MICRO FULFILLMENT

EXPLORING THE LIMITATIONS AND COMPLICATIONS OF IN-STORE MFC INVESTMENTS

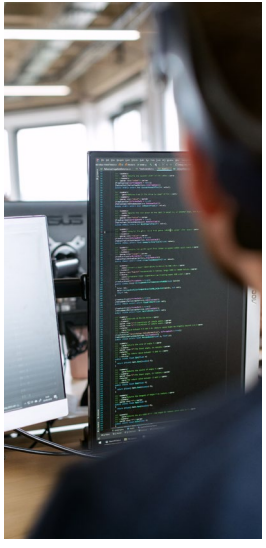
TGW
LIVING LOGISTICS

Risk of failure

Reducing the risks of customer disappointment

Inability to standardise

Why the variable environments make investments difficult



Utilisation

The challenge and importance of effective utilisation

Interview

Interview with ex-Sainsburys Tech - Ashley Hartwell

Risk of failures

Fig. 15
Profile of a best in class system - failure occurrences and durations

This is an example failure profile of a best in class system with total uptime of 98.1%.

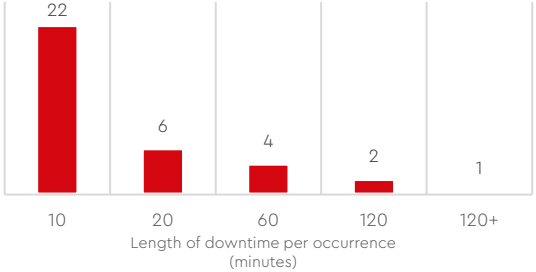
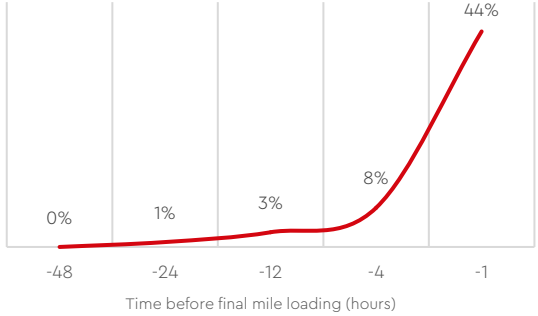


Fig. 16
MFFT and impact on customer deliveries

A single 20 minute system failure will cause <44% of orders to fail within the next hour as there is no flexibility to catch up the work before the deadline.



Quick order retrieval, labour savings and improvements in quality are the sales concepts for automated systems. Still, it's unlikely you will hear so much about MTTF (Mean time to failure) and MTTR (Mean time to recovery) – the critical downtime measures.

The facts are that even the very best installations occasionally have complex faults and can lead to significant downtime, and retailers (and their automation partners) need to prepare for them.

Installations with on-site engineering teams will focus on these KPIs, but in smaller retail settings, like stores, the costs of in house maintenance teams can quickly make the project unviable. The solution being proposed by the industry is 'hands off' maintenance, whereby maintenance resource is set up on a call-out basis.

This might seem like a neat solution to the problem, but it will unavoidably add time to MTTR, which is unlikely to be acceptable. There is also a greater risk that the call-out resource may already be engaged in a repair, extending the MTTR further.

As we have already discussed, some automation providers offer systems with components that can be rapidly exchanged ("hot standby"). However, often this is not the panacea it is claimed to be. It takes time to exchange and may still require an engineer to restart and thoroughly check the system (for damage or other malfunctions) before operations can return to full capacity.

Other solutions to the problem involve creating 'limited impact' concepts – this is where the system does not stop because of a fault with a particular component, instead capacity is partially reduced, and some stock is inaccessible until repairs are completed.

Again, this might seem attractive, but equipment failure of this kind is not particularly common in these environments – a much more common fault or failure is one involving the movement of product. These faults often require a technician to step into the automation environment and rectify the issue – when they do this, you will typically find that a much higher proportion of the system, if not the entire system, is non-operational whilst the failure is being remedied.

In summary, there are no systems currently on the market that are fault free and any fault, which disables a customer-facing system is likely to lead to customer disappointment. This impact on customer loyalty is huge, mainly when failures occur so late in the supply chain – the customer may receive little or no notice of the loss until it is too late. We know that they are highly unlikely to tolerate this type of disappointment.

The only solution which provides real resilience for retailers is one where the same order can be completed in two or more entirely different systems.

Inability to standardise

It's highly likely that each installation within a retail setting will be physically unique – significantly limiting the ability of the equipment providers to standardise their installation paths.

Why is this a problem? It will ultimately lead to rollout programmes that cannot keep up with growth/demand and take far too long to deliver, commission and test in the retailer's eyes.

