Wood yard design methodology for improved supply chain performance

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Why care about wood yards?

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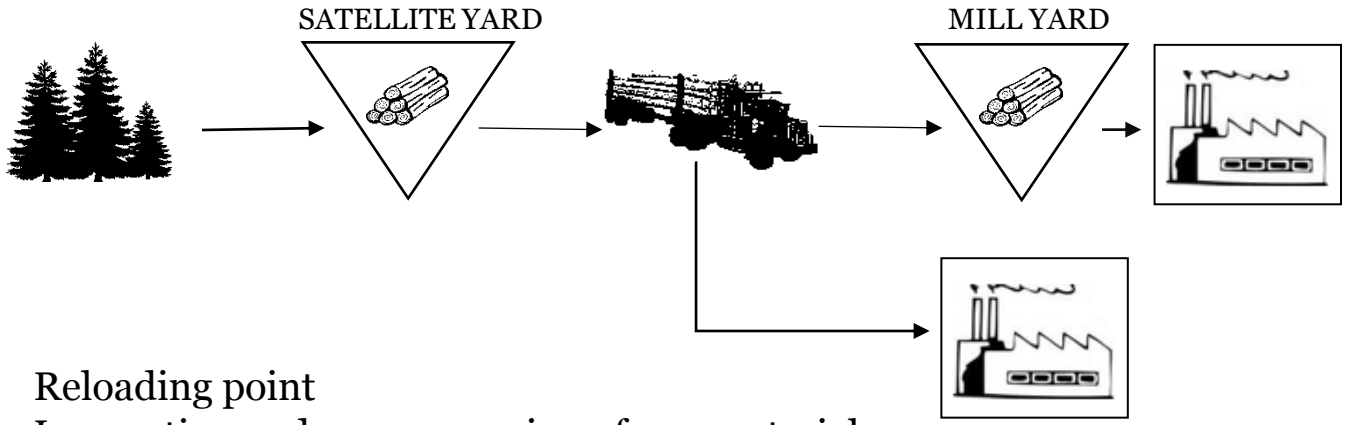
Multiple roles within wood supply chain

- According to their position in the wood supply chain



  - Reloading point
  - Log sorting and pre-processing of raw material
  - Storage
  - Decoupling point

- Costs vs value creation?
- Are their activities and design efficients?

Wood yards in Quebec, Canada

395 000 m^3 on 20 ha:
1 (2) grapple loader(s)

450 000 m^3 on 31 ha:
4 grapple loaders,
1 loader,
2 trucks

420 000 m^3 on 12 ha:
2 grapple loaders,
2 loaders,
1 self-loading

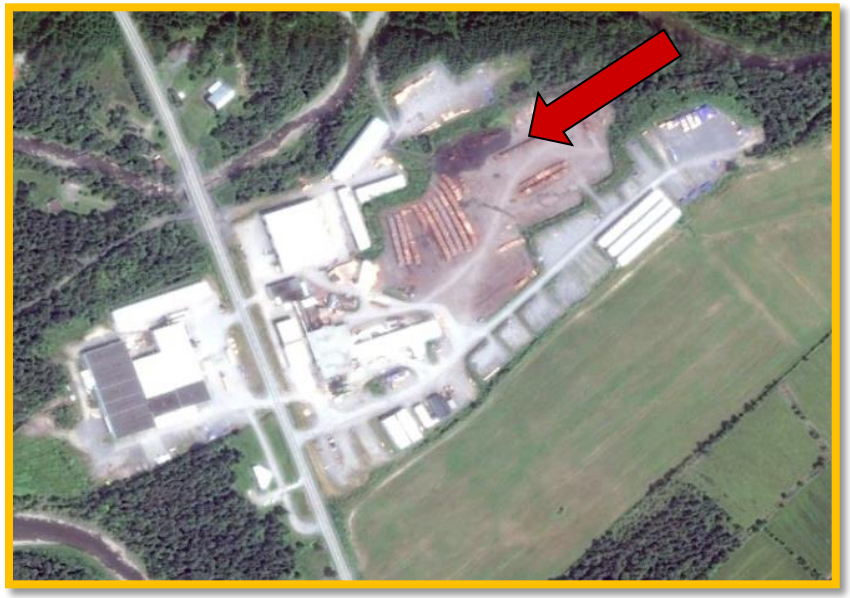
Which one is the most efficient?

