SOME NEW CONSTRUCTIONS OF BIVARIATE WEIBULL MODELS

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Abstract. In this article, several approaches are advanced towards the construction of bivariate Weibull models from the consideration of failure behaviors of the components of a two-component system. First, a general method of construction of bivariate life models is developed in the setting of random environmental effects. Some new bivariate Weibull models are derived as special cases and added insights are provided for some of the existing ones. In the course of model formulation in terms of the dependence structure, a new bivariate family of life distributions is constructed so as to incorporate both positive and negative quadrant dependence in the same parametric setting, and a bivariate Weibull model is obtained as a special case. Finally, some distributional properties are presented for a bivariate Weibull model derived from the consideration of random hazards.

Key words and phrases: Bivariate Weibull, bivariate exponential, Weibull minimum, random hazards, quadrant dependence, independence representation, moments.