The system's components and modules may be standardised, reducing the total equipment cost over time. Still, there are limited possibilities to improve programmes, and there will be a significant upfront investment (and delay) in the design and development phase of each project.

The placement of logistics automation into a retail environment is also not a straightforward material flow – in a distribution centre, there is space for loading and unloading, and the general flow of materials and people around the facility is clear. In an environment where the material flow was only designed for unloading, introducing automation is only part of the puzzle – the total material flow needs redesigning to meet future needs to ensure that there isn't a constraint or bottleneck outside of the automation, preventing it from achieving its capacity. The ability of a retailer to allow the complete reconfiguration and re-design of their material flow without impacting customers is challenging.

What is also problematic is the legacy infrastructure of the store. The power consumption of an automation system, especially when refrigeration is needed, is a significant increase on a single retail outlet which may require the retailer to attempt to increase the total supply of power to the store. If the power is not available, this may be extremely costly to rectify – and it will need evaluating and investigating on a store by store basis.

Other territory and district-specific elements such as fire protection systems and maintenance access can also result in the finished design of a solution looking and feeling very different from the sales concept. In a typical store with a clear height of 6 meters, it may be the case that 2-3 meters are needed at the top of the automation for fire protection and physical access. This reduces the density of the automation solution, but in an environment where space is

Equipment utilisation

The most effective forms of investment in automation are those where the investment can be utilised well throughout the day, week and year.

Underutilisation represents an actual waste for investors – as the costs of the solution will be geared around the busiest day of the year, the equipment also requires constant monitoring, maintenance and upkeep.

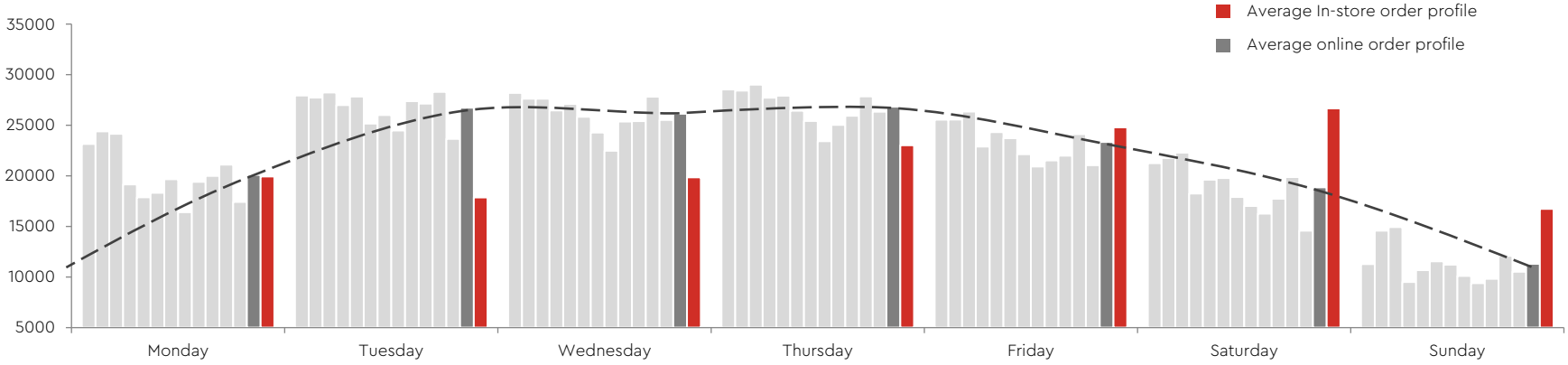
By moving logistics automation into the retail environment, the ability for the retailer to smooth volume over the day is limited. In contrast, the retailer's logistics services have some flexibility to profile the day to maximise utilisation in its typical setting.

Retailers can seek to smooth volume through profile shaping devices and techniques deployed on their websites. However, any solution which forces the customer away from their preferred choice is sub-optimal.

Our data shows that peak day is almost two and a half times the size of the lowest day, with 67% of the week's volume being handled in just four days of the week. This profile is not unusual. They are being handled in just four days of the week. This profile is not uncommon.

Some automation providers are innovating in this space by creating technology that can be phased or leased. However, our evaluations show that these solutions offer limited benefit to the retailer in the context of the total project cost and risk. Retailers will only seek to invest upfront in the additional capability that such phasing provides to minimise risk elsewhere in operation.

Fig. 17
Analysis of 184,000 online grocery orders over 12 months



Interview

Ashley Hartwell

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.

Ashley Hartwell

Managing Consultant at The Supply Chain Consulting Group Limited and Former FTSE 100 Grocery Retail leader.

