Key aspects of maturity assessment in Lean Construction

Sandra Cano, Luis Botero, Jorge Luis García-Alcaraz, Rafael Tovar and Leonardo Rivera

SLC-EModel

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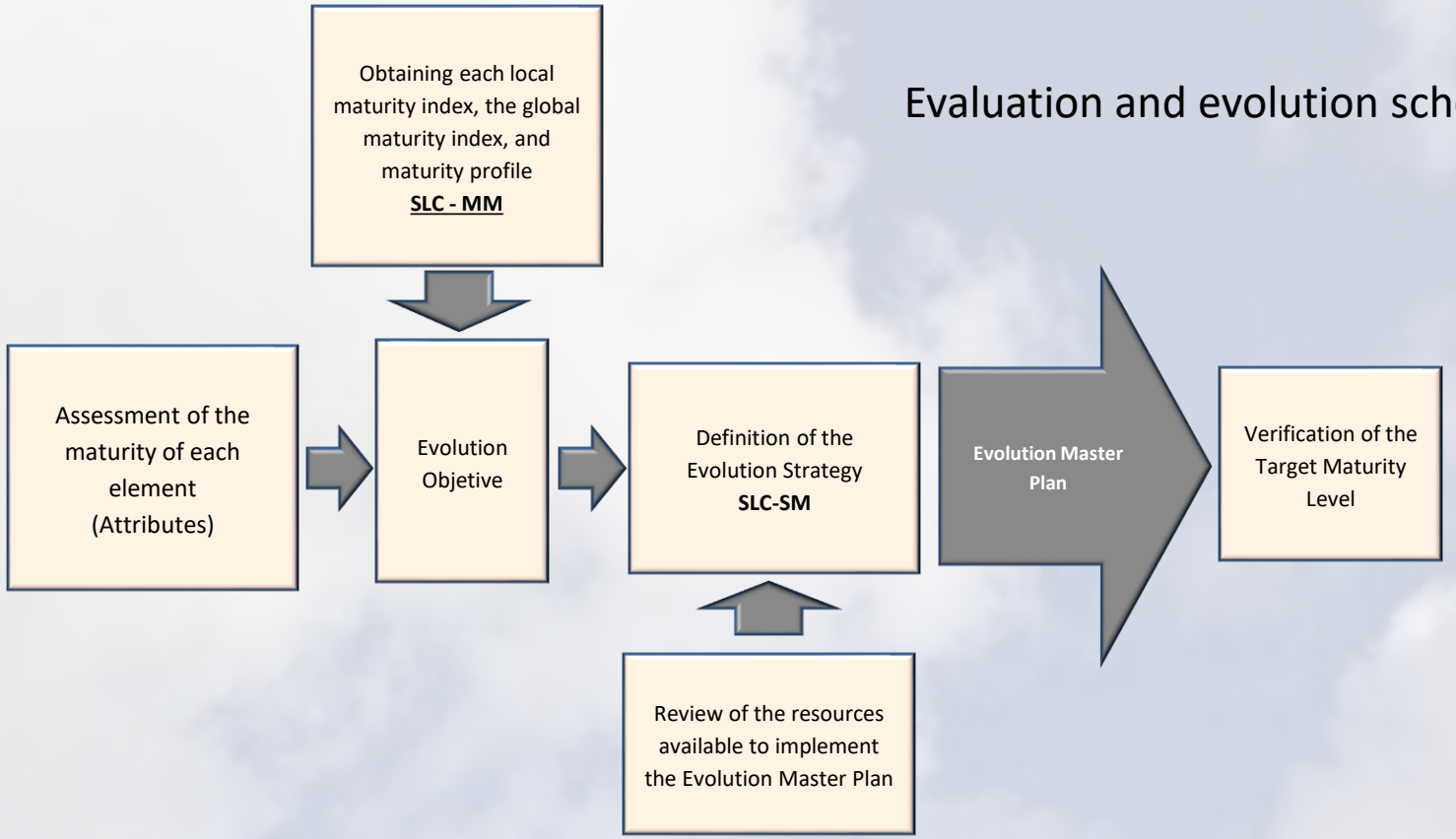
"Lean Construction Maturity Evolution Model in Construction Project Production Management“

SLC - EModel

Lean Construction(LC) implementation

Evaluation and evolution scheme



Definition Of Maturity

Maturity is the state of maximum development, or state of excellence, that offers the ability to make the projected objective come true with the most efficient use of available resources. It is a state that is gradually reached by going through different levels of maturity, which allow us to escalate towards a maximum standard, a reference level of excellence for the context, a "Gold Standard." (Cano & Rivera, 2015).

