

Comparative Analysis of the Level of Development and Current Application of Condition Monitoring and Predictive Maintenance Techniques across different Modes of Transportation

Condition Monitoring (CM) and Predictive Maintenance (PdM) play an important role in safe operation, reduction of operational faults and related maintenance costs, as well as improvement of operational efficiency in the transportation sector. There are numerous studies focusing on the level of development of CM and PdM in transportation. However, no studies have been found on the evaluation of the level of development of CM and PdM across different transportation modes.

This thesis has the purpose to fill this gap by establishing a formal methodology to evaluate the level of development in CM and PdM across transportation modes. In the methodology, several indicators are proposed, along with their definitions, objectives, and calculation methods. Numerical results are given and analyzed based on the calculation methods.

This thesis is conducted as a case study for China. The evaluation results show that, in China, railways have an advantage in the development in CM and PdM compared to other modes of transportation. However, the established methodology is general applicable and can be used as a starting point for further research on this topic.



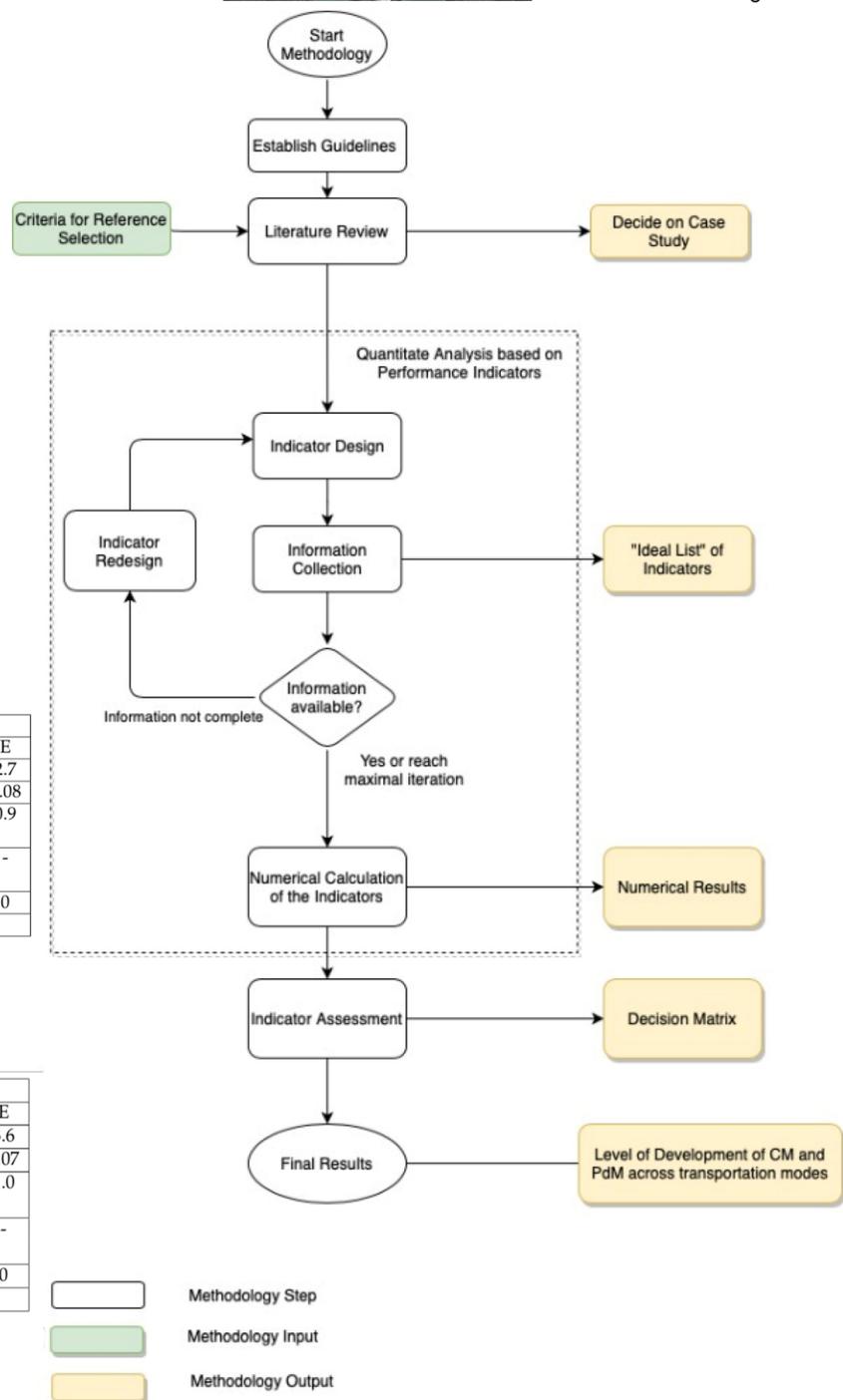
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Indicator	W	Air			Rail			Road			Water		
		R	P	E	R	P	E	R	P	E	R	P	E
Number of Publications	30	32	0.71	21.3	45	1	30	20	0.44	13.3	4	0.09	2.7
Investment Cost	33	81.4	1	33	1.8	0.02	0.7	-	-	-	0.2	0.002	0.08
Proportion of Vehicles using CM or PdM	18	17.34	0.38	6.9	45.45	1	18	3.53	0.08	1.4	2.36	0.05	0.9
Proportion of Infrastructure using CM or PdM	15	-	-	-	25.56	1	15	0.423	0.02	0.3	-	-	-
Open Data Availability	4	5	1	4	0	0	0	0	0	0	0	0	0
Total	100	65.2			63.7			15			3.68		

Decision Matrix: Scenario A

Indicator	W	Air			Rail			Road			Water		
		R	P	E	R	P	E	R	P	E	R	P	E
Number of Publications	40	32	0.71	28.4	45	1	40	20	0.44	17.8	4	0.09	3.6
Investment Cost	30	81.4	1	30	1.8	0.02	0.7	-	-	-	0.2	0.002	0.07
Proportion of Vehicles using CM or PdM	20	17.34	0.38	7.6	45.45	1	20	3.53	0.08	1.6	2.36	0.05	1.0
Proportion of Infrastructure using CM or PdM	5	-	-	-	25.56	1	5	0.423	0.02	0.08	-	-	-
Open Data Availability	5	5	1	5	0	0	0	0	0	0	0	0	0
Total	100	71			65.7			19.5			4.67		

Decision Matrix: Scenario B



Flow Chart of the established methodology

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