



**Maynooth
University**

National University
of Ireland Maynooth

Innovation Value Institute
Webinar series 2020

Covid 19 and the lessons from Supply Chain Disruptions

Digitalisation, Automation and Agility

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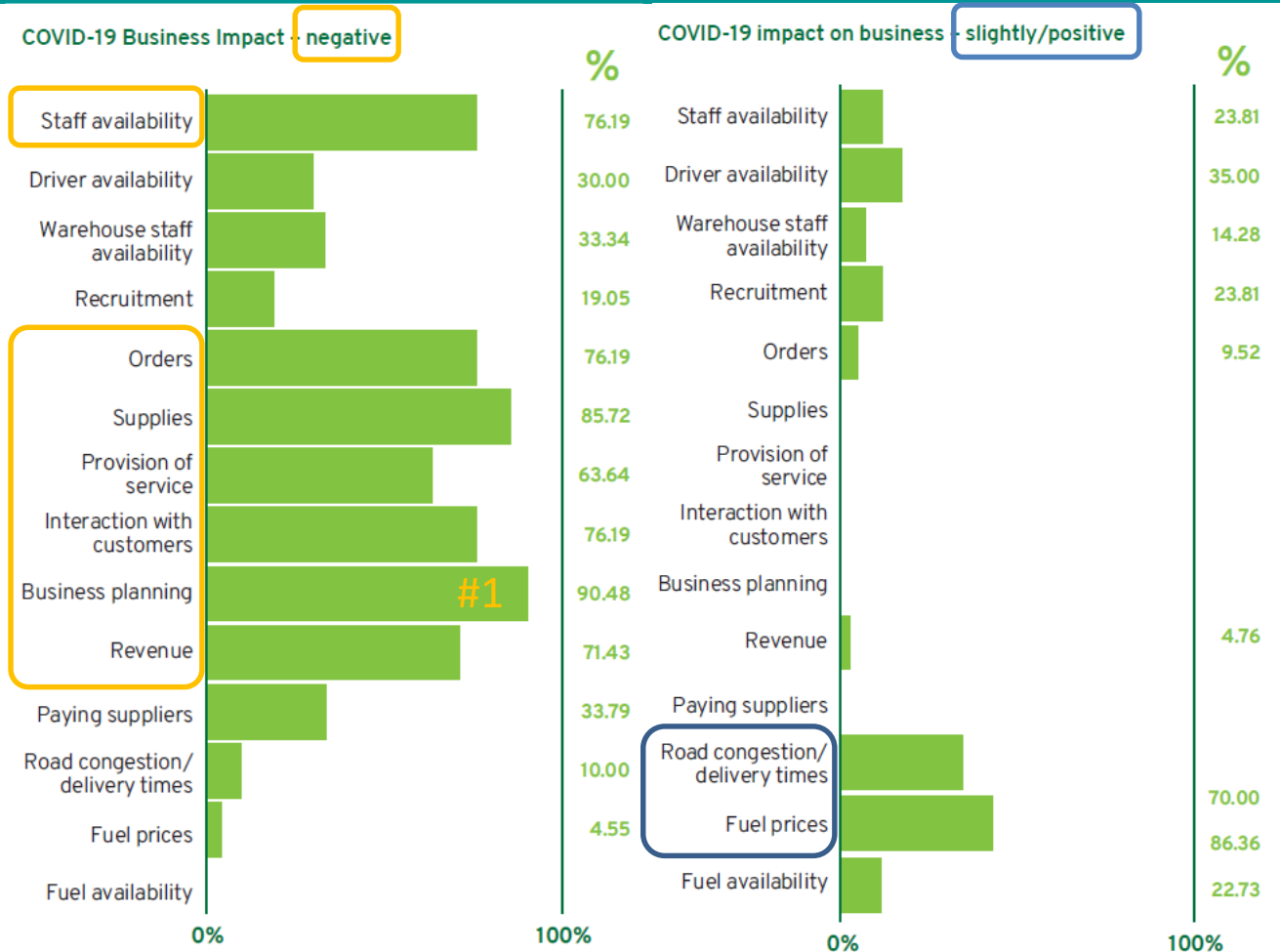
21/05/2020

Contents

- Overview: Covid 19 and Supply Chain Disruptions
- The SC Performance framework : revisiting Supply Chain Agility
- Flexibility and Automation : Ocado vs Tesco approaches for covid19
- Flexible Manufacturing Systems Design: Digitalisation Renault and Nissan