Methodology

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Reference Mapping

Interviews

Survey

450 Elements

People

2 Factors
9 Attributes

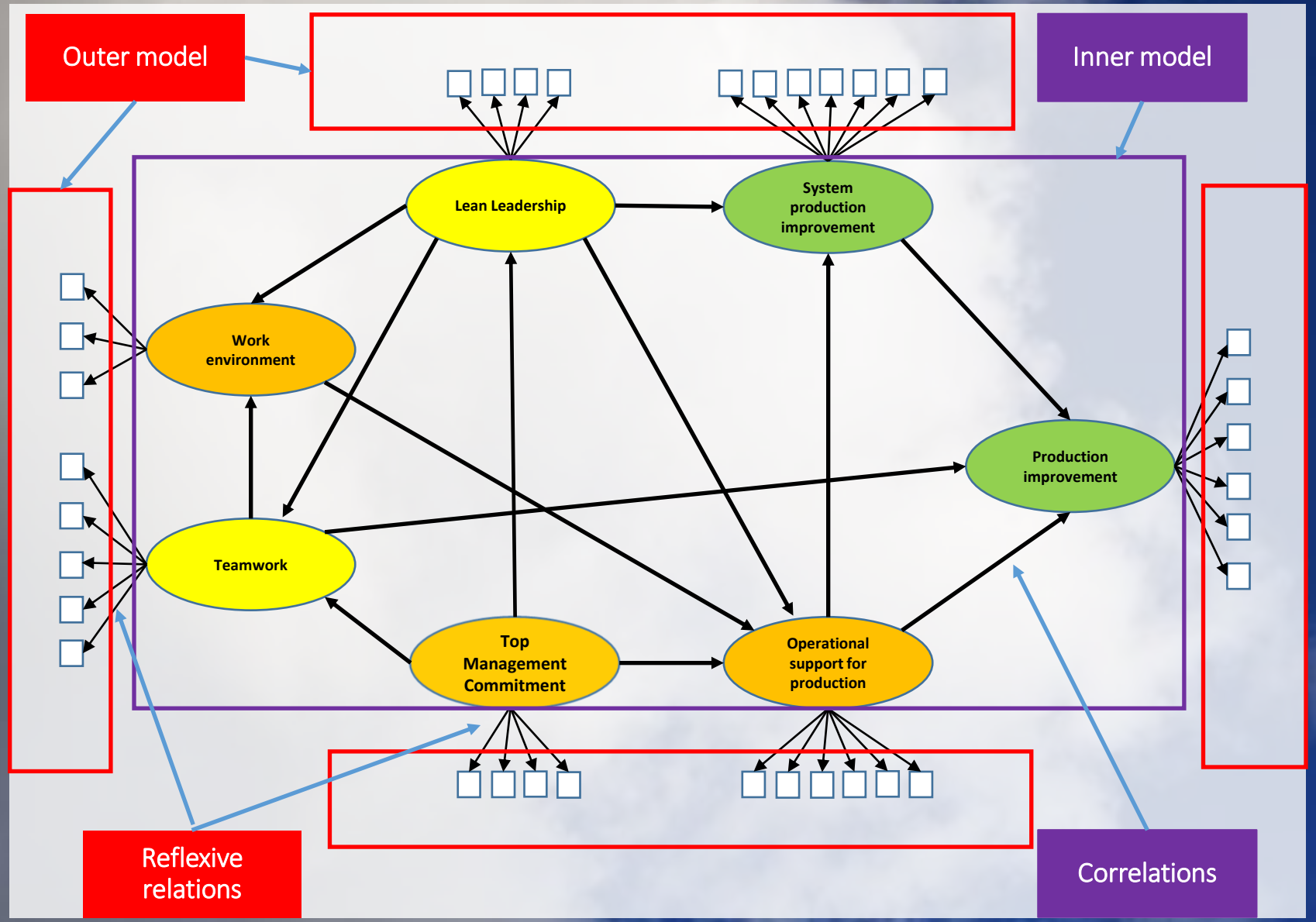
Production System

2 Factors
13 Attributes

Organization support

3 Factors
13 Attributes

Methodology



Maturity assessment

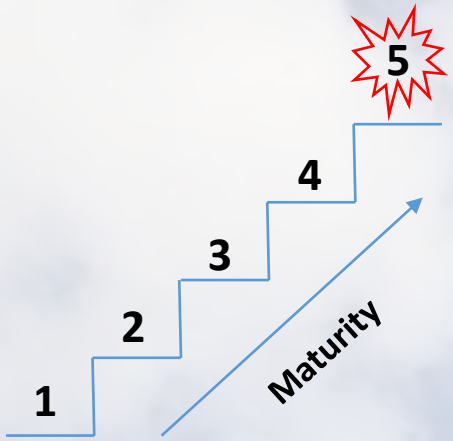
Then….

The maturity model makes possible to have a comparative information that can be used to develop an organizational improvement plan.

Utility of the maturity models

The Maturity Models assess the maturity of elements in the process to define the maturity level reached by the system.

This assessment is represented by maturity levels.



