

Online Appendices

EC.1. Literature review summarization

Table EC.1 summarizes literature references based on inputs, tools, and outputs.

Table EC.1 Literature review classification

Study	Methodology	Failure structure identification data type	Failure detection data type	Failure analysis tool	Output
Filz et al. (2021b)	FMEA	Expert driven	Hybrid expert and data driven	Classification using Neural networks	RPN
Xu et al. (2020)	FMEA	Expert driven	Expert driven	Clustering/classification using other methods	Failure occurrence rate
Rastayesh et al. (2019)	FMEA	Expert driven	Expert driven	Bayesian networks	Failure occurrence rate
Yucesan et al. (2021)	FMEA	Expert driven	Expert driven	Bayesian networks	Failure occurrence rate
Tay et al. (2015)	FMEA	Expert driven	Expert driven	Classification using Neural networks	Failure/causes clusters/classes
Sayed and Lohse (2014)	FMEA	Expert driven	Expert driven	Bayesian networks	Failure occurrence rate
Dey and Stori (2005)	RCA	Expert driven	Data driven	Bayesian networks	Failure occurrence rate
Steenwinckel et al. (2018)	FMEA	Expert driven	Expert driven	Rule based reasoning	Root causes of a failure
Brahim et al. (2019)	FMEA	Expert driven	Expert driven	Bayesian networks	Failure occurrence rate
Tönnes (2018)	RCA	Data driven	Data driven	Other tools	Root causes of a failure
Zuo et al. (2016)	RCA	Data driven	Data driven	Other tools	Mitigation actions
Chang et al. (2015)	FMEA	Expert driven	Expert driven	Clustering/classification using other methods	Failure/causes clusters/classes
Wan et al. (2019)	FMEA	Expert driven	Expert driven	Bayesian networks	RPN
Liu et al. (2019b)	FMEA	Expert driven	Expert driven	Bayesian networks	Failure occurrence rate
Bhardwaj et al. (2022)	FMEA	Expert driven	Data driven	Bayesian networks	Failure occurrence rate
Yang et al. (2018)	FMEA	Expert driven	Expert driven	Bayesian networks	Root causes of a failure
Yang et al. (2022)	FMEA	Expert driven	Expert driven	Bayesian networks	Root causes of a failure
Nie et al. (2019)	FMEA	Expert driven	Expert driven	Bayesian networks	Root causes of a failure
Hireche et al. (2018)	FMEA	Expert driven	Data driven	Bayesian networks	Root causes of a failure
Leu and Chang (2013)	FTA	Expert driven	Data driven	Bayesian networks	Root causes of a failure
Snooke and Price (2012)	FMEA	Data driven	Data driven	Other tools	Root causes of a failure
Nepal and Yadav (2015)	FMEA	Expert driven	Expert driven	Bayesian networks	RPN
Chan and McNaught (2008)	RCA	Expert driven	Data driven	Bayesian networks	Root causes of a failure
Khorshidi et al. (2015)	FMEA	Expert driven	Expert driven	Other tools	RPN
Wang et al. (2018)	FTA	Expert driven	Expert driven	Other tools	Root causes of a failure
Gomez-Andrades et al. (2016)	RCA	Data driven	Data driven	Classification using Neural networks	Failure/causes clusters/classes
Psarommatas and Kiritakis (2022)	RCA	Data driven	Data driven	Classification using Neural networks	Failure occurrence rate
Hecht and Baum (2019)	FMEA	Expert driven	Expert driven	Other tools	Mitigation actions
Mazzoleni et al. (2017)	FMEA	Data driven	Hybrid expert and data driven	Clustering/classification using other methods	Failure/causes clusters/classes
Price and Taylor (2002)	FMEA	Expert driven	Expert driven	Other tools	RPN
Liu et al. (2021)	RCA	Data driven	Data driven	Other tools	Root causes of a failure
Jomthanachai et al. (2021)	FMEA	Expert driven	Expert driven	Classification using Neural networks	Mitigation actions
Mangalathu et al. (2020)	FMEA	Expert driven	Data driven	Clustering/classification using other methods	Failure/causes clusters/classes
Shi et al. (2020)	FMEA	Expert driven	Expert driven	Rule based reasoning	Root causes of a failure
Ma and Wu (2020)	FMEA	Expert driven	Hybrid expert and data driven	Classification using Neural networks	Root causes of a failure
Li et al. (2013)	FMEA	Expert driven	Expert driven	Bayesian networks	Root causes of a failure
Jacobo et al. (2007)	RCA	Expert driven	Expert driven	Rule based reasoning	Mitigation actions
Teoh and Case (2005)	FMEA	Expert driven	Data driven	Other tools	Root causes of a failure