Source: Tran E., (2008) ***Efficacité d'utilisation des chargeuses dans les parcs à bois : quatre études de cas.*** Rapports Avantage (FERIC). Région de l'EST. Québec. Canada

Wood yard dynamic – Seasonal adaptation

D.G. Sawmill, Southern Quebec

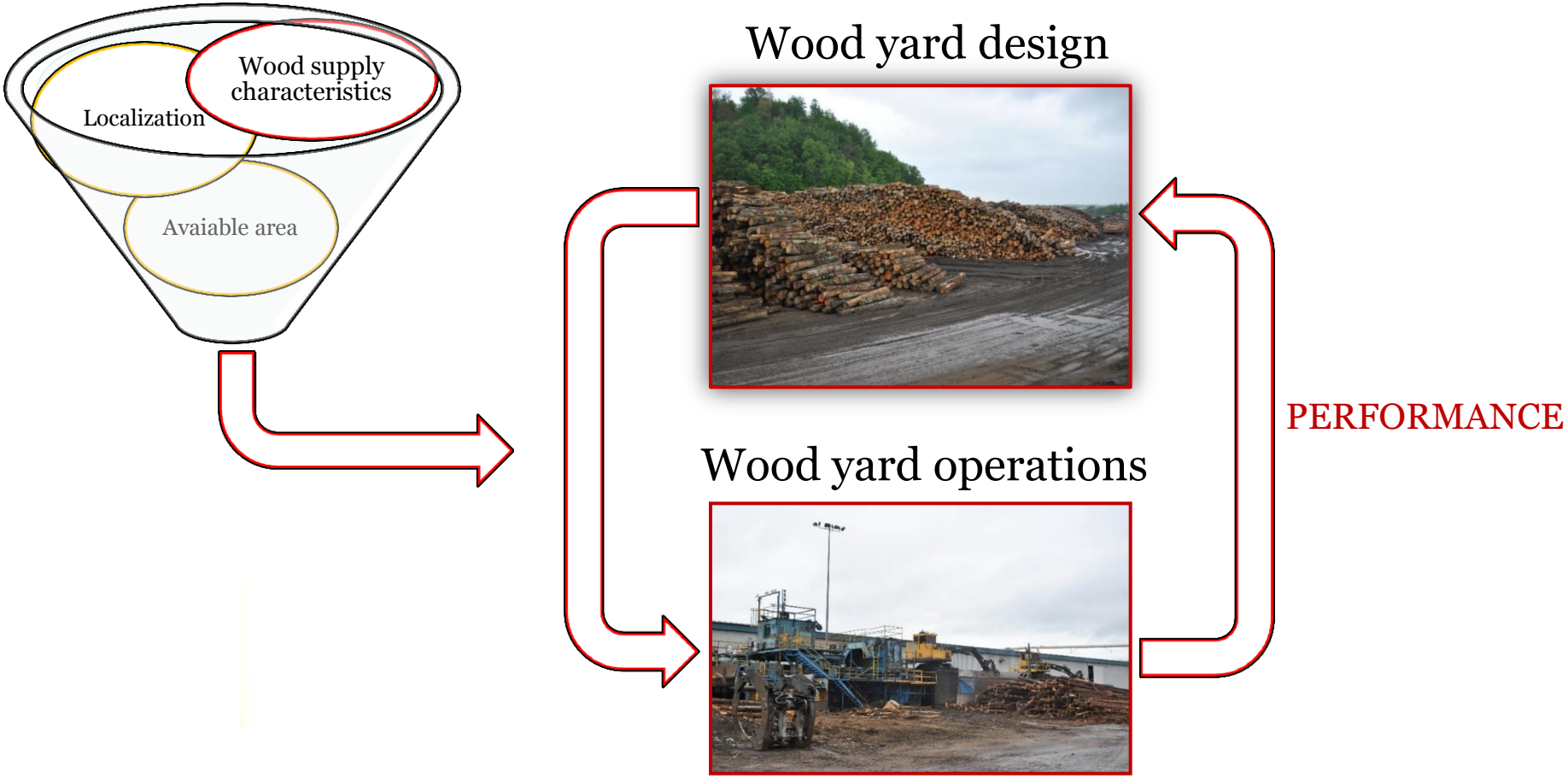
end of April



mid-July

Source: Google Earth Pro 2016

How to design for best performance ?