Freight Transport Association of Ireland

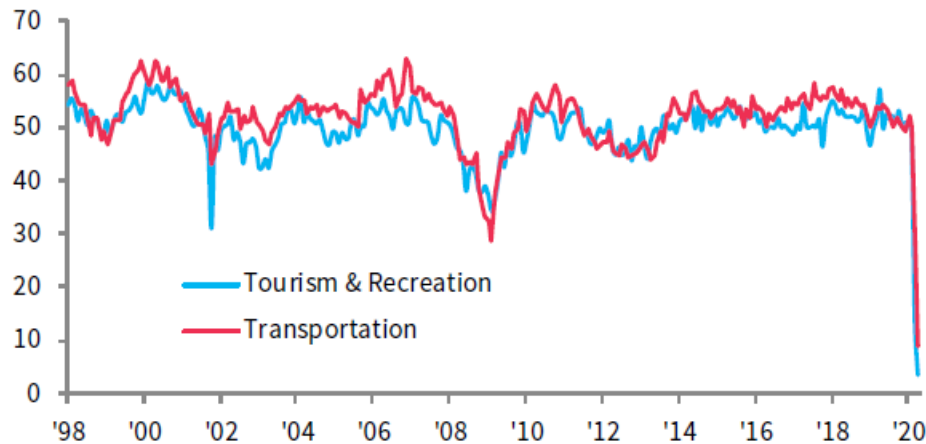
Survey: 30th March – 12th April



Europe and China sector PMI®

IHS Markit Europe Sector PMI®

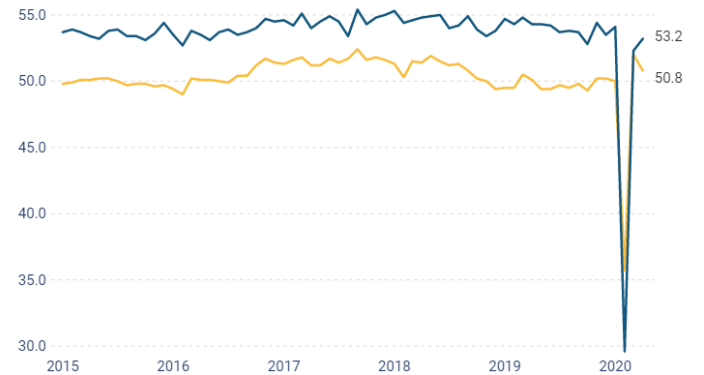
sa, >50 = growth since previous month



Source: IHS Markit.

China's official PMI

— Non-manufacturing — Manufacturing



Above 50: Expansion. Below 50: Contraction.

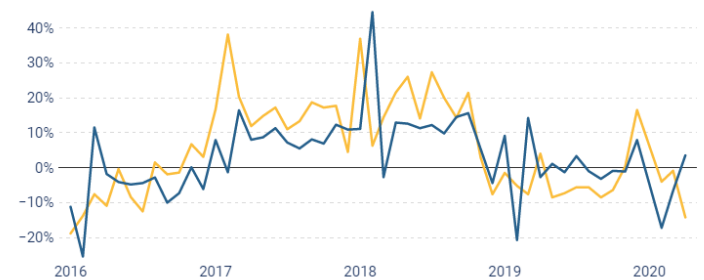
Source: National Bureau of Statistics

SCMP

China's trade growth, monthly

In US dollar terms

— Export — Import

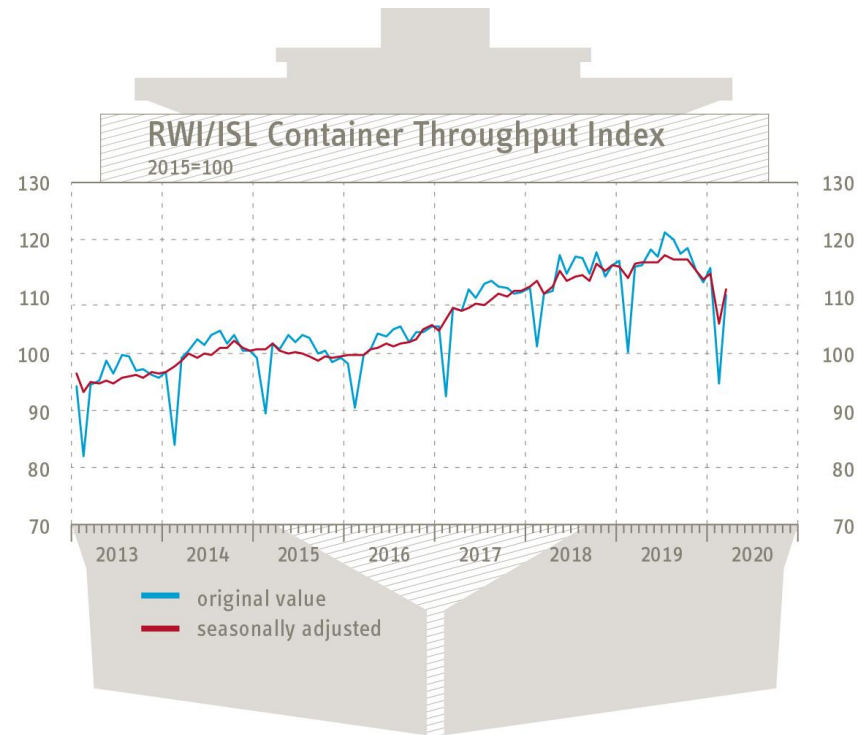
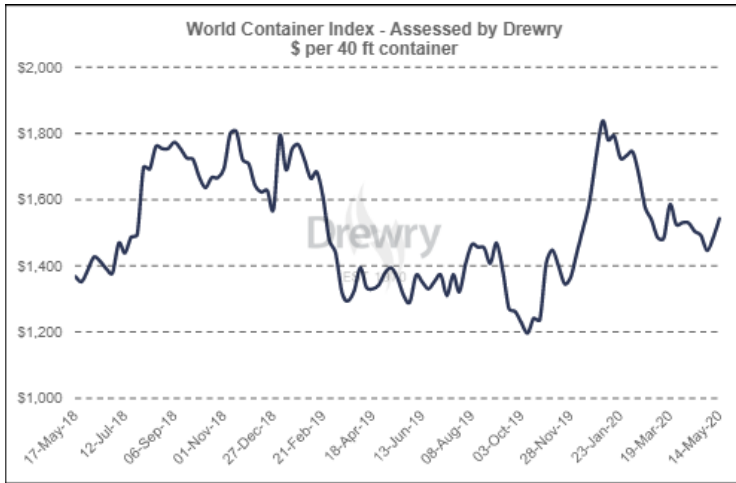