Categories, factors, and attributes

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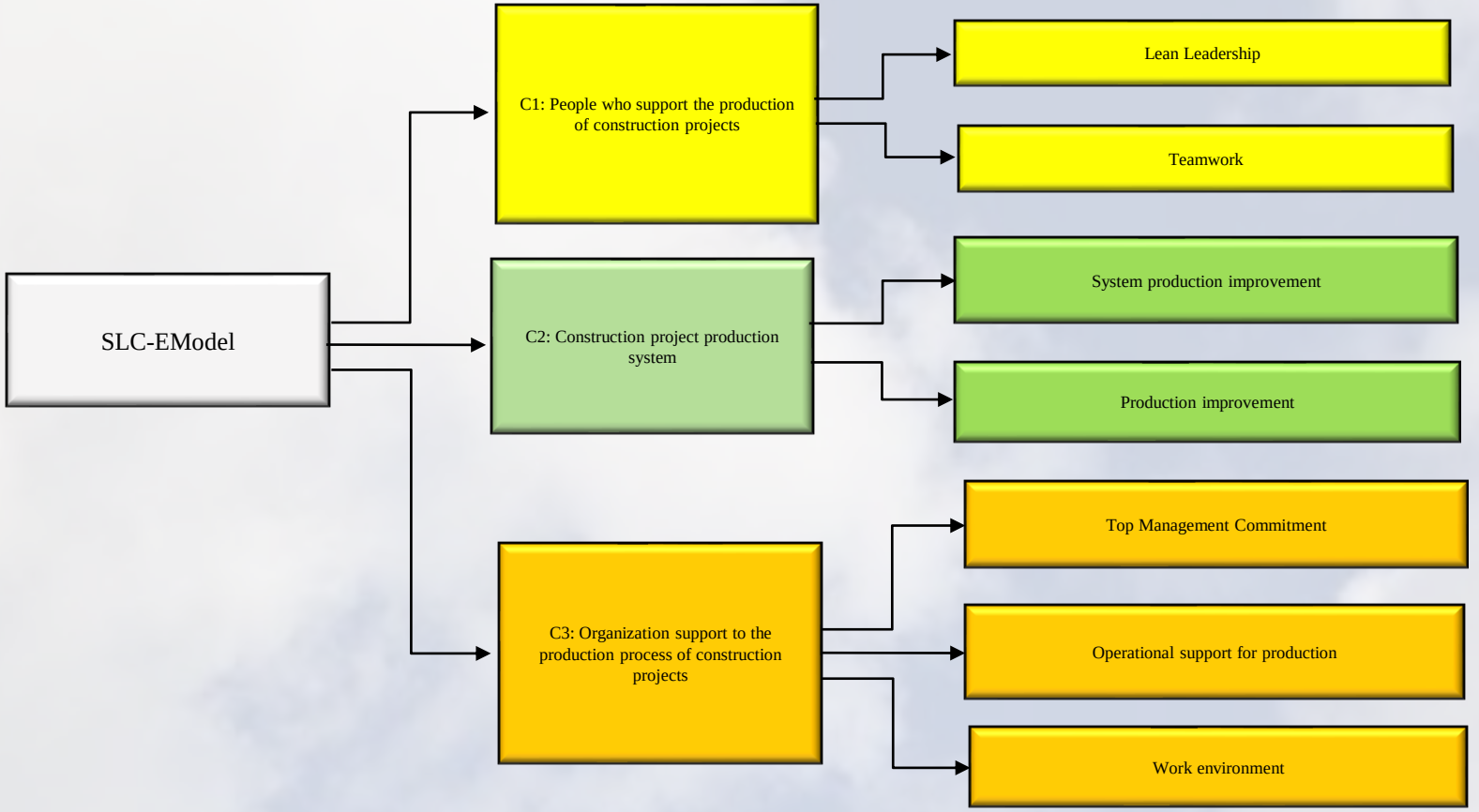