Outline:

- Problem definition
- Materials and methods
- Results

  « *General portrait of wood yards* »
- Conclusions

Phot. Marta Trzcianowska

Problem definition

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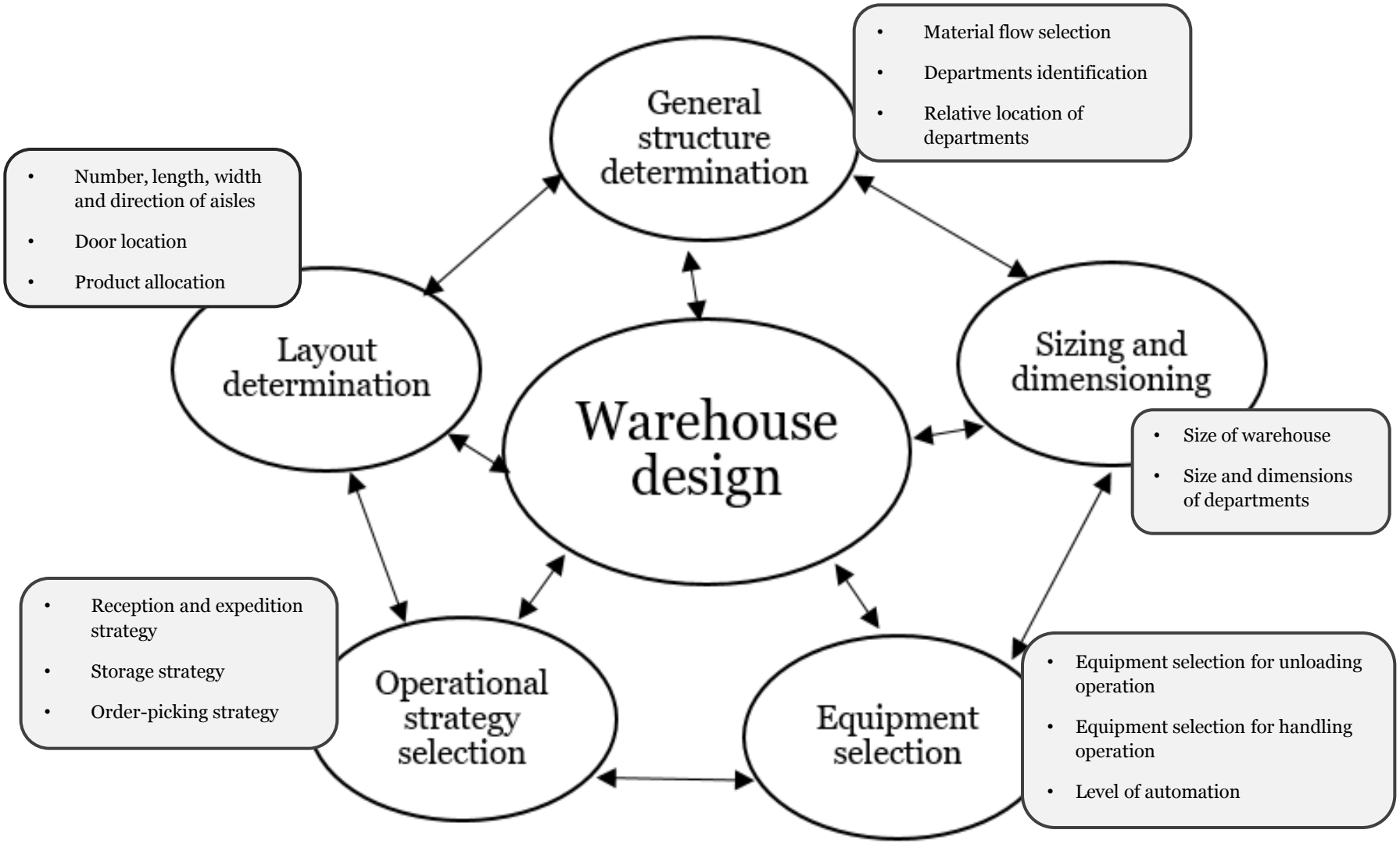
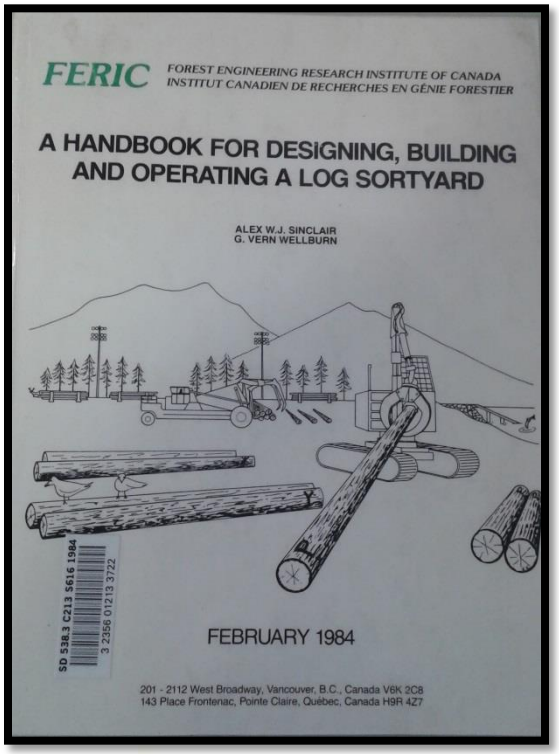
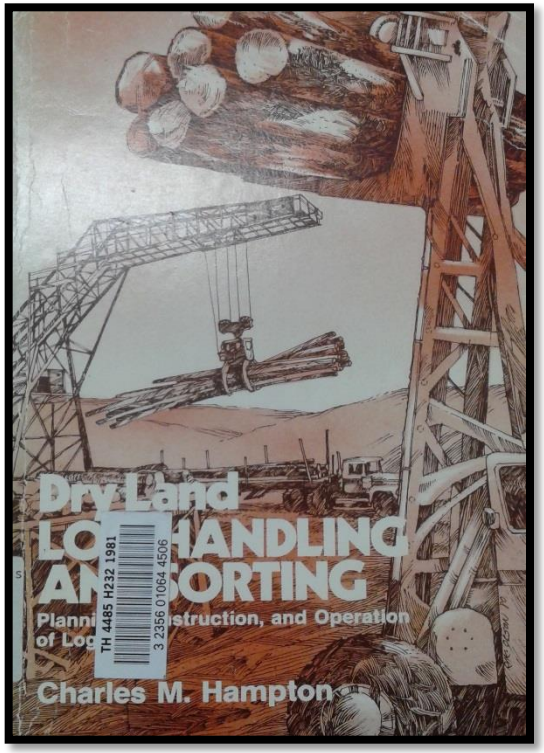
Efficient wood yard design