Note, Jan-Feb 2020 totals are combined

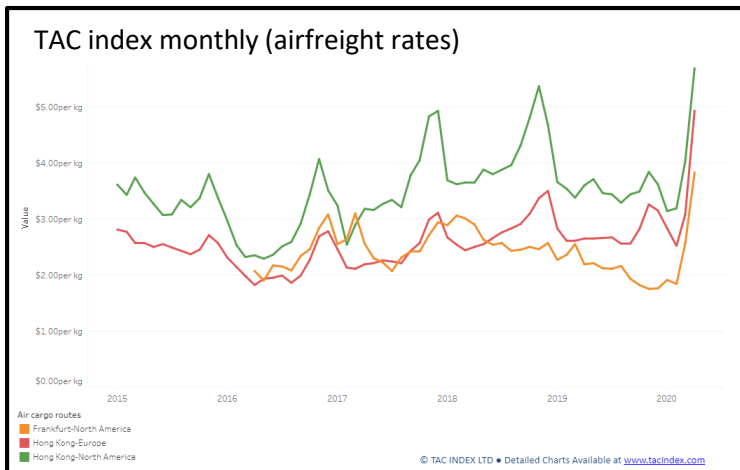
Source: General Administration of Customs

SCMP

Logistics indexes: Mixed messages



RWI/ISL computations based on data provided by 91 ports. March 2020: flash estimate.



KLU session on Covid19: Supply Chain Questions

- KLU session on the impacts of COVID 19 on logistics (2nd April 2020):
 - How serious is the situation today ?
 - How to protect the work force?
 - How vulnerable are the Logistics and transport sectors?
 - How to distinguish panic buying from longer term patterns?
 - How difficult will it be for supply chains to recover?
- How will the management of global supply chains be likely to change?
- To what extent is it likely to reinforce trends such as digitalization and home delivery?
- Will it cause a reversal of globalization ? (reshoring, simpler SCs)
- Can we 'build back better' in an environmental sense?
- What long-term lessons for the medical and food supply chains?

Conjunctural
questions

Structural
questions

Adapted from: McKinnon (2020)