Table EC.1 Continued

Study	Methodology	Failure structure identification data type	Failure detection data type	Failure analysis tool	Output
Rivera Torres et al. (2018)	FMEA	Expert driven	Data driven	Other tools	Root causes of a failure
Duan et al. (2020)	RCA	Data driven	Hybrid expert and data driven	Classification using Neural networks	Failure/causes clusters/classes
Yang and Liu (1998)	FTA	Expert driven	Data driven	Other tools	Root causes of a failure
Al-Mamory and Zhang (2009)	RCA	Expert driven	Data driven	Clustering/classification using other methods	Failure/causes clusters/classes
Yang et al. (2009)	FTA	Expert driven	Data driven	Other tools	Root causes of a failure
Pang et al. (2021)	FMEA	Expert driven	Data driven	Classification using Neural networks	Failure/causes clusters/classes
Schuh et al. (2021)	RCA	Expert driven	Data driven	Other tools	Failure/causes clusters/classes
Yang et al. (2020)	RCA	Expert driven	Data driven	Other tools	Failure occurrence rate
Chen et al. (2018)	RCA	Expert driven	Data driven	Other tools	Root causes of a failure
Demirbaga et al. (2021)	RCA	Data driven	Data driven	Other tools	Root causes of a failure
Zhou et al. (2015)	FMEA	Data driven	Expert driven	Rule based reasoning	Root causes of a failure
Zhang et al. (2023)	RCA	Data driven	Data driven	Clustering/classification using other methods	Failure/causes clusters/classes
Liu and Ke (2007)	RCA	Data driven	Data driven	Other tools	Mitigation actions
Filz et al. (2021a)	RCA	Data driven	Data driven	Clustering/classification using other methods	Quality inspection strategy
Musumeci et al. (2020)	RCA	Expert driven	Hybrid expert and data driven	Clustering/classification using other methods	Failure/causes clusters/classes
Jiao et al. (2020)	RCA	Data driven	Data driven	Other tools	Root causes of a failure
Ament and Goch (2001)	RCA	Data driven	Data driven	Classification using Neural networks	Root causes of a failure
Clancy et al. (2023)	RCA	Data driven	Data driven	Other tools	Root causes of a failure
Yang et al. (2015)	FMEA	Data driven	Hybrid expert and data driven	Classification using Neural networks	Failure/causes clusters/classes
Waghen and Ouali (2021)	FTA	Hybrid expert and data driven	Data driven	Bayesian networks	Root causes of a failure
Oliveira et al. (2021)	RCA	Data driven	Data driven	Other tools	Root causes of a failure
Teoh and Case (2004)	FMEA	Data driven	Data driven	Other tools	Root causes of a failure
Ma et al. (2021)	RCA	Data driven	Data driven	Classification using Neural networks	Mitigation actions
Palluat et al. (2006)	FMEA	Expert driven	Data driven	Classification using Neural networks	Failure/causes clusters/classes
Sariyer et al. (2021)	RCA	Data driven	Data driven	Other tools	Failure/causes clusters/classes
Agrawal et al. (2016)	RCA	Data driven	Data driven	Bayesian networks	Root causes of a failure
Chien et al. (2017)	RCA	Data driven	Data driven	Clustering/classification using other methods	Root causes of a failure
Xu and Dang (2023)	RCA	Data driven	Data driven	Other tools	Failure/causes clusters/classes
Oliveira et al. (2022)	RCA	Data driven	Data driven	Other tools	Failure/causes clusters/classes
Sun et al. (2021)	RCA	Data driven	Data driven	Other tools	Root causes of a failure
Rokach and Hutter (2012)	RCA	Data driven	Data driven	Clustering/classification using other methods	Failure/causes clusters/classes
Gómez-Andrades et al. (2015)	RCA	Data driven	Data driven	Clustering/classification using other methods	Failure/causes clusters/classes
Du et al. (2012)	RCA	Data driven	Data driven	Classification using Neural networks	Root causes of a failure

EC.2. Application Classification

Here is a list of studies categorized by application.

- Maintenance planning: Filz et al. (2021b), Mazzoleni et al. (2017), Rivera Torres et al. (2018), Yang and Liu (1998), Palluat et al. (2006)
- Discrete production processing, machining, and/or assembly quality issues: Xu et al. (2020), Yucesan et al. (2021), Sayed and Lohse (2014), Brahim et al. (2019), Zuo et al. (2016), Khorshidi et al. (2015), Xu and Dang (2020), Pang et al. (2021), Schuh et al. (2021), Yang et al. (2020),

Liu and Ke (2007), Ament and Goch (2001), Ma et al. (2021), Sariyer et al. (2021), Xu and Dang (2023), Oliveira et al. (2022), Rokach and Hutter (2012), Oliveira et al. (2021), Du et al. (2012)

- Chemical systems/manufacturing: Rastayesh et al. (2019), Camarillo et al. (2018), Liu et al. (2021), Chen et al. (2018), Jiao et al. (2020), Agrawal et al. (2016), Sun et al. (2021)

- Semiconductor: Psarommatis and Kiritsis (2022), Chang et al. (2017), Li et al. (2013), Filz et al. (2021a), Waghen and Ouali (2021), Chien et al. (2017)

- Food and/or farming industry: Tay et al. (2015), Chang et al. (2015), Zhang et al. (2023)

- Computer systems: Lee (2001), Yang et al. (2018), Chan and McNaught (2008), Gomez-Andrades et al. (2016), Hecht and Baum (2019), Duan et al. (2020), Demirbaga et al. (2021), Musumeci et al. (2020), Snooke and Price (2012), Gómez-Andrades et al. (2015)

- System reliability and safety: Liu et al. (2019b), Bhardwaj et al. (2022), Yang et al. (2022), Leu and Chang (2013), Wang et al. (2018), Jomthanachai et al. (2021), Al-Mamory and Zhang (2009), Zhou et al. (2015), Yang et al. (2015), Hireche et al. (2018)