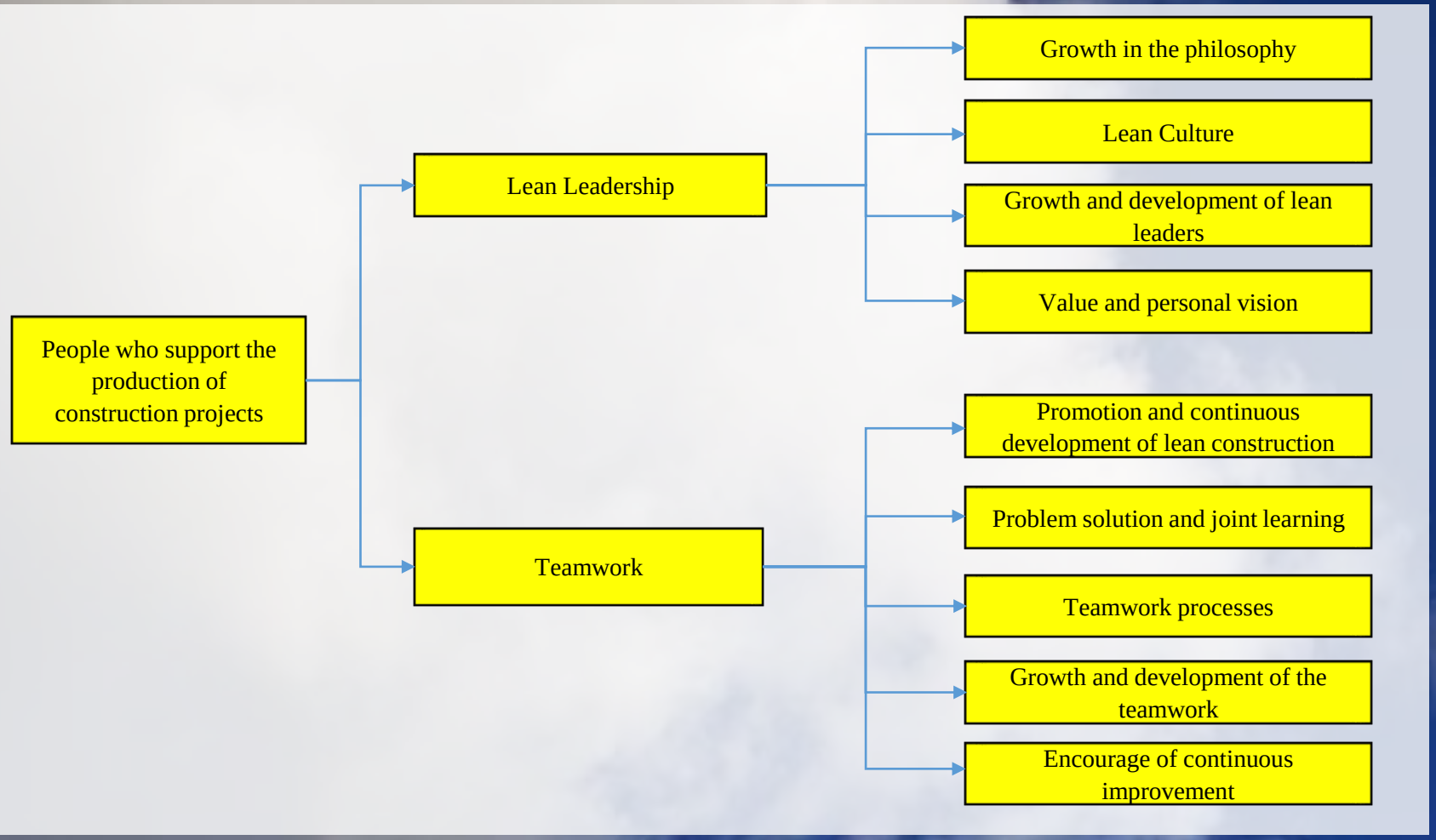
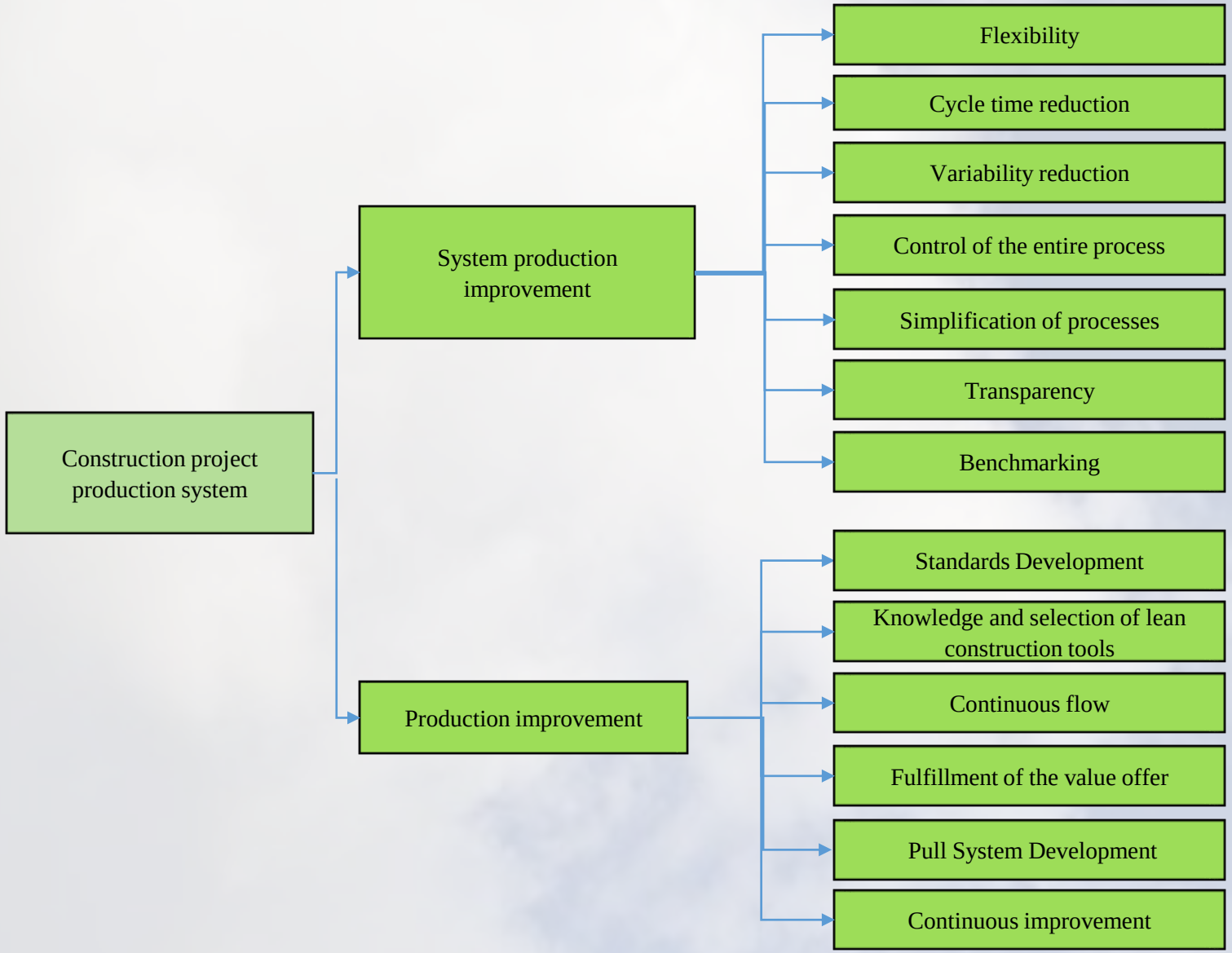
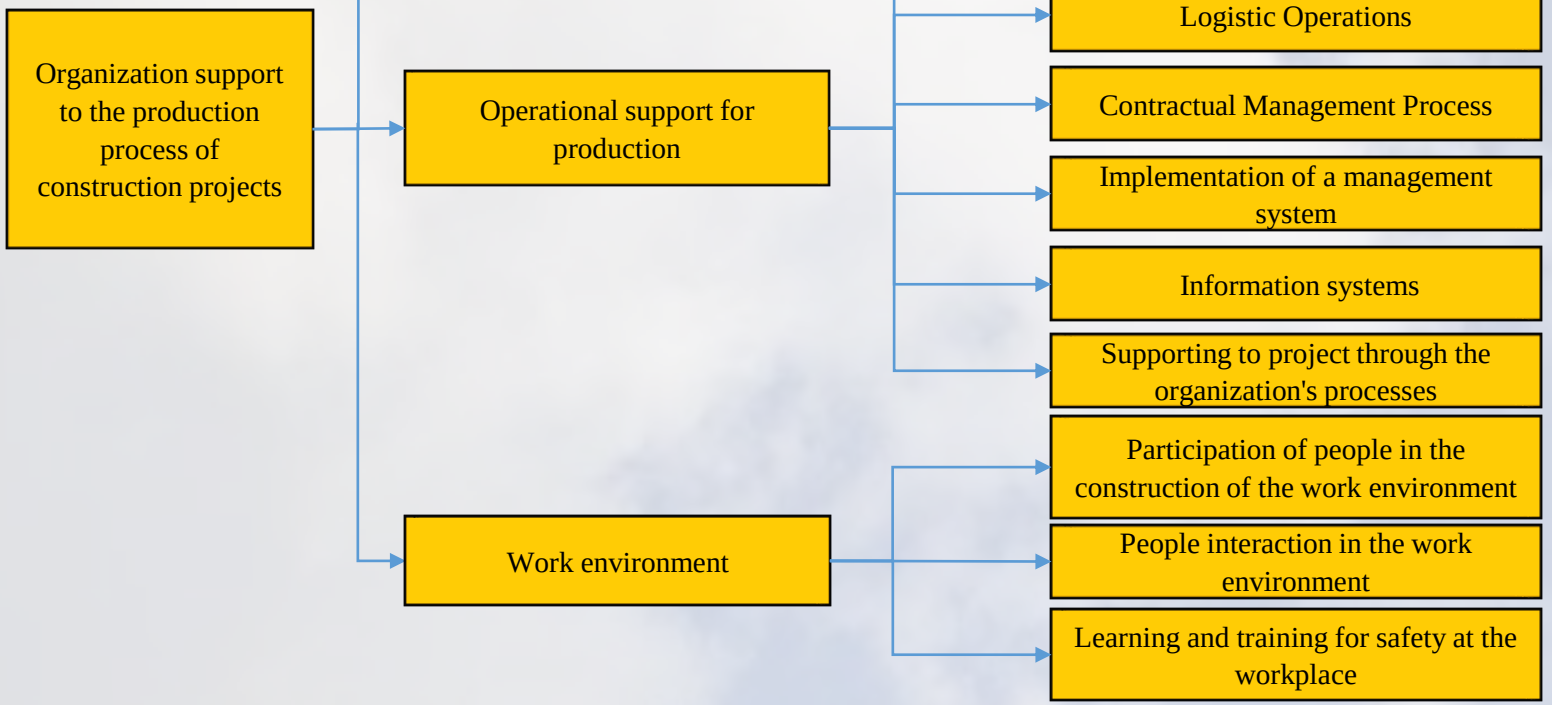