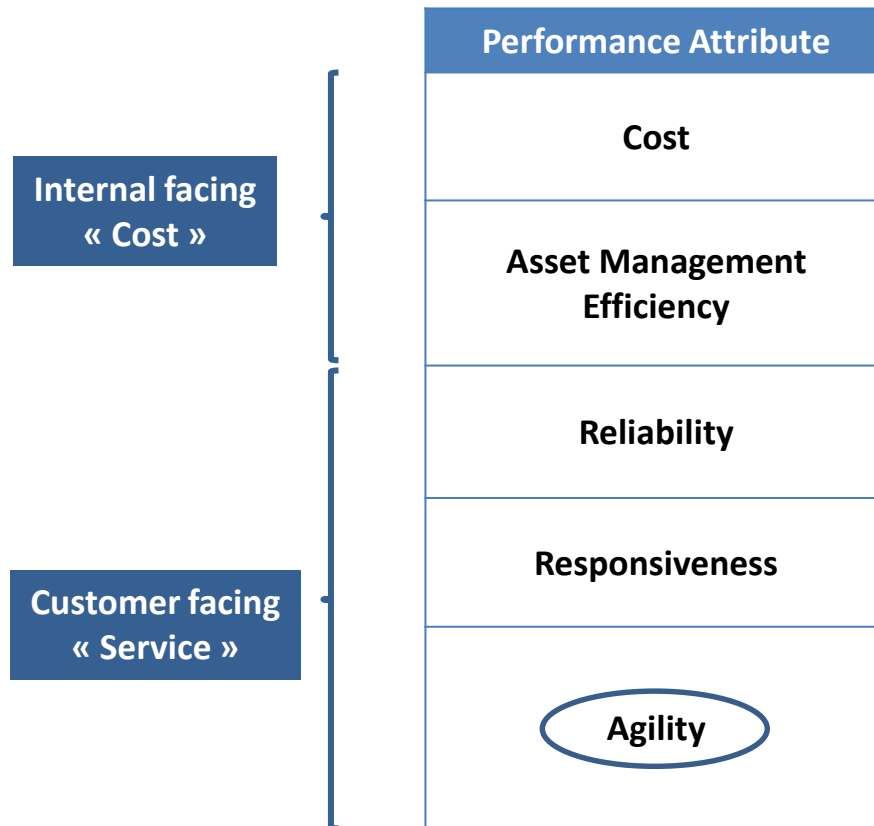
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The Supply Chains performance:

Will we (at last) look at all SCOR performance attributes?

- Will future supply chain designs focus on “Agility” as a performance attribute ?



The Supply Chains performance:

Will we (at last) look at all SCOR performance attributes?

Performance Attribute	Level-1 Strategic Metric	Definition
Reliability	<ul style="list-style-type: none"> Perfect Order Fulfillment 	<ul style="list-style-type: none"> The percentage of orders meeting delivery performance (...)
Responsiveness	<ul style="list-style-type: none"> Order Fulfillment Cycle Time 	<ul style="list-style-type: none"> The average actual cycle time consistently achieved to fulfil customer orders (...).
Agility	<ul style="list-style-type: none"> Overall Value at risk 	<ul style="list-style-type: none"> The sum of the probability of risk events times the monetary impact of the events which can impact any core supply chain functions (e.g. Plan, Source, Make, Deliver and Return) or key dependencies
	<ul style="list-style-type: none"> Upside Supply Chain Flexibility 	<ul style="list-style-type: none"> The number of days required to achieve an unplanned sustainable 20% increase in quantities delivered.
	<ul style="list-style-type: none"> Upside/Downside Supply Chain Adaptability 	<ul style="list-style-type: none"> The maximum sustainable percentage increase in quantity delivered that can be achieved in 30 days. / The reduction in quantities ordered sustainable at 30 days prior to delivery with no inventory or cost penalties.

Source : APICS Supply Chain Council

Supply Chain Digitalisation and Home Delivery

- Amazon (US):
 - + 175K hires following Covid19 (from approx. 800k FTE),
 - Pay raise: 15 to 17 USD/h, plus doubled overtime pay (2 to 4USD/h)
- JD.com (China): +215% year-on-year (over 10 days Jan/Feb)
- Ocado (UK): +40% in retail sales (Q2 2020)



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What have we seen ?

Digital infrastructure, physical infrastructure...

<https://www.tesco.ie/groceries/delivery/default.aspx>

<https://www.tesco.ie/groceries/delivery/default.aspx>

What time would you like your delivery?

Please select a delivery slot from the calendar.

	May 14 - 20		May 21 - 27			May 28 - Jun 3	
	Thu 14 th May	Fri 15 th May	Sat 16 th May	Sun 17 th May	Mon 18 th May	Tue 19 th May	Wed 20 th May
08:00 - 10:00	€7-00	€7-00	€7-00	—	€7-00	€7-00	€5-00
09:00 - 11:00	€7-00	€7-00	€7-00	€7-00	€7-00	€7-00	€5-00
10:00 - 12:00	€7-00	€7-00	€7-00	€7-00	€7-00	€7-00	€7-00
11:00 - 13:00	€7-00	€7-00	€7-00	€7-00	€7-00	€7-00	€5-00
12:00 - 14:00	€5-00	€5-00	€7-00	€7-00	€3-00	€3-00	€3-00
13:00 - 15:00	€5-00	€5-00	€7-00	€7-00	€3-00	€3-00	€3-00
14:00 - 16:00	€5-00	€5-00	€7-00	€7-00	€5-00	€5-00	€5-00
15:00 - 17:00	€7-00	€7-00	€5-00	€7-00	€7-00	€7-00	€7-00
16:00 - 18:00	€5-00	€5-00	€5-00	€7-00	€5-00	€5-00	€5-00
17:00 - 19:00	€5-00	€5-00	€5-00	€7-00	€3-00	€3-00	€3-00
18:00 - 20:00	€7-00	€7-00	€5-00	—	€5-00	€5-00	€3-00
19:00 - 21:00	€7-00	€7-00	€3-00	—	€7-00	€7-00	€7-00
20:00 - 22:00	€3-00	€3-00	—	—	€3-00	€3-00	€3-00
21:00 - 23:00	€3-00	€3-00	—	—	€3-00	€3-00	€3-00

