>2</sup>)



| Centralisation Benefits   |                                       |
|---|---------------------------------------|
|  | Lower investment cost per order       |
|  | Ability to offer full range           |
|  | Simpler flightpath                    |
|  | Increased control over key systems    |
|  | Future-proofed for autonomous picking |
|  | Genuine removal of constraints        |
|  | Deoptimized journey prevention        |

| Hybrid MFC benefits   |  |
|---|--|
|  | Improves Last mile route planning                |
|  | Allows daily store volume flexing                |
|  | Creates a long term growth strategy              |
|  | Creates Upstream parcel merging options          |
|  | Minimisation of food waste                       |
|  | Enables online operations in small-format stores |
|  | Removes complex store retrofits                  |

A hybrid fulfillment model is one where a proportion of daily online orders are centralised. Some capacity is retained in store (for same-day and rapid fulfillment orders), but central order orchestration benefits are realised for overnight orders.

As orders are received, the active delivery routes for the day are re-calculated, ensuring a constant up-to-the-minute optimisation of the entire network.

The proportion of orders centralised each day from each store can be flexed up and down – creating an added layer of resilience across the business to cope with unforeseen events. It also enables the company to continue servicing customers in a critical failure by centralising an entire store's order well if required for some time.

This unique, patent-pending approach allows investors to unlock the full range of benefits outlined in Figure 19. but it also creates different benefits for investors, which are outlined in Figure 20.

# Central orchestration benefits








**Centralisation has been a critical question for many network developers over the years. In the case of grocery fulfillment, the benefits of central order orchestration are significant – however, the concept is not without flaws.**

Many of the benefits stem from the ability to build a more comprehensive, more robust solution that has a high level of resilience in a setting that is tried and tested, made fit for purpose and free from customer traffic. The investor can think over a longer timeframe as well-meaning that they may justify writing investment off over a more extended period. Still, it also enables them to plan upfront for future changes, de-risking their business for the future.

On the downside, the investor loses vital speed. Not the pace to pick an order, but they lose some proximity to the customer. While there are some benefits in the central orchestration of last-mile delivery routing over more expansive geography than a single store, the problem is still significant.







Whilst orders are picked overnight for next-day delivery, we have less of a problem, but this looks set to change as we have set out. Therefore centralised orchestration prevents the retailer from essentially entering this market. This may be unacceptable for the investor.

Fig. 18  
Primary benefits of central order orchestration for grocery online order fulfillment

| Benefit   | Explanation   | Value |
|---|---|-------|
|  Lower investment cost per order       | The principal benefit for central order orchestration is the economies of scale, which investors will benefit from – saving up to 30% per order on the initial capital investment and lowering long term running costs.                   |       |
|  Ability to offer full range           | Having centralised storage enables less storage per SKU, but it also allows investors to offer a fuller range to their customers. Case studies show us that fuller ranges increase baskets by up to 7%.                                   |       |
|  Simpler flightpath                    | Investments in logistics settings rather than retail settings mean that the investor benefits not only from a tried and tested installation process but can also benefit from cost savings linked to design standardisation.              |       |
|  Increased control over key systems    | By reducing the number of installations, the risks of total system failure are reduced for the investor. On-site engineering teams are more affordable, and monitoring and long term optimisation can be better implemented.              |       |
|  Future-proofed for autonomous picking | As technology for complete order picking emerges investors in larger logistics installations will enjoy earlier access to this market as they will have the resident site knowhow and experience to support the investment.               |       |
|  Genuine removal of constraints        | Order capacity in-store is not limited by picking capacity; it is determined by van capacity and loading capacity. Investing in automation within a store will not improve these constraints.   |       |
|  Deoptimized journey prevention       | When stores get full, choosing to fulfil an order from an alternate store may be detrimental to the overall profitability of the order. This erosion of profit as stores get busy is a problem for the in-store automation business case. |       |