Source: Gu, J., Goetschalckx, M. and McGinnis, L.F. (2007) "Research on warehouse operation: A comprehensive review", European Journal of Operational Research, 177(1), 1-21

Available design methods?





Sinclair and Wellburn (1984) Hampton (1981)

Objectives

Global analysis to delineate the issue of wood yard performance:

- Document the current industrial practices in wood yard operations, management and design.
- Determine the key performance indicators that can serve to evaluate different wood yard designs.

Materials and methods

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Survey of wood yards characteristics

+ site visites

Sample selection

Survey application

Site

Wood supply

Resources

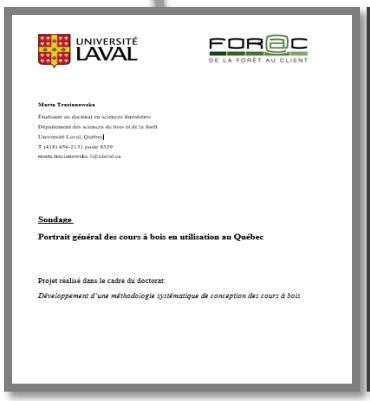
Inventory management

Wood yard design

Wood yard performance

Required data

- **Softwood mill yards** (Fir-Spruce-Pine-Larch)
- **Capacity** > 100 000 m³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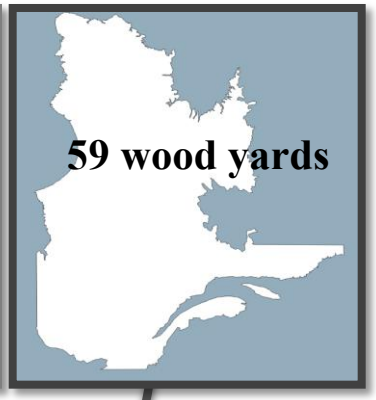
Sondage