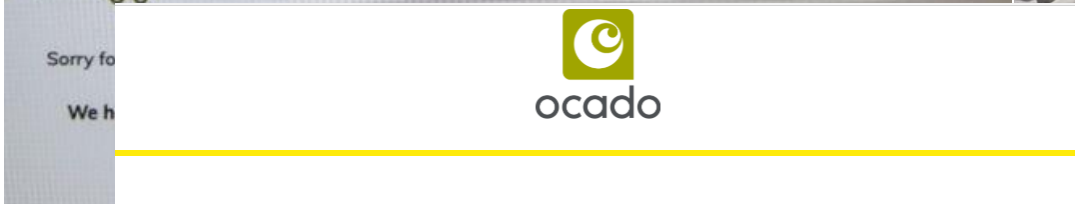
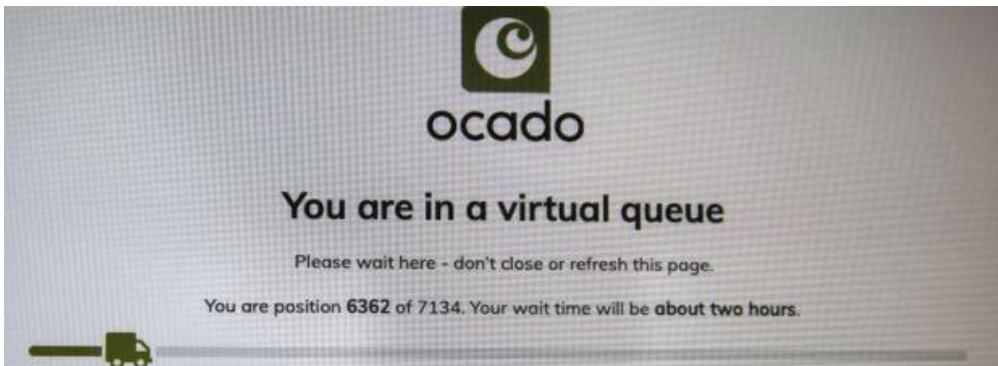


90% of orders picked by hand in 350 stores



What have we seen ?

Digital infrastructure, physical infrastructure...



If you have priority access to ocado.com, please log in. If you are returned to this page, you do not have priority access.

Good news. Starting today, we will send you an email when we are able to offer you a delivery slot, so you will no longer have to visit this page to check slot availability. These emails will replace general slot releases.

Demand for our service continues to run at many times our current capacity, so slot availability may vary by area.

To begin with, you may only get an email every couple of months, but we are working our socks off to increase capacity, and we will offer more frequent access as soon as we can.

How to sign up for delivery slot email alerts.

Simply fill out our [Contact Form](#). In 'Reason to contact', choose 'I am trying to place an order', then in 'My issue is', choose 'I'd like you to email me when you release delivery slots in my area'.



A precedent: The Ocado fire February 2019

- Implications of automation
 - Hard to function out of ‘design values’ (regardless of how broad the range is)
 - Higher concentration of production assets (and therefore, risks) in a few expensive facilities
 - Environment not designed for human intervention when disaster strikes
- Trade-off cost vs flexibility : can we afford it?

Will companies get their fingers burnt for betting too big on automation?

▶ A fire at online grocer Ocado's warehouse sparks debate about the steady rise of automation



www.thenational.ae



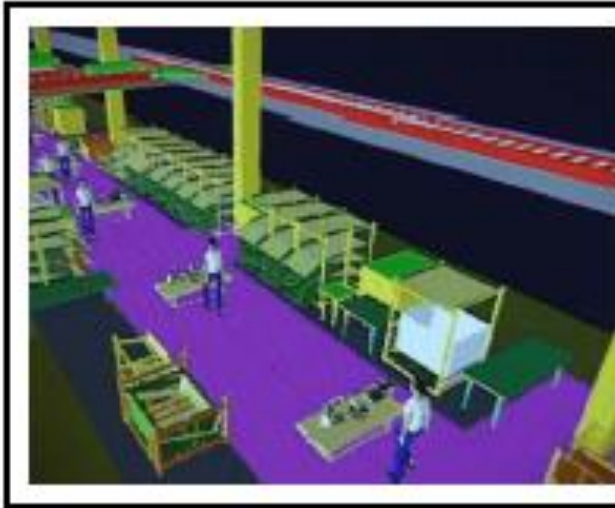
The fire at the Andover warehouse burned for four days in February