# TGW Hybrid MFC benefits

Fig. 20  
Unique benefits of the TGW Hybrid MFC solution

| Benefit   | Explanation   | Value |
|---|---|-------|
|  Last mile route planning                      | By pooling orders for multiple stores, the Hybrid MFC model can dynamically optimise routing for customers to ensure that the vehicle that the order is sent on is always the best for the business.                  |       |
|  Daily store volume flexing                    | Problems happen. We can respond by moving orders back upstream (virtually) and sending them to another store for delivery. We can also proactively smooth volume throughout the week.                                 |       |
| x2 Order grouping for store orders  | By introducing a simple tote buffer into stores, the software used for picking in-store can be re-programmed to take advantage of a concept called 'batching', saving hours walking around the store unnecessarily.   |       |
|  Upstream merging                              | Additional products (samples, parcels, non-food items) can now be cost-effectively introduced in bulk directly into totes that are delivered to customers home  |       |
|  Minimisation of waste                         | With constant vehicle movements back up the supply chain to the central fulfillment centre from stores, returned, uncollected, or failed orders can be passed back upstream and reused to minimise waste              |       |
|  Enables implementation in small-format stores | Order storage buffers are compact. Without having to install complex picking equipment, it allows retailers to install buffers into previously uneconomical store formats and enables access to new markets           |       |
|  Removes complex store retrofits              | Order storage buffers can be installed without the need for testing. They can be partly pre-assembled and can be installed in a short window without in-store software integration, minimising pressure on the store. |       |

**The synergies created from introducing this hybrid model produce a series of unique benefits fact the investor can take advantage of.**

The extent to which the investor can take advantage of these will be unique to their operating model and require validation and quantification.

We estimate that a six-store network, where the retailer invests in a central fulfillment engine and six completed order buffers, will typically require a 2500-3000 tote per hour network solution based on market average order size information.

An illustrative investment proposal is available to complement this report. This proposal works on the basis that the investor acquires a logistics property, pays rent at market rates and pays upfront for the fit-out of all automation, systems integration and is further based on a realistic future variable running cost for the network (including all delivery costs).

This illustration shows that using this supply chain model that investors have the potential to achieve a three-year payback, whilst also significantly increasing the overall long term capacity of the network.

# Long term labour reduction strategies

**Other In-store MFC technology solutions being widely marketed today improve picking efficiency but they fall short of being able to fully automate the picking process.**

Widely reported labour shortages this year across the retail and logistics sectors points to a growing problem – it is difficult to find reliable labour for work at antisocial hours today and this problem is only going to get worse.

Developments in the application of robotic picking for groceries has meant that it is now highly realistic that as part of a 'goods-to-person automated storage and retrieval system that articulated arms can replace the role of the picker. These highly intelligent, cognitive robots are capable of self-learning – they accumulate information with every pick and learn from it. They use cutting edge visioning systems to make sure that products are placed in precise ways into totes and can stack products safely, making sure that heavy items are not placed on delicate ones.

This is not financially within reach for other in-store MFC concepts today because the utilisation and order profile of in-store MFCs simply does not lend itself to the payback of the technology. This technology pays back best when it is highly utilised with a constant flow of work – something that the TGW Hybrid model can create.



To learn more about how TGW can apply robotic picking technology to an MFC concept for your business please contact your local TGW office or visit us via the QR code provided.

This interview contains views that originate from outside TGW. It is therefore possible that the interview does not fully reflect the views of TGW Logistics Group.

#### **Dave Horton FCIQB FAPM**

Managing Director, Consultant & Former Operations Director for Kier Construction – a developer of logistic infrastructure.



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Interview

## Dave Horton

Several large UK grocers announced the closure of online grocery facilities despite booming demand – why do you think that happened?

I think there are several things going on here. Firstly, looking at Sainsbury's I would say that the pandemic have forced them to instantly 'get better' and picking groceries from their store estate – they found a way, under duress, to increase their capacity. As some of these volumes and declined they realised that it didn't make sense to pay for all the overheads and additional management costs of running a separate stand-alone operation out of a single dark store – not when they've unlocked additional capacity in their main estate.

ASDA I think are going through a period of restructuring and will be evaluating options for online growth carefully. I imagine that part of the problem for these sites is their location – one is likely to be under-utilised and the others are in premium wage territory. You can't set up a depot paying national salaries, expecting your team to come into work at 3am and then be surprised when they leave to work over the road for more money and better hours. It's capitalism working!

What is going to be the thing, if anything, that will kill off the concept of the Micro fulfillment centre, our ultra small distribution unit before they really get started?

One person needs a six-loave pack of gluten-free seeded bread, and the next wants a multi-grain, full-size pack of chemical-free and preservative-free home-made bread. When it comes to grocery, let's be honest - there really is no limit on what choice customers really want because when it comes to food, everyone likes to have it their way.

In a digital world where logistics giga-sites can hold half a million different SKUs and customise them all on the way out the door is it realistic to think that the basic range in a supermarket today is going to be enough to satisfy everyone? I don't think so. In a world where you can have choice, you will choose more.





### Closing statement

**TGW has delivered supply chain solutions for clients since 1969 and has managed and advised on logistics assets in excess of 12bn EUR. (as of June 30, 2021).**

TGW's award-winning team of industry experts has decades of experience designing, managing, and implementing materials handling strategies for clients worldwide.

