Domino theory of accident causation pdf

Heinrich's Domino theory states that accidents are caused by a chain of successive events, metaphorically like the fall of a domino line. When one of the dominoes falls, it triggers the next, and the next... - but removing the key factor (such as a dangerous condition or dangerous act) prevents the onset of a chain reaction. What are the dangerous circumstances and acts? According to Heinrich, all incidents are directly related to dangerous conditions and acts that he defines as dangerous performance of individuals, such as standing under suspended load ... horseplay and removal of protective measures. and mechanical or physical hazards, such as unattended gear ... and insufficient light. They are described in detail in human behavior and errors in Module 7. Dominoes Heinrich plays five metaphorical dominoes marked by the cause of the accident. They are a social environment and ancestry, a person's fault, a dangerous act or a mechanical or physical hazard (dangerous condition), accident and injury. Heinrich explicitly defines each of these dominoes and gives advice on how to minimize or eliminate their presence in the series. Person's fault: Another domino also deals with the personality traits of employees. Heinrich explains that character errors born or received, such as poor character, thoughtlessness, ignorance and recklessness, contribute by one to eliminating the causal link of the accident. According to Heinrich, natural or environmental deficiencies in the employee's family or life cause these secondary personal defects, which themselves cause dangerous acts or the existence of unsafe conditions. Herbert W. Heinrich was a pioneering occupational safety researcher whose 1931 publication Industrial Accident Prevention: A Scientific Approach [Heinrich 1931] was based on an analysis of major accident data collected by his employer, a large insurance company. This work, which has been going on for more than 30 years, identified cause and effect factors for industrial accidents, such as dangerous acts of human beings and dangerous mechanical or physical conditions. Heinrich is most famous for the origins of the concept of the safety pyramid. He also developed five dominoes of accident causes, a successed accident model that has been influential in occupational safety thinking. His domino theory represents a series of accidents as a causal chain presented as dominoes that fall in a chain reaction. The fall of the first domino leads to the fall of the second, followed by the third, etc., as described below. H. Heinrich's 1950 book Industrial Accident Prevention: A Scientific Approach Heinrich, as the culmination of a preventable injury to a series of events reminiscent of a domino row that resembles a domino row set so that: Domino knocks over the next one, causing the third to fall and so on until the whole row is knocked down. If this series is interrupted by removing even one of its several factors, the damage will not occur, as shown in the figure below: Accident prevention by interrupting the accident sequence, the five identified factors published in the first version of the 1950 book Industrial Accident Prevention: A Scientific Approach In the first version of this model, published in 1931 were domino 1: ancestry and the worker's social environment, which affects the skills, beliefs and character traits of the worker, and therefore the way in which they perform tasks domino 2: negligence of the worker or personal defects which prevent them from paying sufficient attention to the task (see box of the accident susceptibility theory) domino 3: dangerous act or mechanical/physical hazard , such as worker error (standing under hanging load, starting machines without warning...) or technical equipment failure or insufficiently protected machine domino 4: accident domino 5: injuries or losses, the consequences of the accident accident altitle theory In the period 1920–1960, several industrial psychologists presented a theory , according to which certain workers are more accident-prone than others (they are more likely to be able to withstand accidents even if exposed to equal risk) [Burnham 2008]. Some people working in high-risk industries still feel this way. However, studies carried out since the 1960s show that this theory has little qualifications. Some population categories tend to have more accidents than others (e.g. young male drivers tend to have more car accidents than older drivers – more experienced drivers), but these factors apply to a specific category