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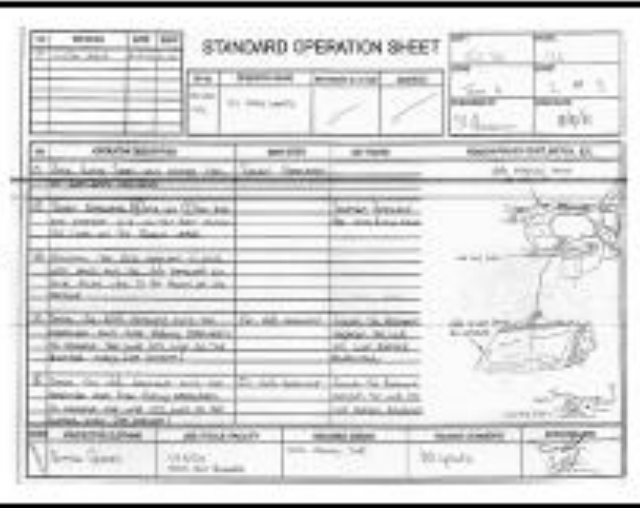
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3-D digital factory and design methods

Vision Renault

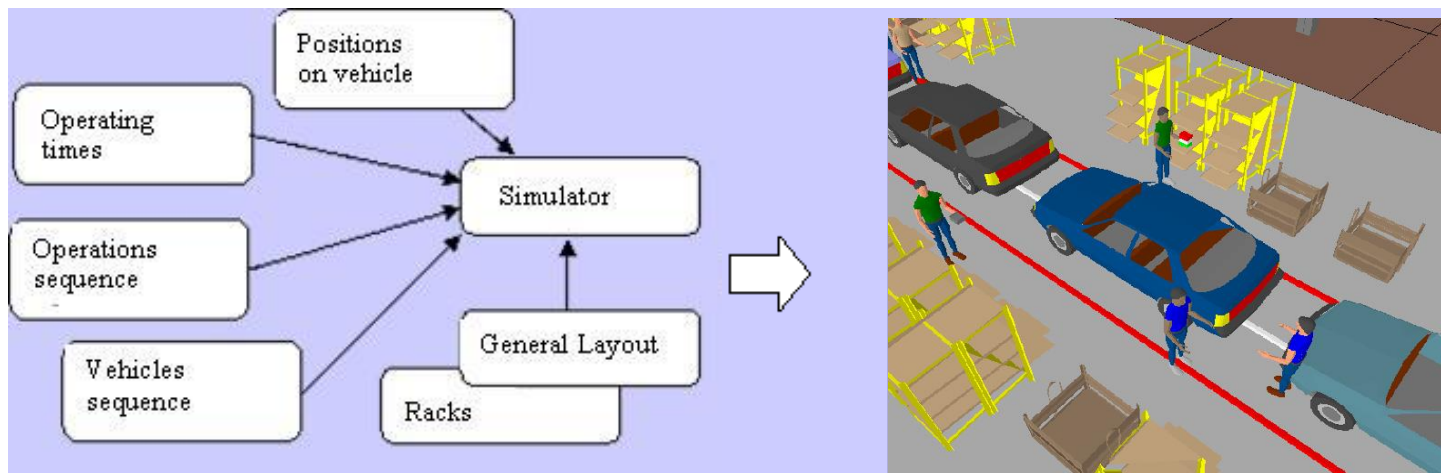


Vision Nissan



3-D digital factory and design methods

- Approach :
 - Implementation of a 'digital copy' of an assembly line (Flins)
 - Use of operational plants databases (BOM, BOO)
 - Model automatically built from these databases



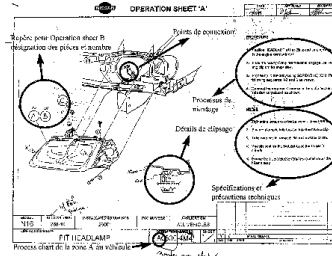
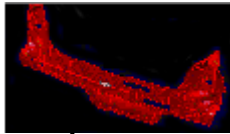
Lean Management approaches at Renault

- Toyota and Nissan : two distinct models. Distinction between « Japanese » and « Toyota » principles.
- Standard operation : one of the elements really belonging to the « Japanese » model, and not adopted by Renault until 2002.