The team's approach combines proprietary research with expert management to deliver strategies and solutions which target superior performance and precise outcomes. The team believes that more predictable and repeatable performance can be achieved by thorough market research aimed at removing human behavioural biases in so far as possible. As markets evolve, these strategies are continuously refined and updated to adapt to dynamic market conditions and incorporate ongoing research.

A handwritten signature in black ink, appearing to read 'James Osborn', written in a cursive style.

James Osborn FCILT  
Editor and VP fulfillment (holding)





### **Part of the series - MFC strategies for omnichannel grocery retail organisations**

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## Performance concepts

In explaining operating models and supply chain concepts we may refer to commonly used methods of calculating performance which are themselves not financial measures. These measures have been defined or specified in the applicable recognised accounting standards (or in other applicable regulations).

For each of these we offer the following definitions:

| LPM label   | Calculation   | Information content   |
|---|---|---|
| Overall Equipment Effectiveness<br>- OEE  | Maximum OEE means 100% Quality (only Good Parts), 100% Performance (as fast as possible), and 100% Availability (no Stop Time).   | In supply chain concepts, often the goal of the solution is referred to as a high OEE, meaning that overall the system is offering a blended combination of throughput performance with quality.  |
| Overall Warehousing Rate<br>- OWR or DWR (Direct warehousing rate)<br>- May also be referred to as UPMH | Total units processed into the distribution network, plus total units dispatched, divided by the total number of variable work hours deployed to achieve the work.  | The highest level of performance measurement in a logistics network concept is the amount of product that is passed through the network for each hour spent overall in the supply chain. Our definition excludes fixed costs of operating a supply chain business (rent, rates and non-operational labour charges). |
| Cost / income ratio (%)   | Calculated as operating expenses divided by operating income before credit loss expense or release.   | This measure provides information about the efficiency of the business by comparing operating expenses with gross income.   |
| Net profit growth (%)   | Calculated as the change in net profit attributable to shareholders from continuing operations between current and comparison periods divided by net profit attributable to shareholders from continuing operations of the comparison period. | This measure provides information about profit growth in comparison with the prior period.  |