Ashley, in your opinion, why do you think that the take up for MFC technology seems to have slowed down?

There's a lot of misinformation out there. And I think for the retailers, it's very difficult to navigate this minefield because they don't really know enough about the technology and the automation to be able to accurately say whether or not they should go one way or another. Technology firms say the underwhelming expansion so far is partly due to retailers pausing negotiations and implementation plans for several months last year as they contended with strained supply chains and enacting safety measures.

What would you advise retailers looking at the technology today?

I would say that the pennies really add up when you look closely at the journey of an order tote through these MFC systems. We can see grocers that have started testing MFCs are struggling to wring promised cost savings out of the systems.

Systems require a higher volume of incoming orders than many grocers realize to justify their hefty price tags, which can range from a few million dollars to around $10 million. Grocers are struggling to come out ahead financially in the face of ongoing costs, like transaction fees of up to several cents per unit shipped, and system maintenance. The systems are also dizzyingly complex, with additional processes often cutting into efficiency. Some systems only have 50% of a store's range in automated storage, requiring retailers to operate separate, sizable manual-picking operations and venture into stores to complete orders, which adds time and costs.

What are your projections for the future of MFC technology and the rate of adoption?

MFCs are really about trying to provide faster service for the consumer ... but the flip side of that is it's got to make economic sense. Grocers are scratching their heads to make sure the math works so that they just don't plough money into something that can help meet consumer demand but doesn't help the bottom line. There is no perfect fulfillment system right now – frankly, all of the options out there have upsides and downsides. What we're seeing is that technology is getting sold, but what is not going with that technology is the help that retailers need to understand how their process engineering has to change as well – I think that this is the biggest barrier to increasing adoption rate and the problem that technology companies need to help fix if they want to sell into retailers in the future.

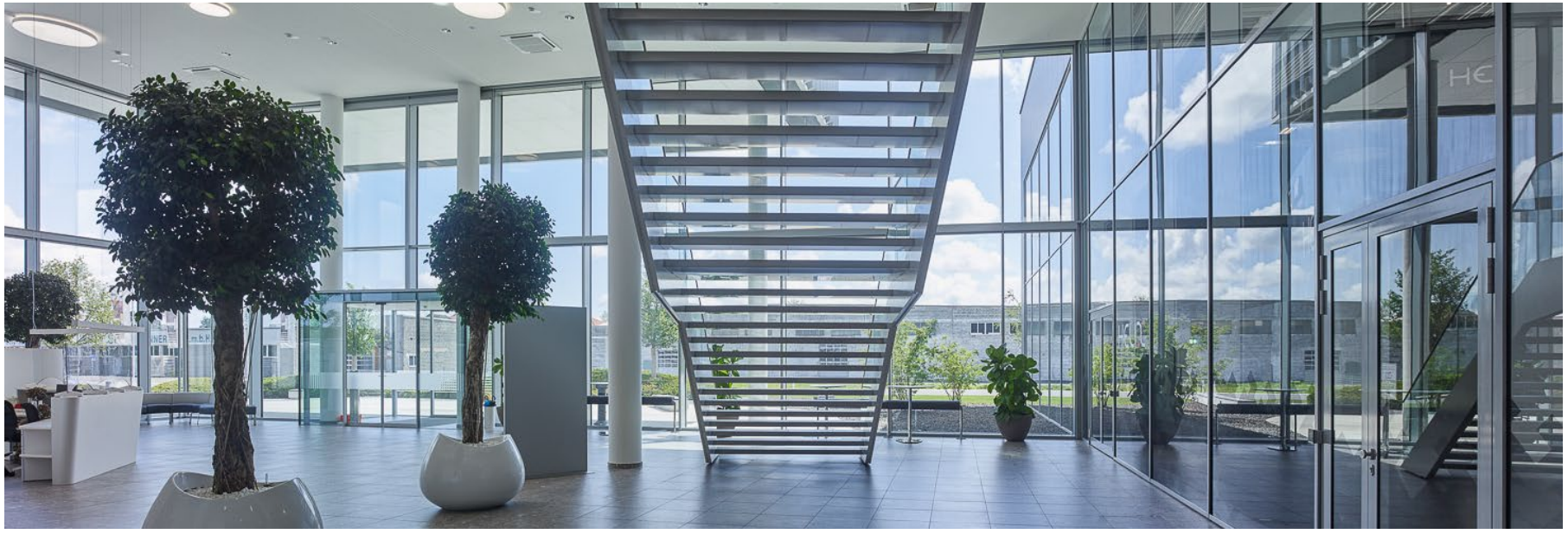
Closing statement

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.

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 - 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 - OWR or DWR (Direct warehousing rate) - 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

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

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