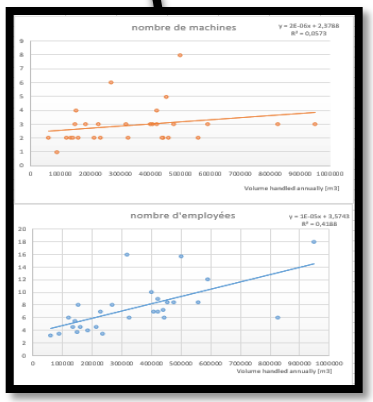
Portrait général des cours à bois en utilisation au Québec

Projet réalisé dans le cadre du doctorat:

Développement d'une méthodologie systématique de conception des cours à bois

Survey creation and validation





General portrait of wood yards

General potrait of wood yards

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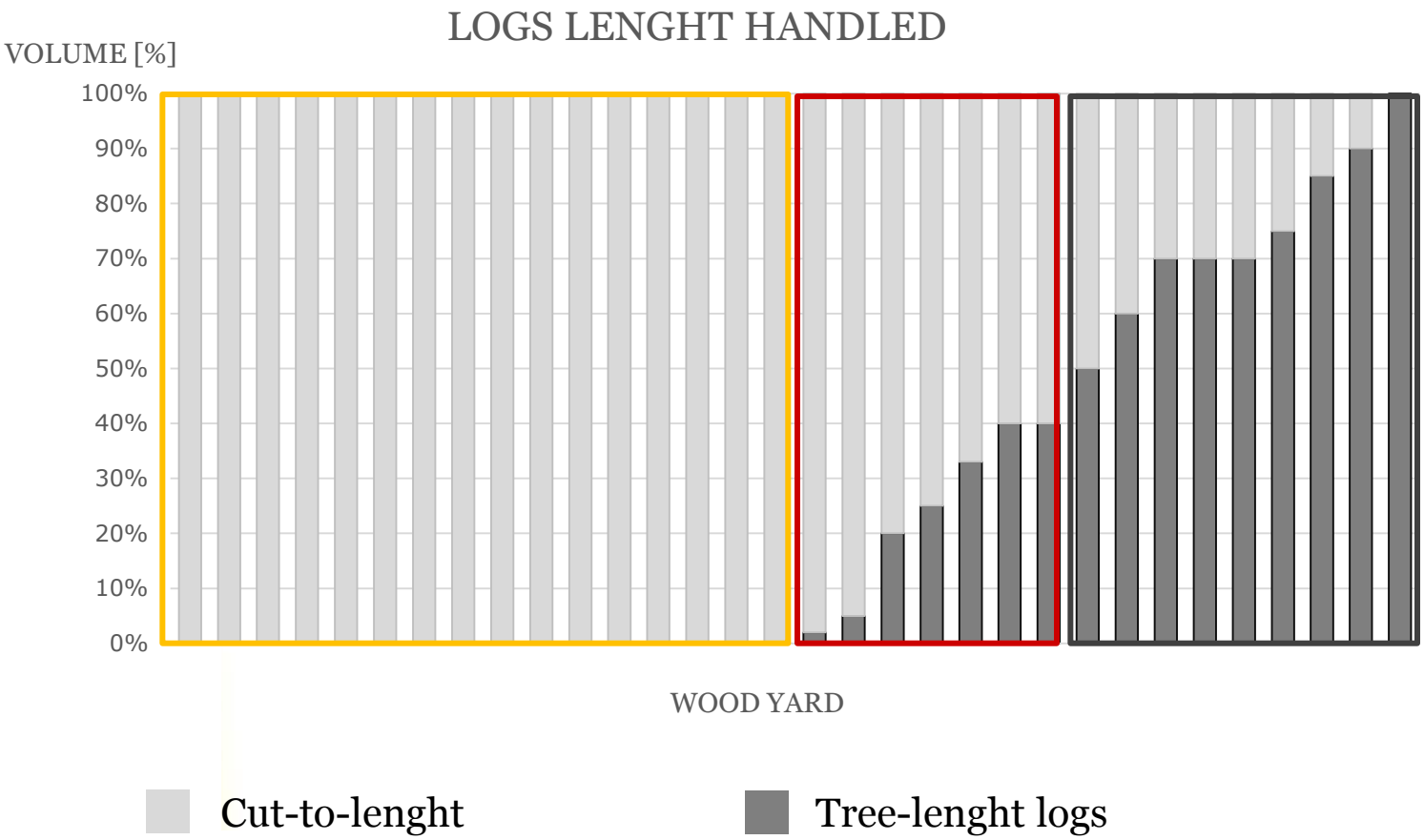
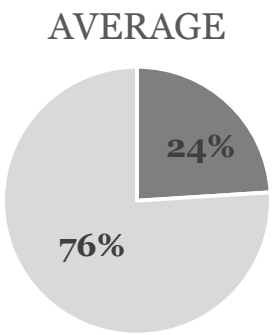
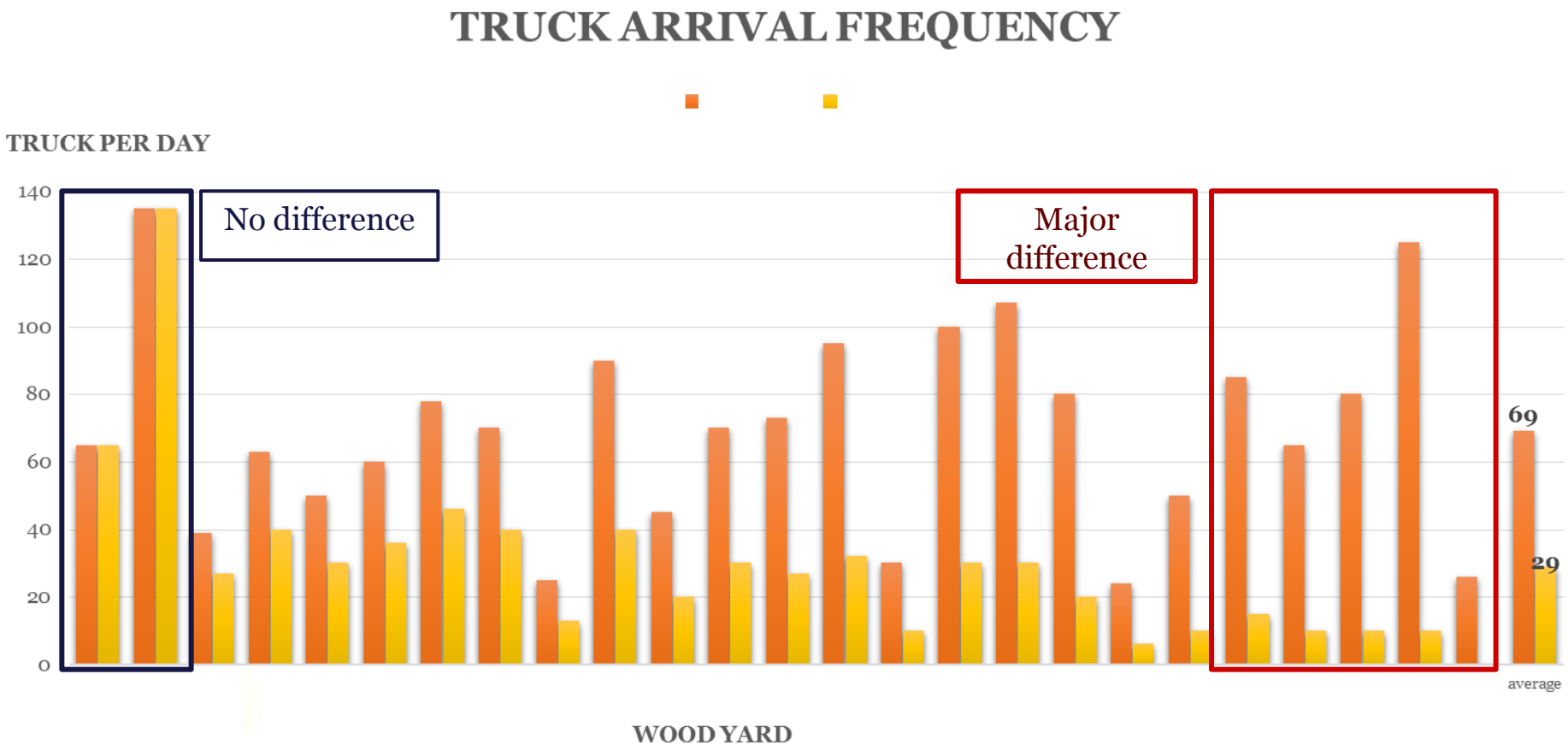
Raw material characteristics