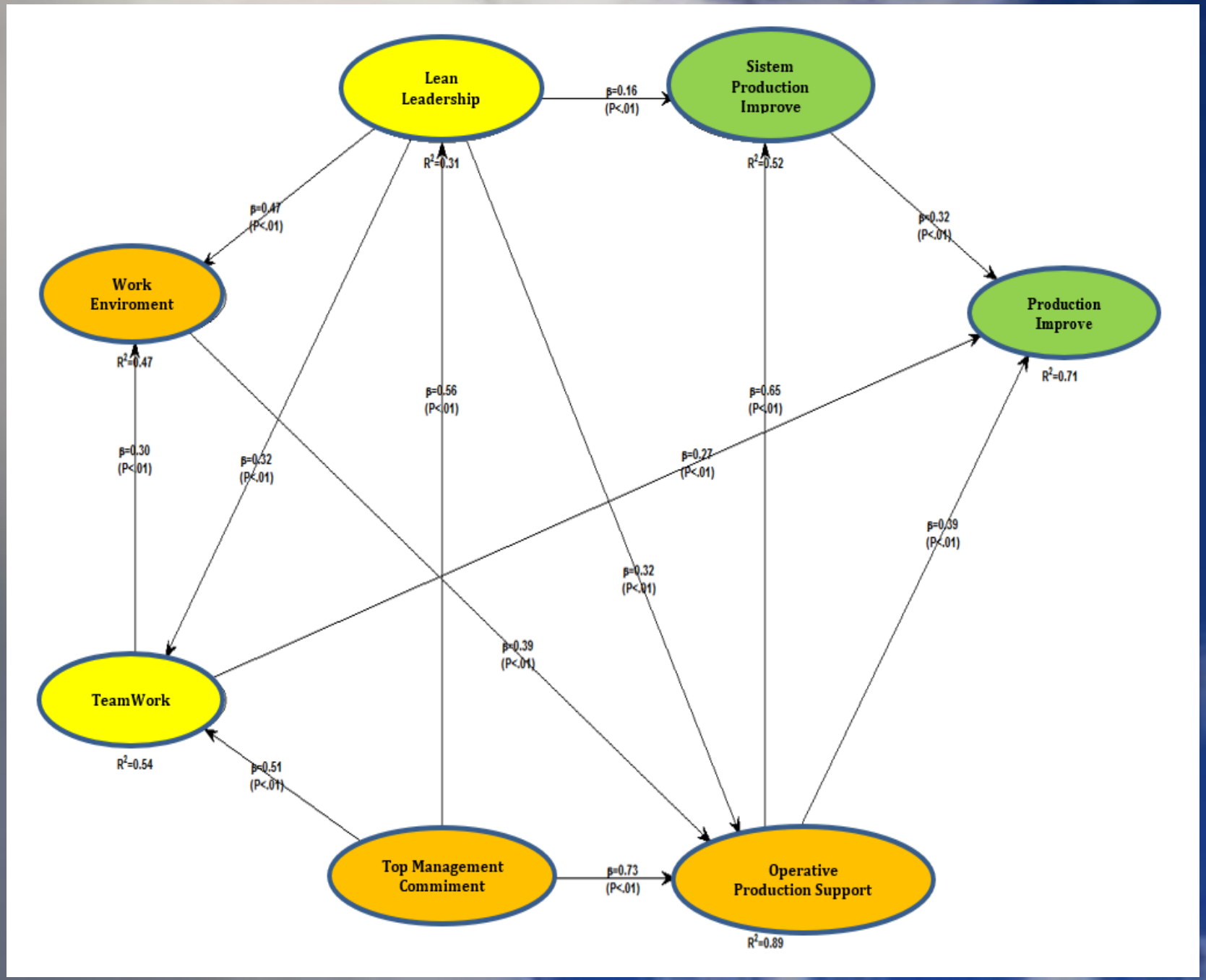
People who support the production of construction projects