# Abbreviations frequently used in our reports

|          |   |          |   |          |                               |          |                                       |          |                                     |
|----------|---|----------|---|----------|-------------------------------|----------|---------------------------------------|----------|-------------------------------------|
| <b>A</b> |   | C&ORC    | Compliance & Operational Risk Control   | FY       | Fiscal Year                   | <b>N</b> |                                       | SCP      | Supply Chain Planning               |
| 3PL      | Third Party Logistics                     | CPFR     | Collaborative Planning and Forecasting Replenishment                                      | <b>G</b> |                               | NAV      | Net asset value                       | SKU      | Stock-Keeping Unit                  |
| 4PL      | Fourth Party Logistics                    | CPH      | (equipment) cycles per hour   | GDP      | Gross Domestic Product        | NDC      | National Distribution Centre          | SICR     | Significant increase in credit risk |
| ABC      | Activity Based Costing                    | CRM      | Customer Relationship Management or Credit Risk Mitigation or Comprehensive Risk Measure. | GVA      | Gross Value Added             | NIFO     | Next In First Out                     | SRM      | Specific Risk Measure               |
| ABS      | Asset-backed securities                   | CRO      | Conversion Rate Optimisation  | GWV      | Gross Vehicle Weight          | NI       | Net Interest Income                   | <b>T</b> |                                     |
| ABM      | Activity Based Management                 | CRP      | Capacity Requirements Planning  | <b>H</b> |                               | NPV      | Net present Value                     | TBTF     | Ro big to Fail                      |
| A-IRB    | Advanced internal ratings-based           | CRR      | Capital Requirements Regulation   | HQLA     | High Quality Liquid Assets    | NVA      | Non-Value adding                      | TLAC     | Total loss absorbing capacity       |
| AIV      | Alternate investment vehicle              | CST      | Combined Stress Test  | <b>I</b> |                               | NVOC     | Non-Vessel Operating Common Carriers  | TMS      | Transportation Management System    |
| AMO      | Advanced Measurement approach             | <b>D</b> |   | IHC      | Intermediate Holding Company  | <b>O</b> |                                       | TOFC     | Trailer on Flatcar                  |
| AoA      | Articles of association                   | DC       | Distribution Centre   | IMA      | Internal Model Approach       | OEE      | Overall Equipment Effectiveness       | TTC      | Through the cycle                   |
| AOM      | Advanced Order Management                 | DMAIC    | Define, Measure, Analyse Improvement, Control   | IMM      | Internal Model Method         | OCA      | Own Credit adjusted                   | TQM      | Total Quality Management            |
| APM      | Alternative Performance Measure           | DRP      | Distribution Resources Planning   | IRC      | Incremental risk charge       | OMS      | Order Management System               | <b>U</b> |                                     |
| API      | Application Programming Interface         | <b>E</b> |   | IRR      | Internal Rate of Return       | OS&D     | Over, short and damaged               | UFC      | Uniform Freight Classification      |
| APS      | Advanced Planning System                  | EBIT     | Earnings Before Interest and Taxes  | <b>J</b> |                               | OWR      | Overall Warehouse Rate                | UPMH     | Units per man hour                  |
| ASF      | Available stable funding                  | EBITDA   | Earnings Before Interest, Taxes, Depreciation   | JIT      | Just-In-Time                  | <b>P</b> |                                       | <b>V</b> |                                     |
| AT1      | Additional tier 1                         | ECR      | Efficient Customer Response   | <b>K</b> |                               | PFE      | Potential Future Exposure             | VaR      | Value at risk                       |
| ATP      | Available to Promise                      | EDI      | Electronic Data Interchange   | KPI      | Key Performance Indicators    | PIT      | Point in Time                         | VA       | Value Adding                        |
| AuM      | Asset under management                    | EOQ      | Economic Order Quantity   | KRT      | Key Risk Taker                | P&L      | Profit and Loss                       | VCS      | Value Creation System               |
| <b>B</b> |   | EPS      | Earnings per share  | <b>L</b> |                               | POS      | Point of Sale                         | VMI      | Vendor Managed Inventory            |
| BOL      | Bill of Lading                            | ERP      | Enterprise Resource Planning  | LAS      | Liquidity-adjusted stress     | POD      | Point of Delivery                     | <b>W</b> |                                     |
| BOM      | Bill of Materials                         | <b>F</b> |   | LCR      | Liquidity coverage ratio      | POE      | Point of Entry                        | WIP      | Work in Process                     |
| BPR      | Business Process Reengineering            | FAK      | Freight All Kinds   | LIFO     | Last In First Out             | <b>Q</b> |                                       | WMS      | Warehouse Management System         |
| <b>C</b> |   | FEFO     | First Expire First Out  | LO/LO    | Lift-on/Lift-off              | QR       | Quick Response                        |          |                                     |
| CAC      | Customer Acquisition Cost                 | FEM      | European Federation of Materials Handling   | LTL      | Less than Truckload           | QRRE     | Qualifying revolving retail exposures |          |                                     |
| CAGR     | Compounded Annual Growth Rate             | FIFO     | First in First Out  | LTV      | Loan to value                 | <b>R</b> |                                       |          |                                     |
| CCAR     | Comprehensive Capital Analysis and Review | FTL      | Full Truckload  | <b>M</b> |                               | RBC      | Risk based capital                    |          |                                     |
| CCR      | Counterpart Credit Risk                   | FTZ      | Free Trade Zone   | M&A      | Mergers & Acquisitions        | RbM      | Risk based monitoring                 |          |                                     |
| CET1     | Common Equity Tier 1                      | FVA      | Funding Valuation Adjustment  | MFC      | Micro fulfillment Centre      | RDC      | Regional Distribution Centre          |          |                                     |
| CFC      | Central fulfillment Centre                | FVOCI    | Fair value through other comprehensive income   | MPS      | Master Production Schedule    | RFID     | Radio Frequency Identification        |          |                                     |
| CI       | Continuous Improvement                    | FX       | Foreign exchange  | MRO      | Material Repair and Overhaul  | RMR      | Retail Management Replenishment       |          |                                     |
| CMI      | Co-Managed Inventory                      |          |   | MRP      | Material Requirement Planning | RTV      | Retail Management Replenishment       |          |                                     |
| CMBS     | Commercial mortgage-backed security       |          |   | MRT      | Material Risk Taker           | <b>S</b> |                                       |          |                                     |
|          |   |          |   | MRTF     | Mean time to failure          | SA       | Standardised approach                 |          |                                     |
|          |   |          |   | MTR      | Mean time to repair           | SaaS     | Software as a Service                 |          |                                     |
|          |   |          |   |          |                               | SCE      | Supply Chain Execution                |          |                                     |
|          |   |          |   |          |                               | SCM      | Supply Chain Management               |          |                                     |

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