Overview of context awareness approaches in Business Process Management

Reference	Description	Requirements	Shortcomings
(Rosemann et al., 2008)	Stratified framework differentiating four forms of context into concentric layers of an onion model: immediate, internal, external, environmental	• Specification of the contextual factors in the four layers	• Taxonomy serves as an initial reference on research in process contextualization • No specification of the contextual factors extraction
(vom Brocke et al., 2016)	Integrated framework of contextual factors related to four dimensions: goal, process, organization, environment	• Specification of the contextual factors in the four dimensions	• Many contextual factors from other fields require empirical investigation in BPM • Interdependencies of contextual factors require further investigation • More research on validation and extension of contextual factors
(vom Brocke et al., 2021)	Context-Aware BPM Method Assessment and Selection (CAMAS) Method helping to assess contexts for BPM methods application and select BPM methods for given contexts	• Set of BPM methods (method bases) • Classification framework (Excel) • Specification of contextual factors	• Assumptions of the method • Evaluation • No specification of the contextual factors extraction
(Anastassiu, Santoro, Recker, & Rosemann, 2016)	Method to identify the contextual elements of a process based on the analysis of a process model	• Process-related information such as input, output, resources, activities • Context-related information such as conditions, artifacts, products, services, information key to the process, events from external environment	• Lack of detailed information in process models • Lack of formalization • Focus on immediate/internal contextual elements based on the process model
(Hoang & Jung, 2014)	Ontological framework for context-aware collaborative business process formulation	• Process execution data (event logs) • Ontologies	• Focus on primitive ontologies • Context information is limited to process execution data and ontologies
(Bucchiarone, Marconi, Pistore, & Sirbu, 2011)	Framework supporting context-aware evolution of processes based on process instance execution and adaptation history, identifies recurring adaptation needs	• Process execution data (event logs)	• Context information is limited to process execution data • Lack of specific solutions for the identified adaptation needs
(De Maio, Fenza, Loia, Orciuoli, & Herrera-Viedma, 2016; Enrique, De Maio, Fenza, Loia, & Orciuoli, 2016)	Framework, model for context-aware heterogeneous group decision making in processes	• Data regarding decision making (decision makers, opinions, weights, records of past decision making) • Contexts modelled with Semantic Web languages and vocabularies like OWL2 and SKOS	• Focus on decision makers and opinion weights • Limitations regarding weights learning • Context information is limited to Semantic Web languages and vocabularies like OWL2 and SKOS
(Wang, Shi, Li, & Liu, 2016)	Framework for context-aware semantic complex event processing	• Process execution data (event logs) • Event ontologies	• Focus on event log data • Context information is limited to ontologies
(Hompes, Buijs, & van der Aalst, 2016)	Framework to analyze key process performance indicators by considering the process context	• Process execution data (event logs) • Descriptive context labels assigned to process entities by applying context functions	• Focus on event log data • Careful interpretation of the results of the automated analysis technique
(Ploesser, Recker, & Rosemann, 2010)	Conceptual model of context-awareness comprising process elements, goals, and context elements	• KPIs • Expert interviews	• Limitations of the expert interviews
(Boukadi, Chaabane, & Vincent, 2009)	Framework for context-aware process modelling considering functional, non-functional and environmental contexts	• Roles, business rules, goals • Process model	• Focus on modelling • Abundant non-functional and environmental contextual factors • No specification of the contextual factors extraction
(Saidani & Nurcan, 2009)	Context model for process modelling including information on who, what, where, when, why, how	• Roles, business rules, goals • Process model • Context information	• Focus on modelling • No specification of the contextual factors extraction
(Rekik, Boukadi, & Ben-Abdallah, 2017)	Framework to integrate context awareness in process outsourcing to the cloud, includes process (KPI, workload), temporal,	• Process execution data (event logs) • Context information	• Focus on specific problem • No specification of the contextual information extraction

	resource (cost, risk, performance) contexts		
(Mounira & Mahmoud, 2010)	Context-aware process mining framework for process flexibility	• Process execution data (event logs) • Process mining components (preprocessing, tool) and context-aware components (context interpreter, reasoner) • Contextual variables	• Focus on process mining and technical perspective
(Said, Chaabane, Andonoff, & Bouaziz, 2014)	BPMN meta-model for modelling process variability of considering contextual dimension	• Context parameters including goal, resources, data, behavioural	• Focus on modelling
(Song, Vanthienen, Cui, Wang, & Huang, 2019b)	Context-aware business process management ecosystem including context-aware process models, context models, decision models and context-aware process execution	• Process execution data (event logs) • Process models • Decision rules • Context ontology	• Focus on methodology • Focus on Internet of Things • Complex requirements • Context interpretation
(Cartelli, Di Modica, & Tomarchio, 2015)	Cost-centric model for context-aware (resources, environment) simulations of processes	• Process execution data (event logs) • Process models • Context models	• Focus on simulations and costs • No specification of the contextual information extraction
(Song, Vanthienen, Cui, Wang, & Huang, 2019a)	DMN-based method for context-aware business process modelling	• Context-dependent decisions • Process and decision models	• Focus on methodology • Focus on decision modelling
(Liptchinsky, Khazankin, Truong, & Dustdar, 2012)	Approach and a graphical notation to model context-aware collaboration processes	• Process context information including related actors and artifacts	• Focus on modelling of collaboration processes • Absence of explicit communication entities (events or messages)
(Hidri, M'tir, Ben Saoud, & Ghedira-Guegan, 2019)	Meta-model for context-aware adaptive business process as a service in collaborative cloud environment	• Service, provider, customer, BPaaS, environment context information	• Conceptual formalisation • No specification of the contextual information extraction