Construction project production system



Organization support to the production process of construction projects

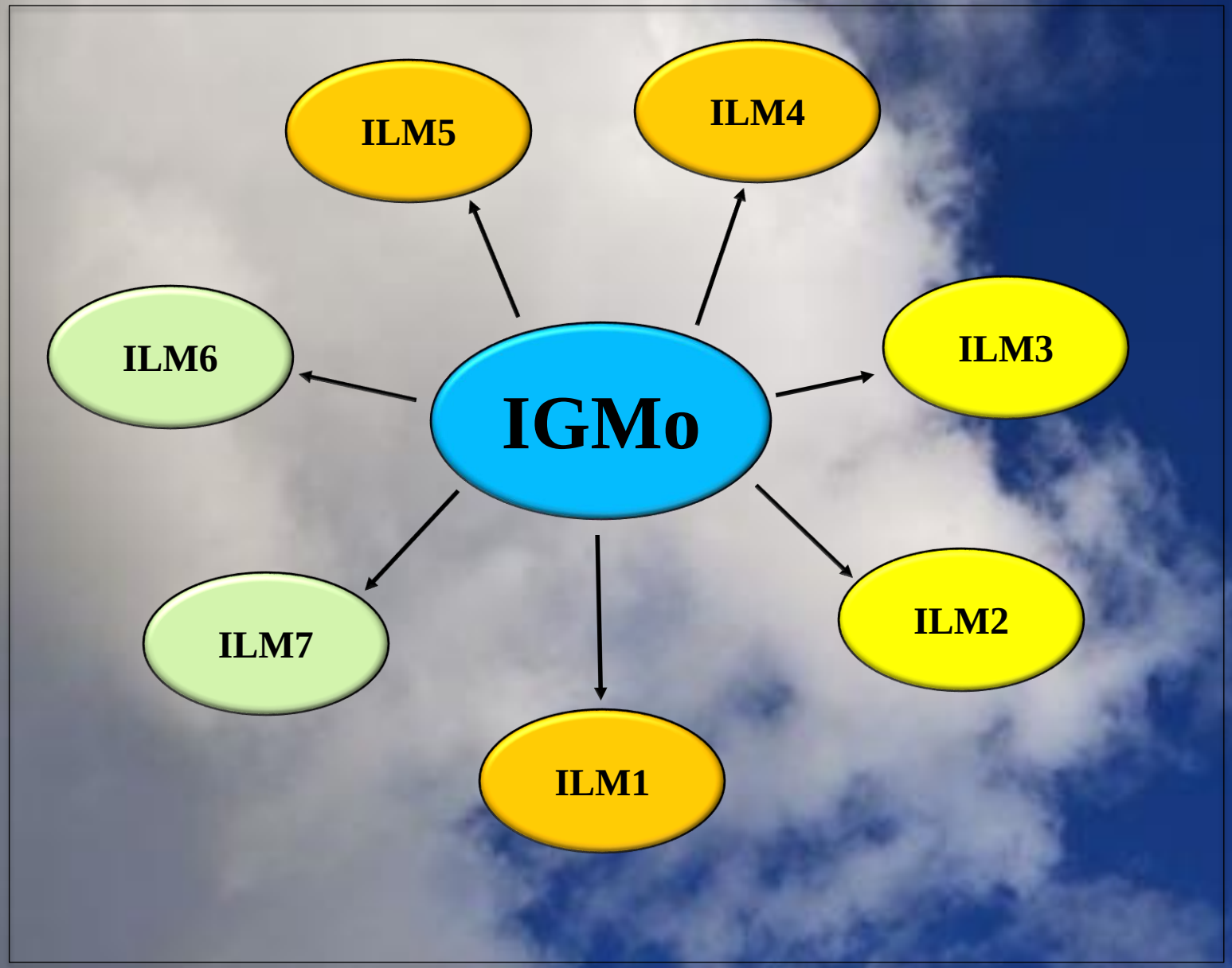

Lean Leadership
Sistem Production Improve
Work Enviroment
Production Improve
TeamWork
Top Management Commiment
Operative Production Support
β=0.16 (P<.01)
R²=0.31
R²=0.52
β=0.47 (P<.01)
β=0.32 (P<.01)
R²=0.47
R²=0.71
β=0.56 (P<.01)
β=0.65 (P<.01)
β=0.30 (P<.01)
β=0.32 (P<.01)
β=0.27 (P<.01)
β=0.39 (P<.01)
β=0.32 (P<.01)
β=0.39 (P<.01)
R²=0.54
β=0.51 (P<.01)
β=0.73 (P<.01)
R²=0.89