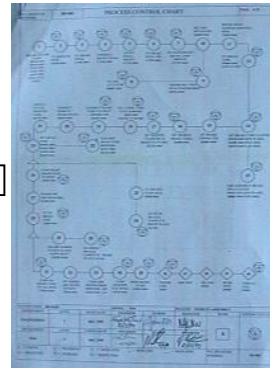
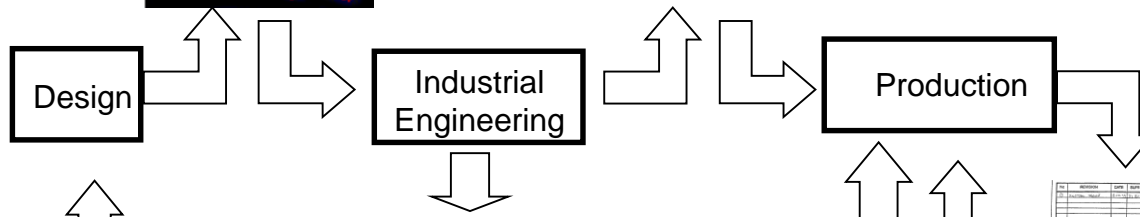
		Toyota	Nissan	Renault
"Toyota" Principles	Kanban	1954/65	1978	1983
	Suggestions	1969-71	1978	1991-95
	Projects Leaders	1953	1987	1989
"Japanese" Principles	“Deal” with unions	1954	1953	-
	Total Quality	1961-64	1957-60	1987
	Standard Operation	1953	1955	2002-03

Designing production systems with the Nissan Production Way

Computer-Aided Design



Process operation sheet
(assembly precautions)
&
Design standard Time
(assembly time objectives)



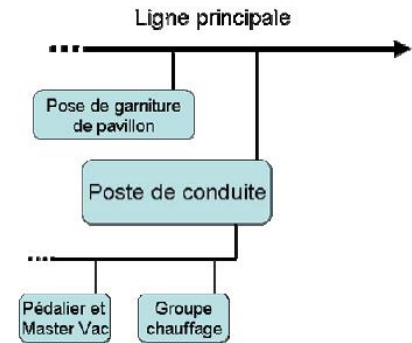
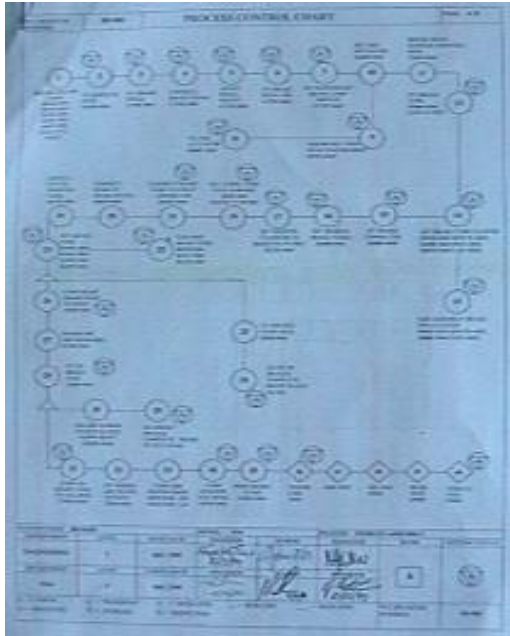
Process control chart
(precedence constraints)

STANDARD OPERATION SHEET			
NO	DESCRIPTION	TIME	REMARKS
1
2
3
4
5
6
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9
10
11
12
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14
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Standard operation sheet
(operations, real times and line balancing)