of persons (e.g. age, level of experience, level of education) than to a particular individual. Organisational and workplace factors have a greater impact on the occurrence of accidents than individual-related factors. Finally, any theories about accidents that lead to guilt to individuals have a number of negative side effects on safety, such as encouraging individuals to react defensively, which drastically reduces the reporting and sharing of security information. For these reasons, the theory of accident awareness is not a useful concept for safety management. Over time, the idea of blaming workplace behavior on ancestry and entrenched personal defects was found inappropriate, and newer versions of the model replace the markings of the first two dominoes with aspects of planning, job organization and management, or more general management control of the organization's safety factors. This accident investigation theory was later developed by Frank Bird, who healed the supervisor Description. Description. which generalized the last accident domino to cover all losses (lost production, damage to equipment or other property, and not just injuries). InterpretationT's linear accident model is simple and easy to understand. Compared to the very simple analyses common at the time (an accident caused by employee error), it helped managers think and identify underlying cause and effect factors that can affect accidents. Its promise to allow the suspension of the accident period by acting on the underlying cause and effect factors (pulling the dominoes) will help convince people to accept the corrective actions proposed by the accident investigation. However, the model can contribute to the search for the culprits or culprits during the accident period, rather than understanding in detail all the factors that may have contributed to the accident. It encourages an interpretation of occupational safety, where workers are seen as accident generators and not by people who do their best to push imperfect systems as best as possible because of all competing requirements. Criticism The Domino model is now widely considered too simple to be a useful tool for understanding the cause and effect factors of accidents: It leads to an overly simple view of the proportion of human performance in accidents and focus on training and compliance with procedures (including behavioural safety programmes) rather than system design, workload and incentives. It adopts a purely linear and mechanical causation model that is not suitable for complex systems, where accidents are usually caused by many interacting, partly competing and unpredictable factors. (Complex systems fail in complex ways is a useful tagline.) Burnham, John C. 2008. Unfallneigung: Why psychiatrists did not adopt and medicalized it. History of psychiatry 19(3):251–274. [Sci-Hub 🔎] Heinrich and Herbert William. 1931. Prevention of an industrial accident: scientific approach. In New York. McGraw-Hill. Published: 2017-07-01 Last updated: 2017-08-01 Theories about the cause and effect of the accident Chapter 3 Home Part 1: Historical perspective and overview Chapter 3 No frames Version theories of accident Causation Lecture Notes Site Navigation navigation for Theories of Accident Causation Username: Subscriber Status:Free 1. Abdolhamidzadeh B., Hassan C.R.C., Hamid M.D., FarrokhMehr S., Badri N., Rashtchian D. Anatomy on the domino accident: roots, triggers and lessons learned. Process. Saf. Environ, what are you? Product 2012;90:424–429. doi: 10.1016/j.psep.2012.04.003. [CrossRef] [Google Scholar] 2. Fu G., Chen P., Zhao Z., Li R. There's something to do. Process Saf. Prog. 2019 doi: 10.1002/prs.12044. [CrossRef] [Google Scholar] 3. Greenwood M., Woods H.M. Occurrence of industrial accidents in individuals with a specific reference Multiple accidents. Industrial Fatigue Research Board; London, United Kingdom: 1919. Report No 4. [Google Scholar] 4. Heinrich H.W., Petersen D., Roos N.R. Prevention of industrial accident: safety management approach. 