SLC-EModel

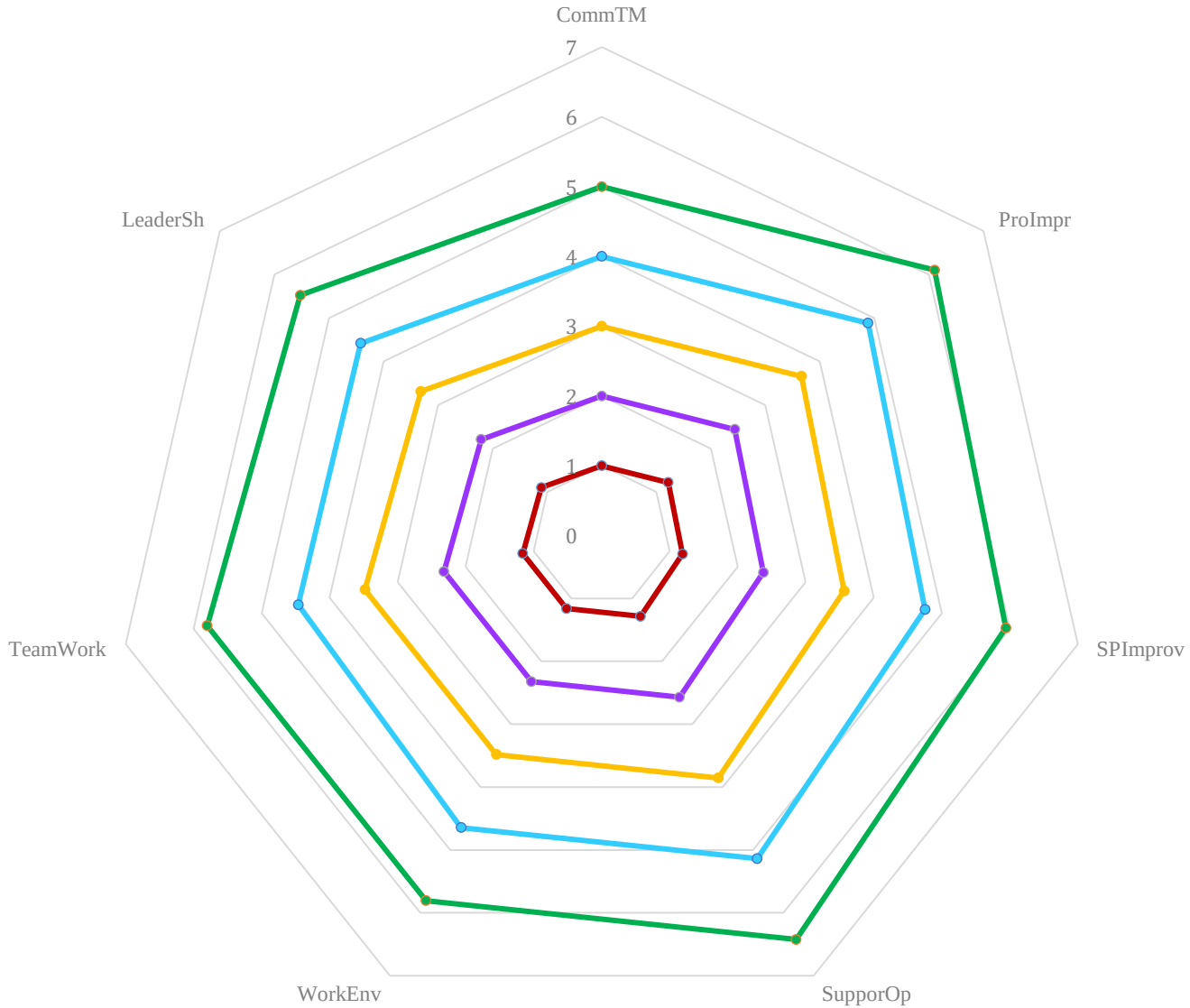
$ILM_1 = Y_{CommTM}$	$Y_1 = (0{,}277 * x_9 + 0{,}278 * x_{10} + 0{,}240 * x_{11} + 0{,}205 * x_{12})$
$ILM_2 = Y_{LeaderSh}$	$Y_2 = (0{,}268 * x_{19} + 0{,}266 * x_{20} + 0{,}253 * x_{21} + 0{,}214 * x_{22}) + (0{,}104 * ILM_1)$
$ILM_3 = Y_{TeamWork}$	$Y_3 = (0{,}192 * x_1 + 0{,}206 * x_2 + 0{,}213 * x_3 + 0{,}198 * x_4 + 0{,}191 * x_5) + (0{,}095 * ILM_1 + 0{,}059 * ILM_2)$
$ILM_4 = Y_{WorkEnv}$	$Y_4 = (0{,}337 * x_6 + 0{,}332 * x_7 + 0{,}331 * x_8) + (0{,}087 * ILM_2 + 0{,}056 * ILM_3)$
$ILM_5 = Y_{SupporOp}$	$Y_5 = (0{,}160 * x_{13} + 0{,}180 * x_{14} + 0{,}171 * x_{15} + 0{,}161 * x_{16} + 0{,}184 * x_{17} + 0{,}144 * x_{18}) + (0{,}136 * ILM_1 + 0{,}059 * ILM_2 + 0{,}072 * ILM_4)$
$ILM_6 = Y_{SPImprov}$	$Y_6 = (0{,}157 * x_{23} + 0{,}152 * x_{24} + 0{,}152 * x_{25} + 0{,}148 * x_{26} + 0{,}143 * x_{27} + 0{,}134 * x_{28} + 0{,}114 * x_{29}) + (0{,}030 * ILM_2 + 0{,}121 * ILM_5)$
$ILM_7 = Y_{ProImpro}$	$Y_7 = (0{,}175 * x_{30} + 0{,}170 * x_{31} + 0{,}169 * x_{32} + 0{,}168 * x_{33} + 0{,}161 * x_{34} + 0{,}157 * x_{35}) + (0{,}050 * ILM_3 + 0{,}072 * ILM_5 + 0{,}059 * ILM_6)$