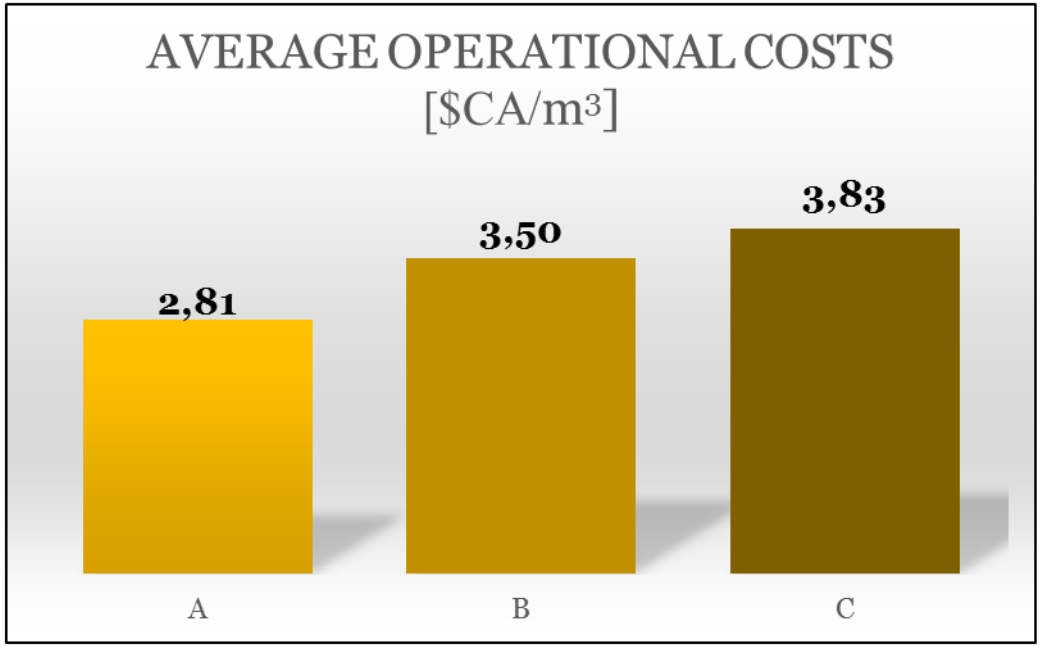




Seasonality of wood supply



Operational costs

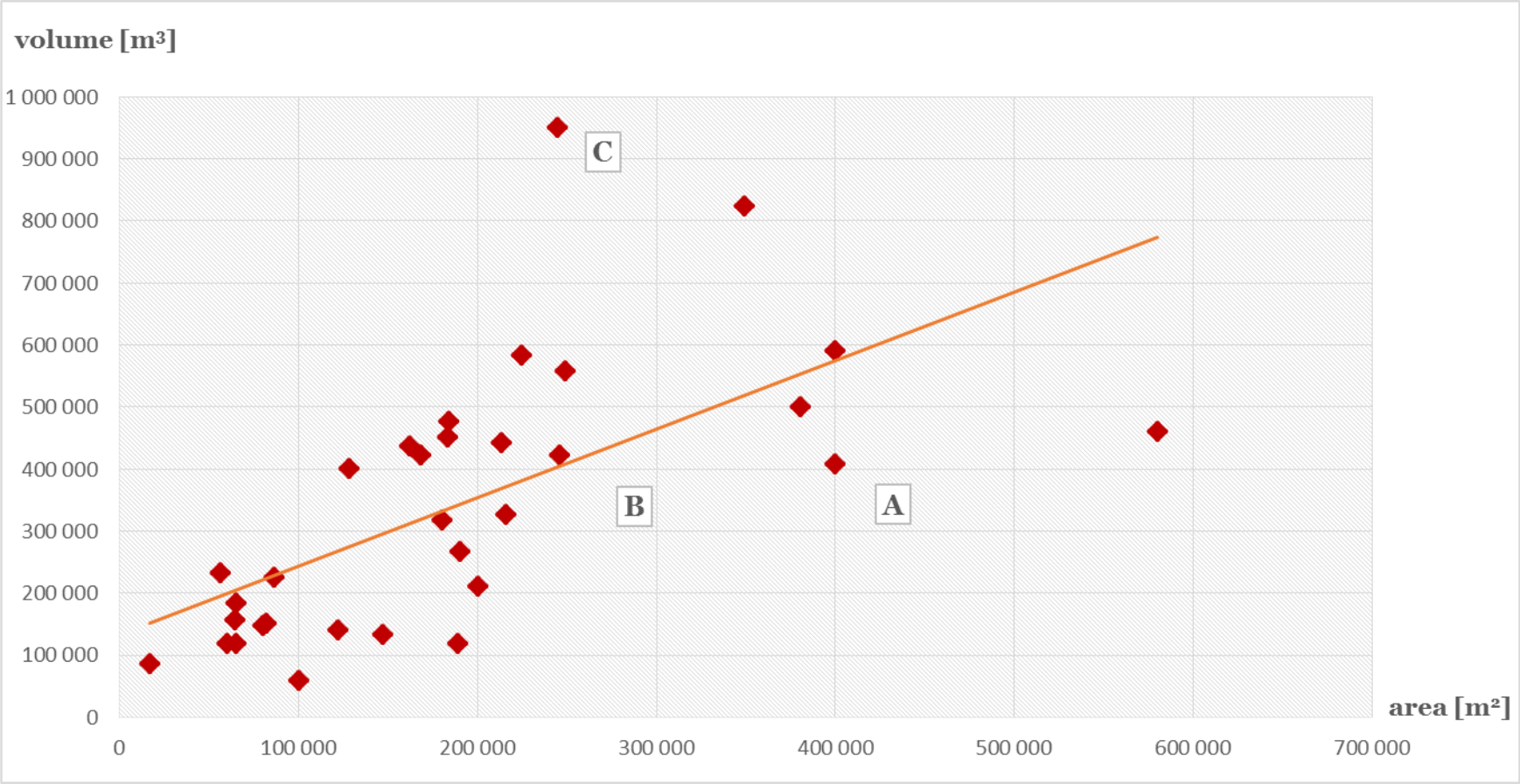


A – unloading, log storage, intrayard transport

B – unloading, **sorting**, log storage, intrayard transport

C – unloading, **scaling, classification, sorting**, log storage, intrayard transport

Volume to wood yard area [m³/m²]



Conclusions

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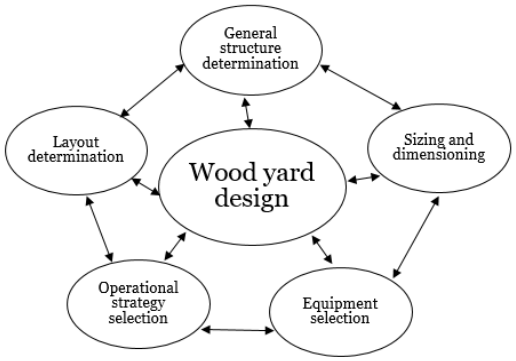
Conclusions

1) Wood yards are often a result of punctual and «unruly» extensions
   - Managers are keen on obtaining design guidelines
   - Gap in scientific literature

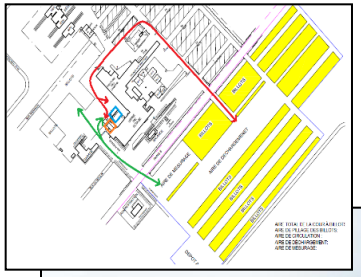
2) Heterogeneity in designs and operations strategies poses a challenge when evaluating key performance indicators.
   - Benchmarking will require further clustering
   - Wood yard performance consideration requires to include wood supply network context

Supply network performance

Supply network



Mill design



Reconsideration
Modifications?

UNSATISFACTORY PERFORMANCE

Reconsideration
Modifications?

References

- Gu, J., Goetschalckx, M. and McGinnis, L.F. (2007) "Research on warehouse operation: A comprehensive review", European Journal of Operational Research, 177(1), 1-21.

- Hampton, C.M. (1981) "Dry land log handling and sorting: Planning, constructing, and operation of log yards", San Francisco, CA: Miller Freeman Publications, Inc.

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- Tran, E. (2008) "Efficacité d'utilisation des chargeuses dans les parcs à bois : quatre études de cas", Forest Engineering Research Institute of Canada (FERIC), Advantage Report, 10 (9), 8 p.

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Thank you!