5th ton McGraw-Hill Companies; New York, NY, United States: 1980. [Google Scholar] 5. Bird F.E.J., Germain G.L. Practical Loss Management Leadership. International Anti-Defeat Institute; Loganville, GA, U.S.: 1985. [Google Scholar] 6. Bird F.E.J., Germain G.L., Clark D.M. Practical Loss Management Leadership. Det Norske Veritas (U.S.); Duluth, GA, United States: 2003. [Google Scholar] 7. Rasmussen J. Risk management in a dynamic society: Modelling problem. Saf. Sa. 1997;27:183–213. doi: 10.1016/S0925-7535(97)00052-0. [CrossRef] [Google Scholar] 8. Reason J. Human error. Cambridge University Press; New York, NY, United States: 1990. [Google Scholar] 9. Wiegmann D.A., Shappell S.A. Human error approach to aviation accident analysis — human factor analysis and classification system. Ashgate release; Burlington, NJ, U.S.: 2003. [Google Scholar]10. Patterson J.M., Shappell S.A. Operator error and system deficiencies: Analysis of 508 mining accidents and accidents in Queensland, Australia with the help of HFACS. Accid, what are you? Anal:2010;42:1379–1385. doi: 10.1016/j.aap.2010.02.018. No, no, no. [CrossRef] [Google Scholar]11. Leveson N.G. New accident model for designing safer systems. Saf. Sci. 2004;42:237–270. doi: 10.1016/S0925-7535(03)00047-X. [CrossRef] [Google Scholar]12. Leveson N.G. Applies system thinking to analyze and learn from events. Saf. Sa. 2011;49:55–64. doi: 10.1016/j.ssci.2009.12.021. [CrossRef] [Google Scholar]13. Salmon P.M., Cornelissen M., Trotter M.J. Systems-based accident analysis methods: Accimap, HFACS and STAMP comparison. Saf. Sa. 2012;50:1158–1170. doi: 10.1016/j.ssci.2011.11.009. [CrossRef] [Google Scholar]14. Fu G., fan Y., Tong R., Gong Y. General method for causation analysis of accidents (4th edition) J. Accid. 2016;2:7–12. [Google Scholar]15. Fu G., Yin W., Dong J., Di F. Behavioral accident allegation: 24Model and its safety, which is part of the coal mines. J. China Coal Soc. 2013;38:1123–1129. [Google Scholar]16. Fu G., Zhao Z., Hao C., Wu Q. The crash path of a coal mine gas explosion is based on a 24-model: A case study of the Ruizhiyuan gas explosion accident. Processes. 2019;7:1–18. doi: 10.3390/pr7020073. [CrossRef] [Google Scholar]17. Wang J., Zhang J., Zhu K., Zhou L. Spontaneous explosives burn accidents at China's underground coal mine: Causes and Prevention. Process. Saf. Prog. 2016;35:221–227. doi: 10.1002/prs.11816. [CrossRef] [Google Scholar]18. Fu G., Zhou L., Wang J., Shi M. Analysis At dangyang power plant in Hubei, China: Causes and lessons learned. Saf. Sci. 2018;102:134–143. doi: 10.1016/j.ssci.2017.10.010. [CrossRef] [Google Scholar]19. Fu G., G., J., Yan M. Anatomy on Tianjin Port Fire and Explosion: Process and Causes. Process Saf. Prog. 2016;35:216–220. doi: 10.1002/prs.11837. [CrossRef] [Google Scholar]20. Xue Y., Fu G. Modified accident analysis and investigation model for the general aviation sector: emphasis on human and organisational factors. J. Saf, what are you? Res. 2018;67:1–15. doi: 10.1016/j.jsr.2018.09.008. No, no, no. [CrossRef] [Google Scholar]21. Zhang Z., Li H., Gao K., Ding W., Duo W. Study on the behavioral causes of Yichun's 8-24 catastrophic accidents. Saf. Sci. Study. 2016;2:1–5. [Google Scholar]22. Swamp X., Fu G., Wang C., Jia Q. 24 Model App for Eastern Star Ferry Analysis. Pol, Marit. Res. 2017;24:116–122. doi: 10.1515/pomr-2017-0113. [CrossRef] [Google Scholar]23. Zhang H., Gong Y., Fu G. Causes classification and statistical analysis of crashes at construction sites based on the 2-4 model. J. Saf, what are you? Sci. Technol. 2017;13:169–174. [Google Scholar]24. Fu G., Lu B., Chen X. Behavior-based model for managing organizational safety. China Saf. Sci. J. 2005;15:21–27. [Google Scholar]25. Fu G. Safety Management – Behaviour-based approach to accident prevention. Science Press, 2000-2 Beijing, China: 2013. [Google Scholar]26. Broadribb M.P. What have we learned? 25 years after Piper Alpha. Process Saf. Prog. 2015;3:16–23. noi: 10.1002/prs.11691. [CrossRef] [Google Scholar]27. Zhou L. Faults in China's hazardous chemical accident safety system. Chinese Mining and Technology University; Beijing, China: 2018. [Google Scholar]28. Hale A.R. Cultural confusion. Saf. Sa. 2000;34:1–14. doi: 10.1016/S0925-7535(00)00003-5. [CrossRef] [Google Scholar]29. Mearns K., Kirwan B., Reader T.W., Jackson J., Kennedy R., Gordon R. Development of a method used to understand and improve the safety culture of air traffic management. Saf. Sa. 2013;53:123–133. doi: 10.1016/j.ssci.2012.09.001. [CrossRef] [Google Scholar]30. Ma Y. Study on the method of building a corporate safety culture. Chinese Mining and Technology University; Beijing, China: 2017. [Google Scholar]31. Stewart J.M. Runs world-class security. John Wiley & Boys; New York, NY, U.S.: 2002. [Google Scholar]32. Stewart J.M. Kenora pulp paper mill safety change. Professor Saf. 2011;46:34–44. [Google Scholar]33. State Occupational Safety and Health Administration accident investigation report on Qingdao '11-22' oil spills and explosions in the Sinopec Donghuang pipelines. [(see 1 May 2019)]; Available online: . .