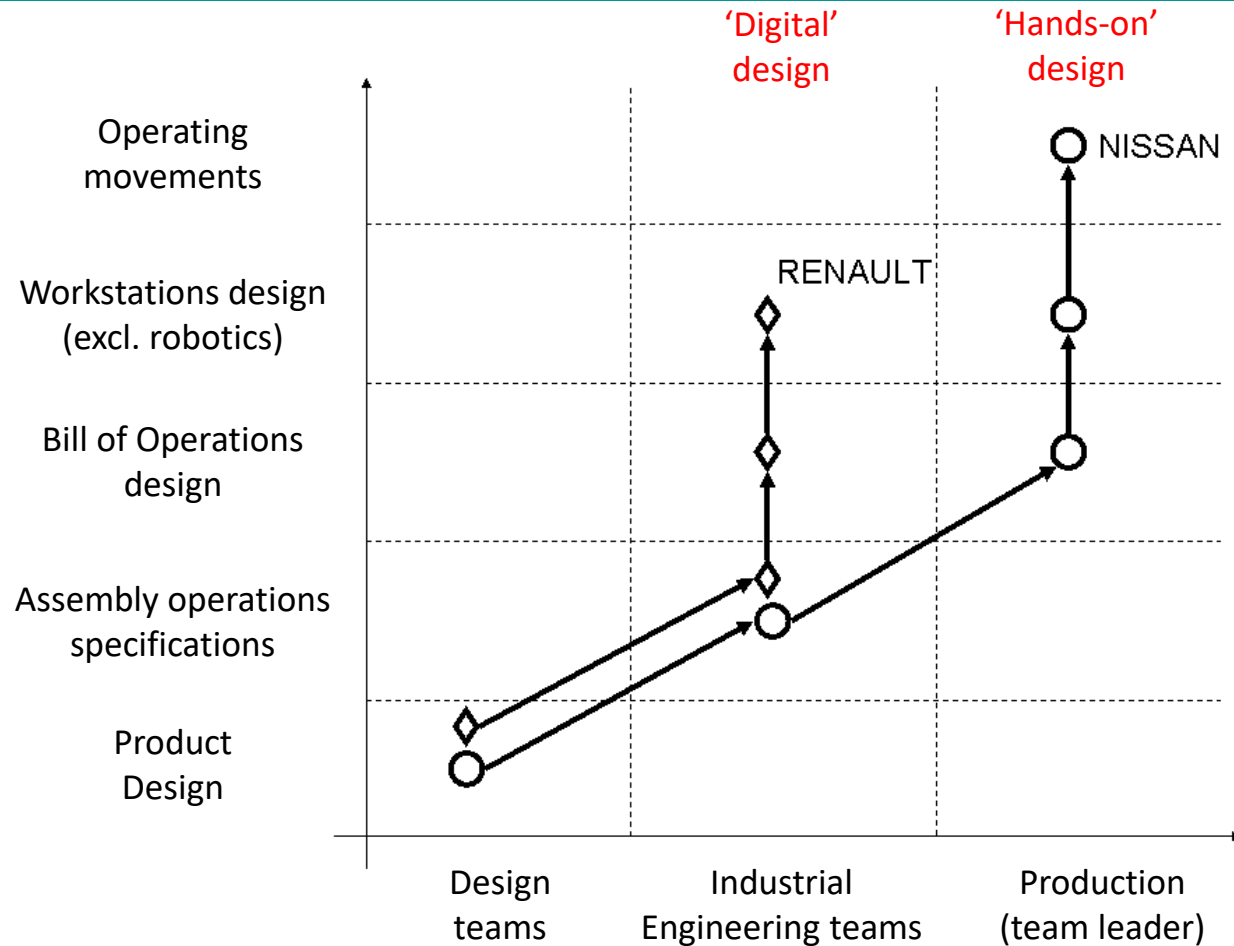
Design Principle 1: Keeping the product design under control

- The Process control chart :
 - Renault : car 'functions' allocated to assembly lines sections.
 - Nissan : a detailed, constraining control chart, for operations within assembly lines sections



Fonction	Tronçon	Hauteur	Contraintes
PAVE MOUSSE D'AILE	SE8	450	< grille d'auvent
ADAPTATION DU SIEGE ARRIERE SUR	SE8	450	< siege
F10358--- GARNITURE DE MONTANT DE BAIE	SE8	450	< pare soleil< snappen av
F10469--- PARE-SOLEIL AV	SE8	450	
F10365--- GARNITURE DE PIED MILIEU SUP	SE8	450	<snappen av et ar
F10356--- GARNITURE DE CUSTODE	SE8	450	< joint étanchéité principale
F10363--- GARNITURE DE PIED ARRIERE sup	SE8	450	< pied extreme ar
F10363--- GARNITURE DE PIED extremeARRIERE	SE8	450	< tablette lat
F10367--- GARNITURE LATERALE DE TABLETTE	SE8	450	< eclaireur de coffre<
F10319--- JOINT D'ETANCHEITE PRINCIPALE	SE8	450	< bas de marche av et obtu
FIXATION CEINTURE AR / PLANCHER	SE8	450	< garn pied ar
F10363--- GARNITURE DE PIED ARRIERE	SE8	450	< snappen ar
F10317--- JOINT D'ETANCHEITE PRINCIPALE	SE8	450	< garniture de bas d e
F10527--- REMPLISSAGE CA	SE8	450	< FACADE AV
F10124--- TRAVERSE AV SUP.	SE8	450	< serrure de capot av
F10596--- SERRURE CAPOT	SE8	450	
ECOPE PRISE D'AIR	SE8	450	
F10124--- CÂBLAGE FACADE AVANT	SE8	450	< projecteur
CLIPS INDEXAGE AILE/BOUCLIER	SE8	450	< projecteur
CLIPS CENTRAGE Y BOUCLIER AV	SE8	450	< bouclier av
APPRO ETCLIPSAGE BUTEES DE CAPOT	SE8	450	

Design Principle 2: Keeping the workshop involved



Final words...

- In final design stages, validation requirements are not always equal. They depend on the flexibility of the process designed.
 - The required flexibility will be defined by the complexity and uncertainty that the production system is submitted to
- Automation and digitalisation challenges:
 - More flexibility (always!)
 - Downgraded modes & Human interaction
 - While keeping this insurance 'premium' low



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Thank you

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