Structural equations

Maturity local index, ILMi



Global Maturity Index



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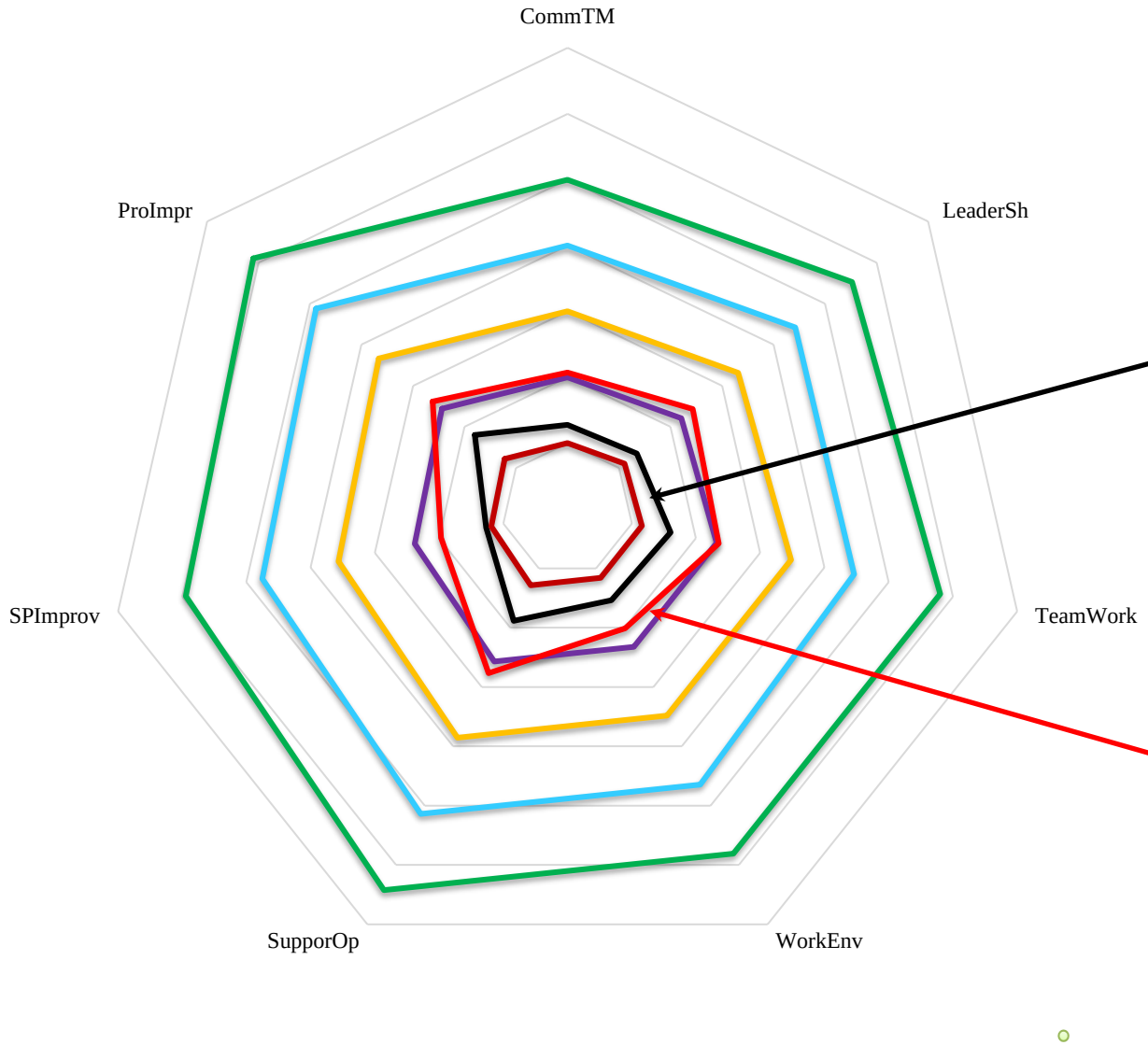
Global Maturity Index

Example



Current IGM = 1,33

IGM Objective = 2,0

Conclusions

- This model was designed to assess the maturity of Lean Construction in the CPM. However, its development allows it to be adapted and applied to other contexts and production processes.
- The SLC-EModel has the ability to explain the phenomenon of maturity in this and any productive sector, considering that any production system has the same categories as those defined in it.

Conclusion

- In the project production system, people are the essential component for the production process. In the construction project, all operations are carried out with people who constitute work teams, and the team's work builds their work environments. In this way, companies must concentrate their efforts on the formation of human capital to build an Lean Construction culture.
- The production process of the construction project requires people trained with attitude and willingness to work and improve continuously, a production system, and organizational operations at the service of the project that effectively contribute to the production flow.

Conclusion

- To adopt and apply manufacturing technologies in the construction industry, a better understanding of innovation management practices is required. An evolution model must be a simple tool to apply, which systemically includes people at different levels of the organization.
- The authenticity of the elements identified and the relationships between them are ensured since the results broadly represent the phenomenon of maturity observed objectively. The results of the SEM clearly and broadly represent the constructs to which it refers.

Future work recommendations

- For the implementation of the model, it is required to apply in the field the attributes assessment. Due to the high volume of information to evaluate the model, a software tool must be developed to provide the maturity rating.

If you want to contact me, my email is

sandra.cano@correounivalle.edu.co